H 2 M architects + engineers

PROJECT MANUAL

VOLUME 3 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 Middle School – Various Upgrades

250 US – 202, Somers, NY 10589
SED Control #66-21-01-06-0-001-021
Project No. SMSD2507

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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B. Protection of existing equipment, furnishings and buildings.

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1.02 SCHEDULING

A. Schedule Work to coincide with other trades and availability of site and building access.

B. Complete new utility installations prior to connections to existing utilities.

C. Coordinate removal, storage and protection of equipment connected to existing systems scheduled to be re-installed.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 PROTECTION OF EXISTING WORK

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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A. Drawing and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Limited Regulated Building Materials Survey Report performed by Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C. dated November 2, 2026, consisting of 198 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 Middle School
250 Rt. 202
Somers, New York 10589

TUSKERS SOMERS MIDDLE 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. 190150513

LANGAN

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Appendix B Laboratory Results and Chain-of-Custody Documentation (PCB Caulk)
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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 Middle School, at 250 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 #:	101296952
Survey Date(s):	September 24, 28, 29 and 30, 2026
Property Address:	250 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 Middle School	1937 Original Building 1958 Addition 1999 Addition 2006 Addition	3 Levels	Unknown	Unknown

KEY FINDINGS

(For building spaces affected by the planned project activities as identified in June 26 Various Upgrades at Somers Middle 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	Bathrooms - Men's 106F, Faculty 106H	ACM	50 LF	As per AHERA report Quantity is an allowance. May not be affected by scope of work.
Pipe insulation and mud pipe fitting insulation	Rooms 105, 107, 211, 221, 315, 316	ACM	300 LF	As per AHERA report Quantity is an allowance if materials are identified & affected by sink/faucet work
Pipe insulation and mud pipe fitting insulation	Rooms 105, 107, 209, 211, 234, 235, 236, 237, 239, 240, 241, 242, 243, 244, 300, 301, 302, 303, 303A, 304, 305, 306, 311, 313, 314, 315, 316 & 317	ACM	300 LF	As per AHERA report Quantity is an allowance if materials are identified & affected by unit ventilator// fin tube radiator removal

Material	Material Locations	Survey Results	Estimated Quantity	Notes/Comments
Concealed unit ventilator and/or radiator insulations/backings	Rooms 105, 107, 209, 211, 234, 235, 236, 237, 239, 240, 241, 242, 243, 244, 300, 301, 302, 303, 303A, 304, 305, 306, 311, 313, 314, 315, 316 & 317	Assumed ACM	750 LF	Intrusive sampling was omitted due to building occupancy.
Various size and color floor tiles and associated mastic (single layer and multiple layers, exposed or concealed under non-ACM tiles/mastic)	Rooms 105, 107, 211, 235, 237, 239, 240, 241, 242, 243 & 244	ACM	9,625 SF	As per AHERA report and prior sampling.
12-inch tan floor tile (top) and mastic	Classroom 311 - Original Building	ACM	1,050 SF	'As per Langan's survey (March 2026). 'Floor not being replaced. Mentioned only if to be affected by unit ventilator and/or radiator work.
Gray floor tile (bottom) and mastic	Classroom 311 - Original Building	ACM		
Ceramic wall tile grout & concealed wall tile backing, mastic, and setting bed behind ceramic wall tiles	Bathrooms - Men's 106F, Faculty 106H	Assumed ACM	1,300 SF	Intrusive sampling was omitted due to building occupancy.
Mirror Mastic	Bathrooms - Men's 106F, Faculty 106H	Assumed ACM	20 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 - Men's 106F, Faculty 106H	Assumed ACM	215 SF	Intrusive sampling was omitted due to building occupancy.

Material	Material Locations	Survey Results	Estimated Quantity	Notes/Comments
Door core insulation	Basement - Stair 6 & 7 Stair S1-L2, S2-L2. S3-L2, S4-L2, S1-l3, S2-L3, S4-L3 Men's Room 106H, Rooms 209, 210, 211, 213, 214, 215, 220H, 234, 236, 300A, 300C, 300D(2), 300E, 301, 302, 303, 304, 305, 306, 307, 307A, 308, 309, 309A, 309B, 311, 313, 314, 315, 321A	Assumed ACM	1,214 SF	Intrusive sampling was omitted due to building occupancy.
Suspect electrical components within switchboards/panels	Select Building Areas	Assumed ACM	110 SF	Intrusive sampling was omitted due to building occupancy/live electrical MS-ED 101.00 notes 1,3,4 MS-ED 102.00 notes 1 MS-ED 103.00 notes 1 MS-E 105.00 notes A
BUILDING EXTERIORS - ACM/ASSUMED ACM FINDINGS				
Exterior window lintel caulk	Exterior - Original Building	ACM	160 LF	As per Langan's survey. (March 2026) MS-A 200.00 Keynote 7 locations
Concealed window lintel flashing/tar/felt materials	Exterior - Original Building	Assumed ACM	160 SF	Intrusive sampling was omitted due to building occupancy.

Material	Material Locations	Survey Results	Estimated Quantity	Notes/Comments
Exterior window caulk with cladding	Exterior - Original Building	ACM	300 LF	'As per Langan's survey. (March 2026) MS-A 202.00 Keynote 6 MS-A 510.00 Bay Windows
Exterior original window frame and sill caulk (behind cladding)	Exterior - Original Building	ACM		
Multi-layered built-up roofing and roof flashing materials (membrane layers and vapor barrier/tar on roof deck) - Exposed and under EPDM membrane, mechanical equipment flashing, caulks, tars, sealants, and mastics.	For Roof Plans "A" & "B"	Assumed ACM	12,000 SF	Intrusive sampling was omitted due to building occupancy. Includes all materials potentially affected by work on roofs.
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 new fan unit & mechanical installations	Assumed ACM	240 SF	Intrusive sampling was omitted due to building occupancy. MS-MD 119.00 MS-M 113.00, 114.00, 117.00, 118.00,
Concealed waterproofing materials (i.e. tar/felt membrane) associated with removal/installation of unit ventilators	School Building Facades - Rooms 105, 107, 209, 211, 234, 235, 236, 237, 239, 240, 241, 242, 243, 244, 301, 303, 304, 306, 311, 313, 315, 316 & 317	Assumed ACM	230 SF	Intrusive sampling was omitted due to building occupancy.
Concealed waterproofing materials (i.e. tar/felt membrane) associated with thru-wall air intakes and piping	School Building Façades	Assumed ACM	20 SF	Intrusive sampling was omitted due to building occupancy. MS-A 100.00 MS-M 122.00, 123.00
Suspect electrical components within Switchboard "MDP"	Electrical Room 103B	Assumed ACM	20 SF	Instrusive sampling was omitted due to live electrical

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-04.

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 12 assays using an X-Ray Fluorescence (XRF) analyzer to screen the structure to identify lead concentrations in painted surfaces. Of these 12 XRF readings, 5 showed detectable concentrations of lead. Two (2) readings contained lead concentration above 1.0 milligram per square centimeter (1.0 mg/cm^2).

- White paint on exterior wood door frames – Door 4 (tested twice to confirm initial reading)

From prior March 2026 survey:

- White paint on wood window frames – Original building
- Red ceramic wall tile – Boy's locker room and bathrooms, 1999 build

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 were not detected in the samples analyzed.

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 Middle School, at 250 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 Middle School SED Submission drawings set prepared by H2M Architects+Engineers. Building spaces surveyed are depicted in Drawings ASL-01 through ASL-04.

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 Middle School, formally created in 1937, is a part of the Somers Central School District (SCSD). Over several decades, Somers Middle School has undergone significant modernization. Major expansions added classrooms, science labs, art rooms, guidance offices, and a new primary entrance rotunda during late 20th- and early 21st-century capital projects. A large auditorium (approximately 650 seats) and an expanded cafeteria were constructed to support performing arts and schoolwide events. The surveyed Somers Middle School is a public school located at 250 RT. 202, Somers, NY 10589, serving grades 6–8 exclusively, within the Somers Central School District. The school is situated in Westchester County. The three-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 not employed. Langan inventoried, classified, and collected representative bulk samples from suspect homogeneous areas (HAs) and submitted the samples for analysis. HAs are materials that appear similar in color, texture, and date of material application. The condition and approximate location of each identified suspect ACM were documented.

Samples collected were properly packaged in individual plastic bags, sealed; catalogued and chain-of-custody documentation was completed. Laboratory analysis was performed following EPA 600/R-93/116 Method using Polarized Light Microscopy with Dispersion Staining (PLM/DS) which utilizes Visual Area Estimation (VAE) for determining concentrations of asbestos in a sample. Non-friable organically bound (NOB) materials which tested non-ACM via PLM were analyzed using transmission electron microscopy (TEM). Analytical testing was performed in accordance with NYSELAP Methods 198.1 (friable materials), 198.1(NOB), 198.4 (NOB-TEM), and 198.8 (surfacing materials containing vermiculite). Samples were analyzed by 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
- June 2026 Various Upgrades at Somers Middle School Sed Submission drawings set prepared by H2M Architects+Engineers.
- 2026.03.30 Langan Survey

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 24, 28, 29 and 30, 2026, by Langan's Fernando Velasquez, Frank Acciarito 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-04.

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:

- White paint on exterior wood door frames – Door 4
- White paint on wood window frames –Original Building.
- Red ceramic wall tile – Boy's locker room and bathrooms, 1999 build

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 were not detected in the samples analyzed for the building areas impacted by proposed scope of work.

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 delegates 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. People 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 not detected in the caulk samples analyzed for the building areas impacted by proposed scope of work. Therefore, no remedial actions or specific recommendations regarding PCBs in the caulking are necessary.

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. Frank Acciarito. 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



Frank Acciarito
NYSDOL Asbestos Inspector
Cert# 26-6TS1N-SHAB

TABLES

Table 1 - SUMMARY OF ASBESTOS SURVEY FINDINGS
Project "SED RBM @ Somers MS" 250 US-202, Somers, NY 10589

Sample ID	Material	Material Locations	Sampling Results		Estimated Quantity of ACM	Notes/Comments
BUILDING INTERIORS - ACM/ASSUMED ACM FINDINGS						
--	Pipe insulation and mud pipe fitting insulation	Bathrooms - Men's 106F, Faculty 106H	ACM	--	50 LF	As per AHERA report Quantity is an allowance. May not be affected by scope of work.
--	Pipe insulation and mud pipe fitting insulation	Rooms 105, 107, 211, 221, 315, 316	ACM	--	300 LF	As per AHERA report Quantity is an allowance if materials are identified & affected by sink/faucet work
--	Pipe insulation and mud pipe fitting insulation	Rooms 105, 107, 209, 211, 234, 235, 236, 237, 239, 240, 241, 242, 243, 244, 300, 301, 302, 303, 303A, 304, 305, 306, 311, 313, 314, 315, 316 & 317	ACM	--	300 LF	As per AHERA report Quantity is an allowance if materials are identified & affected by unit ventilator// fin tube radiator removal
--	Concealed unit ventilator and/or radiator insulations/backings	Rooms 105, 107, 209, 211, 234, 235, 236, 237, 239, 240, 241, 242, 243, 244, 300, 301, 302, 303, 303A, 304, 305, 306, 311, 313, 314, 315, 316 & 317	Assumed ACM	--	750 SF	Intrusive sampling was omitted due to building occupancy.
--	Various size and color floor tiles and associated mastic (single layer and multiple layers, exposed or concealed under non-ACM tiles/mastic)	Rooms 105, 107, 211, 235, 237, 239, 240, 241, 242, 243 & 244	ACM	--	9,625 SF	As per AHERA report and prior sampling.
OFT-X	12-inch tan floor tile (top) and mastic	Classroom 311 - Original Building	ACM	CHRY 11% CHRY 1.2%	1,050 SF	As per Langan's survey (March 2026). 'Floor not being replaced. Mentioned only if to be affected by unit ventilator and/or radiator work.
OFT-Y	Gray floor tile (bottom) and mastic	Classroom 311 - Original Building	ACM	CHRY 10% CHRY 5.6%		
--	Ceramic wall tile grout & concealed wall tile backing, mastic, and setting bed behind ceramic wall tiles	Bathrooms - Men's 106F, Faculty 106H	Assumed ACM	--	1,300 SF	Intrusive sampling was omitted due to building occupancy.
	Mirror Mastic	Bathrooms - Men's 106F, Faculty 106H	Assumed ACM	--	20 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 - Men's 106F, Faculty 106H	Assumed ACM	--	215 SF	Intrusive sampling was omitted due to building occupancy.
--	Door core insulation	Basement - Stair 6 & 7 Stair S1-L2, S2-L2. S3-L2, S4-L2, S1-l3, S2-L3, S4-L3 Men's Room 106H, Rooms 209, 210, 211, 213, 214, 215, 220H, 234, 236, 300A, 300C, 300D(2), 300E, 301, 302, 303, 304, 305, 306, 307, 307A, 308, 309, 309A, 309B, 311, 313, 314, 315, 321A	Assumed ACM	--	1,214 SF	Intrusive sampling was omitted due to building occupancy.

Table 1 - SUMMARY OF ASBESTOS SURVEY FINDINGS
Project "SED RBM @ Somers MS" 250 US-202, Somers, NY 10589

Sample ID	Material	Material Locations	Sampling Results		Estimated Quantity of ACM	Notes/Comments
	Suspect electrical components within switchboards/panels	Select Building Areas	Assumed ACM	--	110 SF	Intrusive sampling was omitted due to building occupancy/live electrical MS-ED 101.00 notes 1,3,4 MS-ED 102.00 notes 1 MS-ED 103.00 notes 1 MS-E 105.00 notes A
BUILDING EXTERIORS - ACM/ASSUMED ACM FINDINGS						
OWLC-1	Exterior window lintel caulk	Exterior - Original Building	ACM	CHRY 5.8%	160 LF	As per Langan's survey. (March 2026) MS-A 200.00 Keynote 7 locations
--	Concealed window lintel flashing/tar/felt materials	Exterior - Original Building	Assumed ACM	--	160 SF	Intrusive sampling was omitted due to building occupancy.
OWC-1	Exterior window caulk with cladding	Exterior - Original Building	ACM	CHRY 3.1%	300 LF	As per Langan's survey. (March 2026) MS-A 202.00 Keynote 6 MS-A 510.00 Bay Windows
OWSC-1	Exterior original window frame and sill caulk (behind cladding)	Exterior - Original Building	ACM	CHRY 7.6%		
--	Multi-layered built-up roofing and roof flashing materials (membrane layers and vapor barrier/tar on roof deck) - Exposed and under EPDM membrane, mechanical equipment flashing, caulks, tars, sealants, and mastics.	For Roof Plans "A" & "B"	Assumed ACM	--	12,000 SF	Intrusive sampling was omitted due to building occupancy. Includes all materials potentially affected by work on roofs.
--	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 new fan unit & mechanical installations	Assumed ACM	--	240 SF	Intrusive sampling was omitted due to building occupancy. MS-MD 119.00 MS-M 113.00, 114.00, 117.00 & 118.00
--	Concealed waterproofing materials (i.e. tar/felt membrane) associated with removal/installation of unit ventilators	School Building Facades - Rooms 105, 107, 209, 211, 234, 235, 236, 237, 239, 240, 241, 242, 243, 244, 301, 303, 304, 306, 311, 313, 315, 316 & 317	Assumed ACM	--	230 SF	Intrusive sampling was omitted due to building occupancy.
--	Concealed waterproofing materials (i.e. tar/felt membrane) associated with thru-wall air intakes and piping	School Building Façades	Assumed ACM	--	20 SF	Intrusive sampling was omitted due to building occupancy. MS-A 100.00 MS-M 122.00, 123.00
NON-ACM FINDINGS						
FT-1	Gray w/gray spots floor tile and mastic	Throughout Surveyed Areas	Non-ACM	ND		As per current Langan's survey. (2026)
FT-2	Dark green floor tile and mastic	Throughout Surveyed Areas	Non-ACM	ND		As per current Langan's survey. (2026)
FT-3	12 by 12 Beige w/multicolor floor tile and mastic	Throughout Surveyed Areas	Non-ACM	ND		As per current Langan's survey. (2026)
FT-4	Gray w/white spots floor tile and mastic	Room 317	Non-ACM	ND		As per current Langan's survey. (2026)
FT-5	12 by 12 Gray peel and stick floor tile	Room 305	Non-ACM	ND		As per current Langan's survey. (2026)
FT-6	Off-white floor tile and mastic	Bottom layer room 305	Non-ACM	ND		As per current Langan's survey. (2026)

Table 1 - SUMMARY OF ASBESTOS SURVEY FINDINGS
Project "SED RBM @ Somers MS" 250 US-202, Somers, NY 10589

Sample ID	Material	Material Locations	Sampling Results		Estimated Quantity of ACM	Notes/Comments
FT-7	12 by 12 White w/gray floor tile and mastic	Room 303	Non-ACM	ND		As per current Langan's survey. (2026)
FT-8	12 by 12 White w/green streaks floor tile and mastic	Room 302 on Terrazzo	Non-ACM	ND		As per current Langan's survey. (2026)
FT-9	White w/green spots floor tile and mastic	Room 301 on wood	Non-ACM	ND		As per current Langan's survey. (2026)
DSM-1	Red duct seam mastic	Throughout Surveyed Areas	Non-ACM	ND		As per current Langan's survey. (2026)
CT-1	2 by 1 Rough white ceiling tile	Room 105 107 above drop ceiling	Non-ACM	ND		As per current Langan's survey. (2026)
CTGR-1	Ceramic fireplace grout	Room 211	Non-ACM	ND		As per current Langan's survey. (2026)
CTSB-1	Ceramic fireplace setting bed	Room 211	Non-ACM	ND		As per current Langan's survey. (2026)
BB-1	Dark brown cove base and mastic	Throughout Surveyed Areas	Non-ACM	ND		As per current Langan's survey. (2026)
BB-2	Beige cove base and mastic	Throughout Surveyed Areas	Non-ACM	ND		As per current Langan's survey. (2026)
BB-3	Green cove base with mastic	Throughout Surveyed Areas	Non-ACM	ND		As per current Langan's survey. (2026)
BB-4	Gray cove base with mastic	Throughout Surveyed Areas	Non-ACM	ND		As per current Langan's survey. (2026)
BB-5	4" Black cove base and mastic	Throughout Surveyed Areas	Non-ACM	ND		As per current Langan's survey. (2026)
FSC-1	Firestop caulk red	Penthouse	Non-ACM	ND		As per current Langan's survey. (2026)
ESM-1	End seam mastic white	Penthouse	Non-ACM	ND		As per current Langan's survey. (2026)
EJC-1	Expansion joint caulk on wall gray	Main Entrance	Non-ACM	ND		As per current Langan's survey. (2026)
EJC-2	Expansion joint caulk on wall pink	Lobby Entrance	Non-ACM	ND		As per current Langan's survey. (2026)
OWC-1	Original window caulk	Bay Window #2	Non-ACM	ND		As per current Langan's survey. (2026)
CFC-1	Counter Flashing Caulk	Penthouse	Non-ACM	ND		As per current Langan's survey. (2026)
EJC-3	Exterior Joint Caulk	Bay Window #2	Non-ACM	ND		As per current Langan's survey. (2026)
06SR-1	Gypsum wallboard	Section 2006 Throughout	Non-ACM	ND		As per Langan's survey. (March 2026)
06JC-1	Joint compound to gypsum wallboard	Section 2006 Throughout	Non-ACM	ND		As per Langan's survey. (March 2026)
99WP	Wall plaster	Section 1999 Throughout	Non-ACM	ND		As per Langan's survey. (March 2026)
99SR-1	Gypsum wallboard	Section 1999 Throughout	Non-ACM	ND		As per Langan's survey. (March 2026)
99JC-1	Joint compound to gypsum wallboard	Section 1999 Throughout	Non-ACM	ND		As per Langan's survey. (March 2026)
99TW-1	Tectum wall/ceiling panel	Gym - 1999 Section	Non-ACM	ND		As per Langan's survey. (March 2026)
99LC-1	Exterior louver caulk	Mechanical Room 220L - 1999 Section	Non-ACM	ND		As per Langan's survey. (March 2026)
58FP	Sprayed-on fireproofing	Mechanical Room 220L - 1958 Section	Non-ACM ACM	ND		As per Langan's survey. (March 2026)
58SR-1	Gypsum wallboard	Section 1958 Throughout	Non-ACM	ND		As per Langan's survey. (March 2026)
58JC-1	Joint compound to gypsum wallboard	Section 1958 Throughout	Non-ACM	ND		As per Langan's survey. (March 2026)
58CT-1	Ceiling tile (wood particle)	Section 1958 Select Areas	Non-ACM	ND		As per Langan's survey. (March 2026)
58FMA-1	Floor mastic	Mechanical Room 220L - 1958 Section	Non-ACM ACM	ND		As per Langan's survey. (March 2026)

Table 1 - SUMMARY OF ASBESTOS SURVEY FINDINGS
Project "SED RBM @ Somers MS" 250 US-202, Somers, NY 10589

Sample ID	Material	Material Locations	Sampling Results		Estimated Quantity of ACM	Notes/Comments
58DSC-1	Brown duct seam caulk	Select Areas Throughout the School Building	Non-ACM	ND		As per Langan's survey. (March 2026)
OBCP-1	Ceiling plaster (1 Layer) - Rough	Boiler Rooms & Other Select Areas - Original Building	Non-ACM ACM	ND		As per Langan's survey. (March 2026)
OCP	Ceiling plaster (2 Layers)	Original Building Throughout	Non-ACM	ND		As per Langan's survey. (March 2026)
OBWP	Wall plaster (1 layer) - Rough	Boiler Rooms & Other Select Areas - Original Building	Non-ACM	ND		As per Langan's survey. (March 2026)
OJPL	Wall/ceiling plaster (1 layer) - Rough	Storages, Custodian Closets & Other Select Areas - Original Building	Non-ACM	ND		As per Langan's survey. (March 2026)
OWP	Wall plaster (2 layers)	Original Building Throughout	Non-ACM	ND		As per Langan's survey. (March 2026)
OEPL	Exterior wall plaster under windows	Exterior - Original Building	Non-ACM	ND		As per Langan's survey. (March 2026)
OSR-1	Gypsum wallboard	Select Areas - Original Building	Non-ACM	ND		As per Langan's survey. (March 2026)
OJC-1	Joint compound to gypsum wallboard	Select Areas - Original Building	Non-ACM	ND		As per Langan's survey. (March 2026)
OTP	Tectum ceiling panel	Select Areas - Original Building	Non-ACM	ND		As per Langan's survey. (March 2026)
OCD-1	Ceiling deck panel (Roof Deck)	3rd Floor - Original Building	Non-ACM	ND		As per Langan's survey. (March 2026)
OBM-1	Brick mortar	Original Building Throughout	Non-ACM	ND		As per Langan's survey. (March 2026)
OMM-1	CMU mortar	Original Building Throughout	Non-ACM	ND		As per Langan's survey. (March 2026)
OCPP-1	2'x2' white flat ceiling panel	Select Areas Throughout the School Building	Non-ACM	ND		As per Langan's survey. (March 2026)
OCPP-2	2'x4' white grooved ceiling panel	Select Areas Throughout the School Building	Non-ACM	ND		As per Langan's survey. (March 2026)
OCPP-3	2'x2' white grooved ceiling panel	Select Areas Throughout the School Building	Non-ACM	ND		As per Langan's survey. (March 2026)
OCCP-4	2'x4' white rough with pin hole ceiling panel	Select Areas Throughout the School Building	Non-ACM	ND		As per Langan's survey. (March 2026)
99CPP-5	2'x4' white flat ceiling panel	Select Areas Throughout the School Building	Non-ACM	ND		As per Langan's survey. (March 2026)
ODSC-2	Gray duct seam caulk	Roof - Original Building	Non-ACM	ND		As per Langan's survey. (March 2026)
OWM	Wall material behind wood wall panel	Library Media Center 208 - Original Building	Non-ACM	ND		As per Langan's survey. (March 2026)
311WP-1thru 7	Wall plaster (2 layers)	Room 311 , 3rd Floor - Original Building	Non-ACM	ND		As per Langan's survey. (March 2026)
GDW-1	Glue daubs on walls behind gypsum boards	Rooms 213 and 214 series - Offices - 2nd Floor - Original Building	Non-ACM	ND		As per Langan's survey. (March 2026)
--	Wire insulation (exposed and within conduits) associated with fire alarm devices (scheduled for removal)	Throughout the School Building	Non-Suspect	--		Non-suspect vinyl type of wire insulation was observed.

Table 1 - SUMMARY OF ASBESTOS SURVEY FINDINGS

Project "SED RBM @ Somers MS" 250 US-202, Somers, NY 10589

Sample ID	Material	Material Locations	Sampling Results	Estimated Quantity of ACM	Notes/Comments

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 MS" 250 US-202, Somers, NY 10589

Reading ID #	Component	Substrate	Color	Test Location		Total Lead mg/cm^2	Results	Comments
				Floor	Area			
1	Positive Calibration					1.00		
2	Positive Calibration					1.00		
3	Positive Calibration					0.90		
4	Negative Calibration					0.00		
5	Negative Calibration					0.00		
6	Negative Calibration					-0.10		
7	Door Frame	Metal	White	Exterior	Door 3	0.20	LCP	---
8	Window	Metal	White	Exterior	Bay Window #2	0.10	LCP	---
9	Window	Metal	White	Exterior	Bay Window #2	0.10	LCP	---
10	Column	Wood	White	Exterior	Near Door 4	-0.10	NON	---
11	**Door Frame**	**Wood**	**White**	**Exterior**	**Door 4**	**1.80**	**LBP**	**---**
12	**Door Frame**	**Wood**	**White**	**Exterior**	**Door 4**	**16.80**	**LBP**	**---**
13	Foundation	CMU	Red	Exterior	NE Corner on Foundation	0.10	LCP	---
14	Column	Wood	White	Exterior	Near Door 10	-0.10	NON	---
15	Door	Metal	White	Exterior	Maintenance Dept.	0.00	NON	---
16	Door	Metal	Red	Exterior	Door 13	0.10	LCP	---
17	Door	Metal	White	Exterior	Door 13	0.00	NON	---
18	Door Frame	Metal	Red	Exterior	Door 13	0.00	NON	---
19	Baseboard					0.60		Note 1
20	Door					0.70		Note 1
21	Positive Calibration					0.8		
22	Positive Calibration					0.9		
23	Positive Calibration					1		
24	Negative Calibration					-0.1		
25	Negative Calibration					0.1		
26	Negative Calibration					0		
	PREVIOUS XRF SCREENING RESULTS							
1	Positive Calibration					1.00		
2	Positive Calibration					1.00		
3	Positive Calibration					0.90		
4	Negative Calibration					0.00		
5	Negative Calibration					0.00		
6	Negative Calibration					-0.10		
7	Floor	Concrete	Gray	1	103B - Original Building	0.10	LCP	---
8	Baseboard	Concrete	Gray	1	103B - Original Building	0.20	LCP	---
9	Door	Metal	Olive	1	103B - Original Building	0.00	NON	
10	Door Frame	Metal	Olive	1	103B - Original Building	-0.20	NON	
11	Wall	Plaster	Beige	1	Corridor - Original Building	-0.20	NON	---
12	Wall	Plaster	Beige	1	Corridor - Original Building	-0.20	NON	---
13	Wall	Plaster	Olive	1	Corridor - Original Building	-0.20	NON	---
14	Wall	CMU	Beige	1	Corridor - Original Building	-0.10	NON	---
15	Wall	CMU	Olive	1	Corridor - Original Building	-0.30	NON	---
16	Wall	Brick	Beige	1	101 - Original Building	-0.10	NON	---
17	Wall	Gypsum Board	Beige	1	101 - Original Building	-0.10	NON	---
18	Wall	Plaster	Beige	1	103E - Original Building	0.00	NON	---
19	Wall	Glazed Brick	Beige	1	103E - Original Building	-0.10	NON	---
20	Wall	Glazed Brick	Beige	1	103E - Original Building	0.00	NON	---
21	Wall	Plaster	White	1	103E - Original Building	0.40	LCP	---
22	Ceiling	Plaster	White	1	103E - Original Building	0.00	NON	---
23	Ceiling	Plaster	Beige	1	103E - Original Building	0.00	NON	---
24	Floor	Terrazzo	Beige	1	103E - Original Building	0.10	LCP	---
25	Wall	Brick	White	1	103F - Original Building	-0.20	NON	---
26	Wall	Brick	Gray	1	103F - Original Building	-0.40	NON	---
27	Floor	Concrete	Red	1	103F - Original Building	0.50	LCP	---
28	Wall	Concrete	White	1	103I - Original Building	0.20	LCP	---
29	Wall	Plaster	Beige	2	Lobby - Original Building	0.00	NON	---
30	Wall Molding	Wood	Olive	2	Lobby - Original Building	0.00	NON	---
31	Window Panel	Wood	Light Olive	2	Lobby - Original Building	-0.10	NON	---

Table 2 - XRF SCREENING RESULTS

Project "SED RBM @ Somers MS" 250 US-202, Somers, NY 10589

Reading ID #	Component	Substrate	Color	Test Location		Total Lead mg/cm^2	Results	Comments
				Floor	Area			
32	Wall	Plaster	Beige	2	Corridor - Original Building	0.00	NON	---
33	Wall	Glazed Brick	Tan	2	Corridor - Original Building	-0.10	NON	---
34	Wall	Gypsum Board	Blue	2	213A - Original Building	0.10	LCP	---
35	Wall	Gypsum Board	Blue	2	213 - Original Building	0.10	LCP	---
36	**Window Frame**	**Wood**	**White**	**2**	**213E- Original Building**	**13.90**	**LBP**	**---**
37	Radiator Cover	Metal	Blue	2	213E - Original Building	0.40	LCP	---
38	Door Frame	Metal	White	2	213 - Original Building	0.80	LCP	---
39	**Window Frame**	**Wood**	**White**	**2**	**213F- Original Building**	**9.20**	**LBP**	**---**
40	Radiator Cover	Metal	Beige	2	213F - Original Building	0.10	LCP	---
41	Wall	Gypsum Board	Blue	2	213F - Original Building	0.20	LCP	---
42	Wall	Gypsum Board	Beige	2	214 - Original Building	0.10	LCP	---
43	**Window Frame**	**Wood**	**White**	**3**	**316 - Original Building**	**3.30**	**LBP**	**---**
44	Window Sill	Wood	White	3	316 - Original Building	0.00	NON	---
45	Wall	Plaster	Beige	3	316 - Original Building	0.30	LCP	---
46	**Window Frame**	**Wood**	**White**	**3**	**317 - Original Building**	**5.20**	**LBP**	**---**
47	Window Sill	Wood	White	3	317 - Original Building	0.20	LCP	---
48	Wall	Plaster	Beige	3	317 - Original Building	0.10	LCP	---
49	Radiator Cover	Metal	Black	3	317 - Original Building	0.20	LCP	---
50	**Window Frame**	**Wood**	**White**	**3**	**307 - Original Building**	**5.80**	**LBP**	**---**
51	Window Sill	Wood	White	3	307 - Original Building	0.20	LCP	---
52	Wall	Plaster	Gray	3	307 - Original Building	0.40	LCP	---
53	Radiator Cover	Metal	Gray	3	307 - Original Building	0.60	LCP	---
54	Wall	Gypsum Board	Beige	2	Corridor - 1999 Section	0.00	NON	---
55	Wall	Gypsum Board	Olive	2	Corridor - 1999 Section	0.00	NON	---
56	Wall	CMU	Beige	1	105 - 1999 Section	-0.30	NON	---
57	Wall	CMU	Beige	1	105 - 1999 Section	-0.50	NON	---
58	Wall	Gypsum Board	Beige	1	105 - 1999 Section	0.20	LCP	---
59	Wall	Gypsum Board	Beige	1	129 - 1999 Section	0.00	NON	---
60	Wall	Plaster	Green	1	130 - 1999 Section	0.10	LCP	---
61	Wall	Plaster	Green	1	130 - 1999 Section	0.00	NON	---
62	Wall	CMU	Beige	1	106 - 1958 Section	-0.40	NON	---
63	Wall	CMU	Beige	1	106 - 1958 Section	-0.30	NON	---
64	Wall	CMU	Beige	2	244 - 1958 Section	-0.50	NON	---
65	Wall	CMU	Beige	2	244 - 1958 Section	-0.50	NON	---
66	Window Frame	Wood	White	2	236 - 1958 Section	0.00	NON	---
67	Wall	Gypsum Board	Beige	2	236 - 1958 Section	0.10	LCP	---
68	Window Sill	Wood	White	2	236 - 1958 Section	-0.10	NON	---
69	Radiator Cover	Metal	White	2	236 - 1958 Section	0.00	NON	---
70	Positive Calibration					1.00		
71	Positive Calibration					0.90		---
72	Positive Calibration					1.00		
73	Negative Calibration					0.00		
74	Negative Calibration					0.00		---
75	Negative Calibration					0.00		
76	Positive Calibration					1.00		
77	Positive Calibration					1.00		---
78	Positive Calibration					1.00		
79	Negative Calibration					-0.10		
80	Negative Calibration					0.10		---
81	Negative Calibration					-0.10		
82	Wall	Gypsum Board	Beige	1	113L - 1999 Section	0.20	LCP	---
83	Wall	Gypsum Board	Olive	1	113L - 1999 Section	0.20	LCP	---
84	Door	Metal	Beige	1	113L - 1999 Section	0.00	NON	---
85	Door Frame	Metal	Beige	1	113L - 1999 Section	0.00	NON	---
86	Wall	Ceramic Tile	Beige	1	Boys Locker - 1999 Section	0.30	LCP	---
87	**Wall**	**Ceramic Tile**	**Red**	**1**	**Boys Locker - 1999 Section**	**10.50**	**LBP**	**---**

Table 2 - XRF SCREENING RESULTS

Project "SED RBM @ Somers MS" 250 US-202, Somers, NY 10589

Reading ID #	Component	Substrate	Color	Test Location		Total Lead mg/cm^2	Results	Comments
				Floor	Area			
88	**Wall**	**Ceramic Tile**	**Red**	**1**	**Bathroom - 1999 Section**	**12.30**	**LBP**	**---**
89	Floor	Ceramic Tile	Beige	1	Bathroom - 1999 Section	0.00	NON	---
90	Window Frame	Metal	White	1	Boys Locker - 1999 Section	0.00	NON	---
91	Window Sill	Plastic	White	1	Boys Locker - 1999 Section	0.00	NON	---
92	Wall	Gypsum Board	Beige	1	Lobby - 2006 Section	0.10	LCP	---
93	Wall	Glazed Brick	Tan	1	Lobby - 2006 Section	-0.20	NON	---
94	Wall	Gypsum Board	White	1	111 - 2006 Section	0.00	NON	---
95	Window Frame	Wood	Varnish	1	111 - 2006 Section	-0.10	NON	---
96	Window Sill	Wood	Varnish	1	111 - 2006 Section	0.10	LCP	---
97	Radiator	Metal	White	1	111 - 2006 Section	0.10	LCP	---
98	Wall	Gypsum Board	White	1	112A - 2006 Section	0.10	LCP	---
99	Wall	Gypsum Board	White	1	112A - 2006 Section	-0.30	NON	---
100	Wall	CMU	Black	B	4B - 2006 Section	0.20	LCP	---
101	Wall	CMU	Black	B	4B - 2006 Section	-0.20	NON	---
102	Wall	CMU	White	B	4 - 2006 Section	0.30	LCP	---
103	Positive Calibration					0.90		---
104	Positive Calibration					1.00		
105	Positive Calibration					1.00		
106	Negative Calibration					0.20		---
107	Negative Calibration					0.10		
108	Negative Calibration					0.00		

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 MS" 250 US-202, Somers, NY 10589

Material	Sample ID #	Material Location	PCB Type	Results [µg/Kg]//[PPM]	PCB or Non-PCB	Material Estimated Quantity	Comments
Counter flashing caulk	CFC-1A	Penthouse	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			
Counter flashing caulk	CFC-1B	Penthouse	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			
Exterior joint caulk	EJC-1A	Main entrance	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			
Exterior joint caulk	EJC-1B	Main entrance	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			
Exterior joint caulk	EJC-2A	Café entrance	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 MS" 250 US-202, Somers, NY 10589

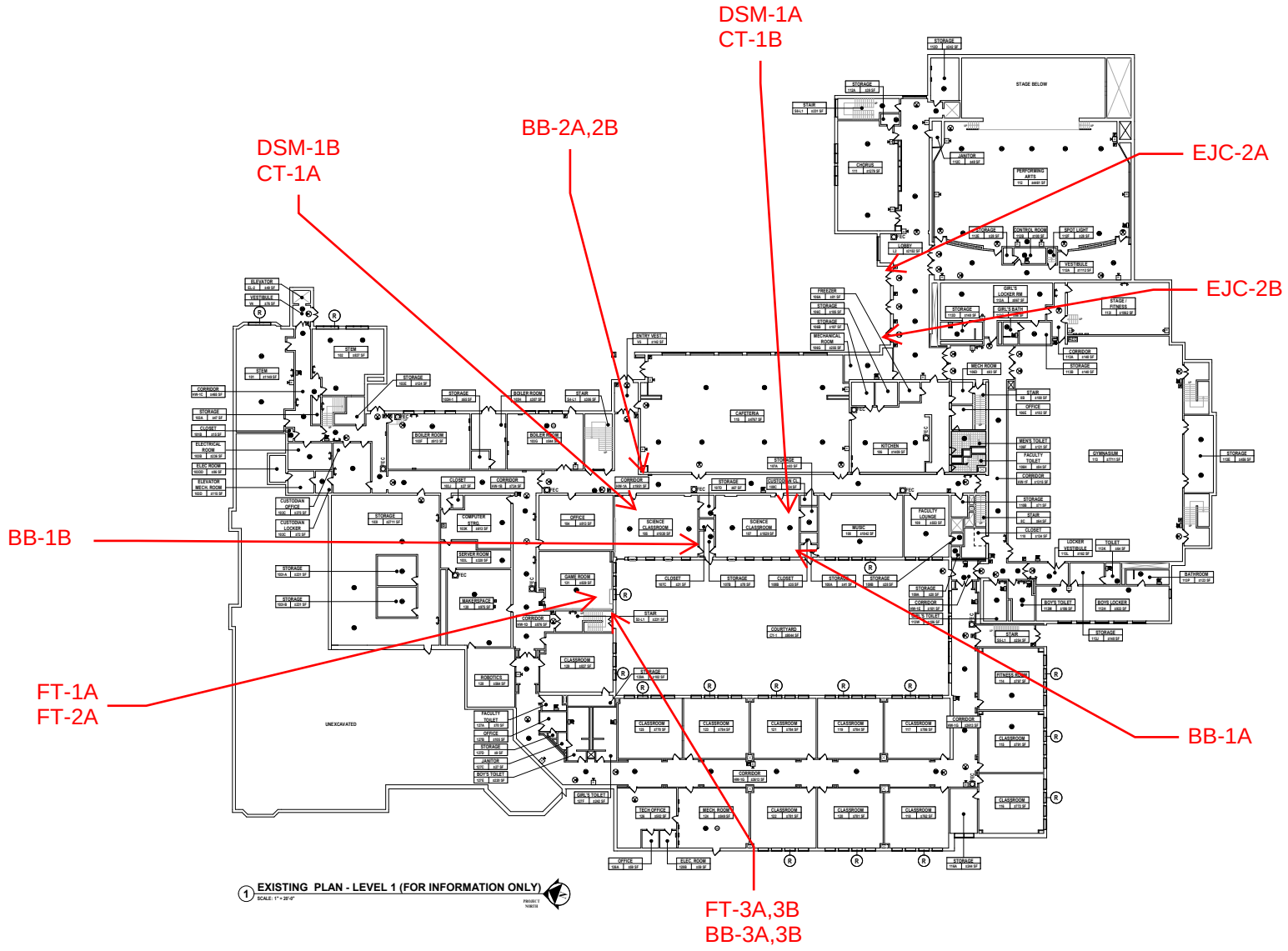
Material	Sample ID #	Material Location	PCB Type	Results [µg/Kg]//[PPM]	PCB or Non-PCB	Material Estimated Quantity	Comments
Exterior joint caulk	EJC-2B	Café entrance	PCB-1016	ND // 0.00	NON-PCB	---	___
			PCB-1221	ND // 0.00			
			PCB-1232	ND // 0.00			
			PCB-1242	ND // 0.00			
			PCB-1248	ND // 0.00			
			PCB-1254	ND // 0.00			
			PCB-1260	ND // 0.00			
			PCB-1262	ND // 0.00			
			PCB-1268	ND // 0.00			
Original window caulk	OWC-2A	Bay window #2	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			
Original window caulk	OWC-2B	Bay window #2	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			
Firestop caulk red	FSC-1A	Penthouse	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			
Firestop caulk red	FSC-1B	Penthouse	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 MS" 250 US-202, Somers, NY 10589

Material	Sample ID #	Material Location	PCB Type	Results [µg/Kg]//[PPM]	PCB or Non-PCB	Material Estimated Quantity	Comments
Exterior joint caulk	EJC-3A	Bay window #2	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			
Exterior joint caulk	EJC-3B	Bay window #2	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**

FIGURES



GENERAL NOTES:

A. THIS PLAN IS PROVIDED TO SHOW APPROXIMATE SAMPLING LOCATIONS. THE ACTUAL LAYOUT OF THE BUILDING AND BUILDING EQUIPMENT MAY BE SLIGHTLY DIFFERENT THAN SHOWN.

LANGAN
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NJ Certificate of Authorization No.24GA27996400

Project
SED RBM @ Somers MS

250 US-202
Somers, NY

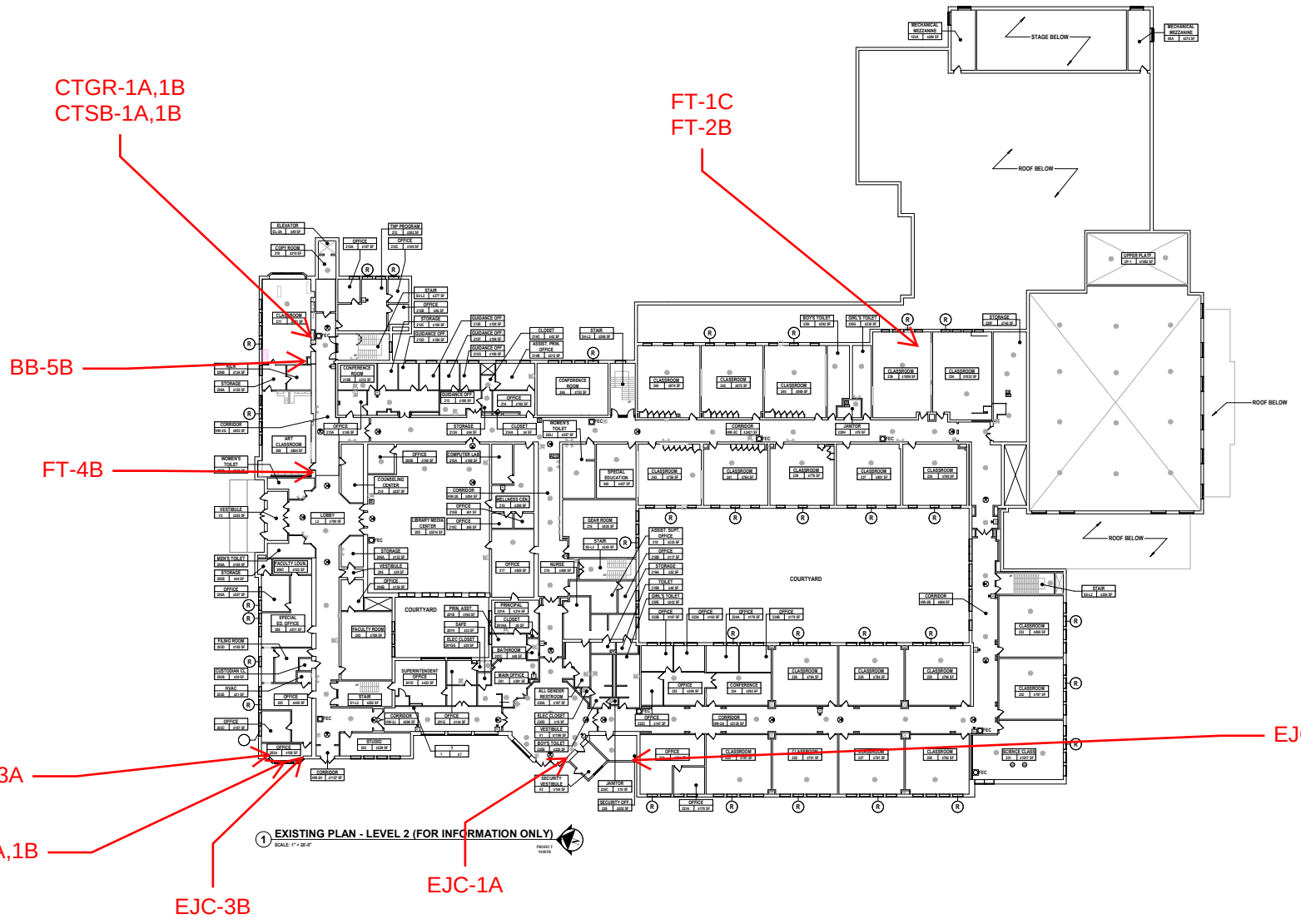
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ASBESTOS SAMPLING LOCATIONS

Project No.	190150513
Date	10/28/2026
Drawn By	M. Benson
Checked By	C. Napolitano

Drawing No.
ASL-01

Sheet 1 of 4

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NJ Certificate of Authorization No.24GA27996400

Project
SED RBM @ Somers MS

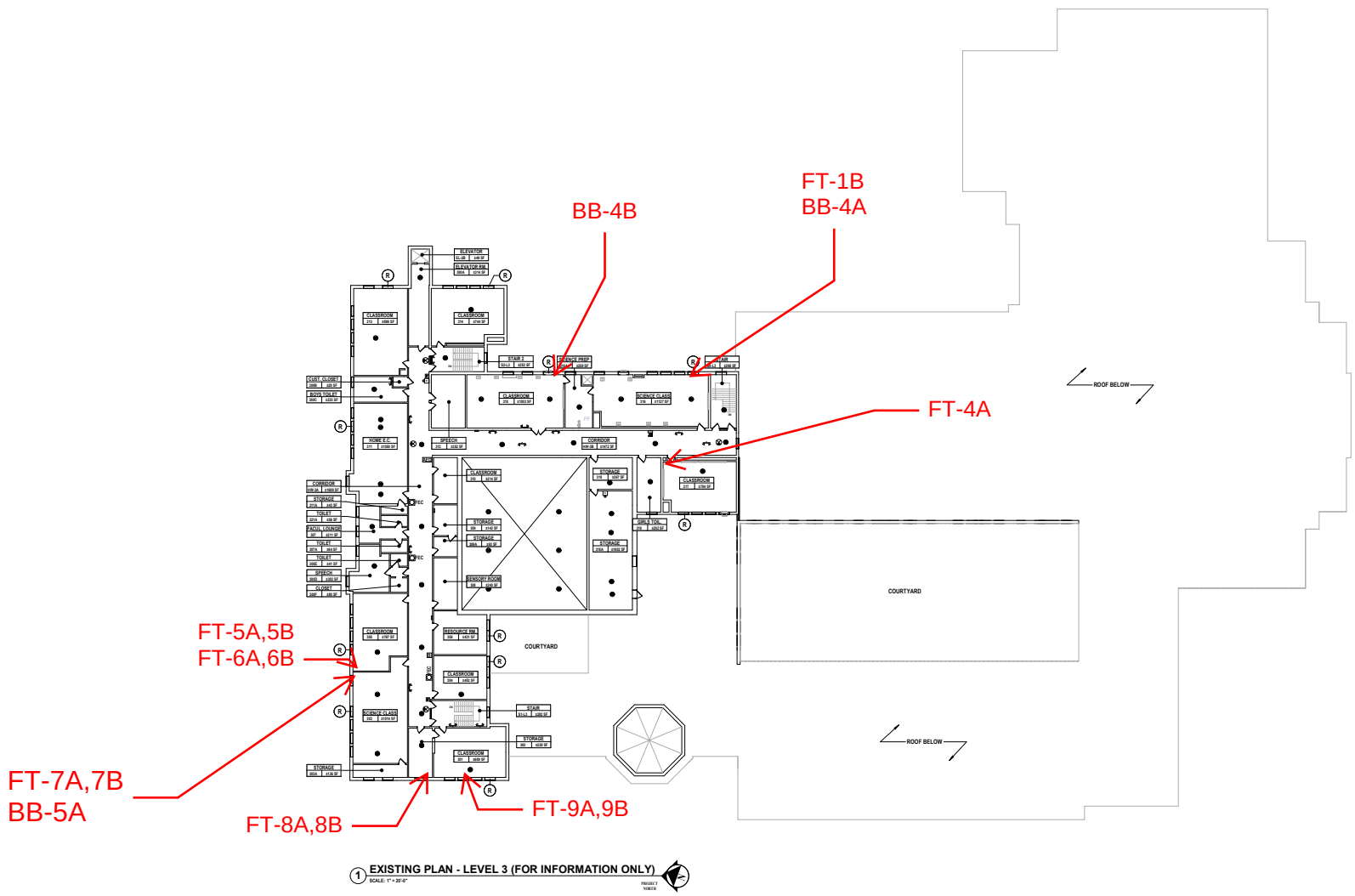
250 US-202
Somers, NY

Drawing Title
ASBESTOS SAMPLING LOCATIONS

Project No. 190150513
Date 10/28/2026
Drawn By M. Benson
Checked By C. Napolitano

Drawing No. ASL-02
Sheet 2 of 4

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NJ Certificate of Authorization No.24GA27996400

Project
SED RBM @ Somers MS

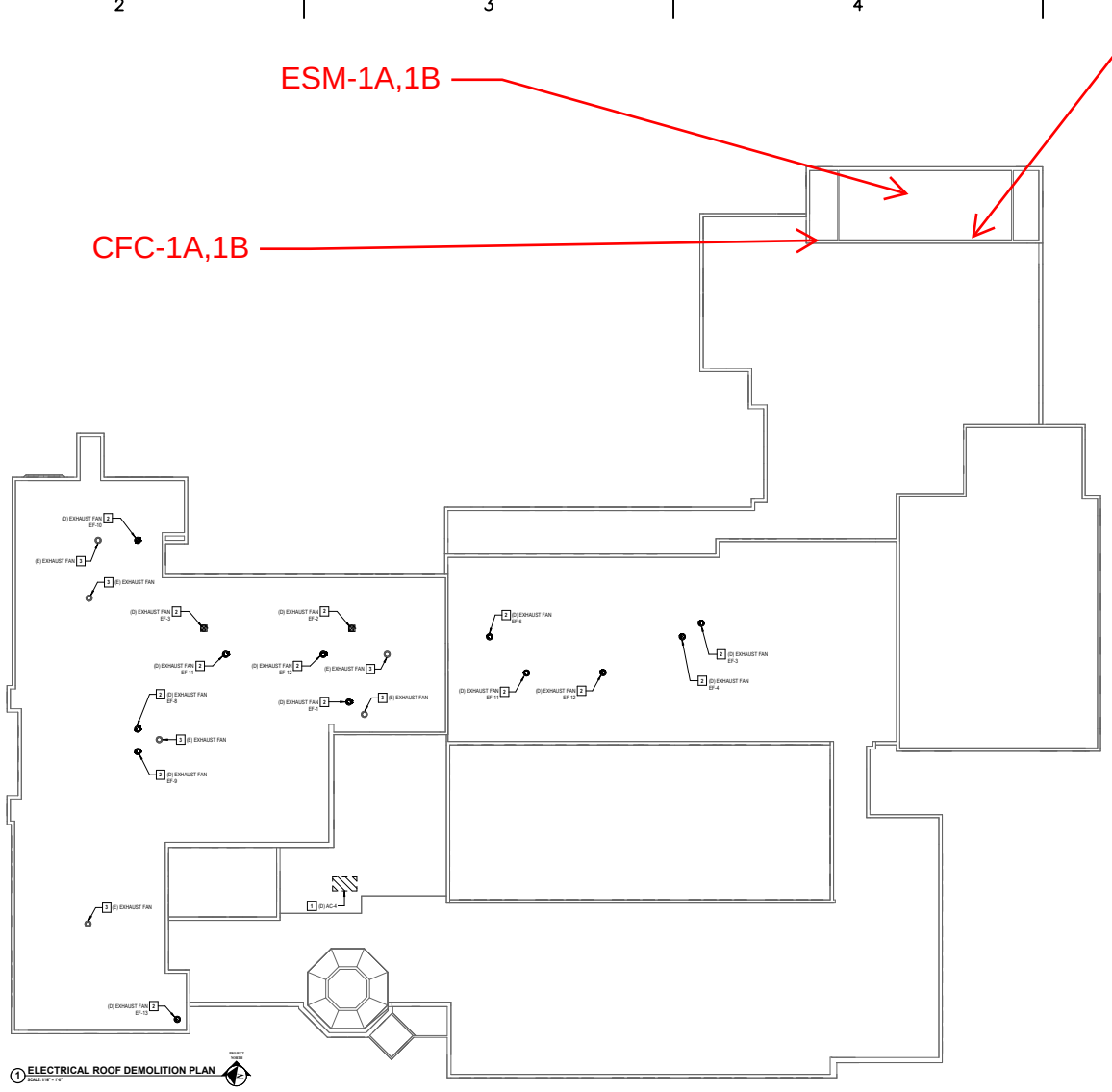
250 US-202
Somers, NY

Drawing Title
ASBESTOS SAMPLING LOCATIONS

Project No. 190150513
Date 10/28/2026
Drawn By M. Benson
Checked By C. Napolitano

Drawing No. ASL-03
Sheet 3 of 4

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GENERAL NOTES:

A. THIS PLAN IS PROVIDED TO SHOW APPROXIMATE SAMPLING LOCATIONS. THE ACTUAL LAYOUT OF THE BUILDING AND BUILDING EQUIPMENT MAY BE SLIGHTLY DIFFERENT THAN SHOWN.

LANGAN
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NJ Certificate of Authorization No.24GA27996400

Project
SED RBM @ Somers MS

250 US-202
Somers, NY

Drawing Title
ASBESTOS SAMPLING LOCATIONS

Project No. 190150513
Date 10/28/2026
Drawn By M. Benson
Checked By C. Napolitano

Drawing No. ASL-04
Sheet 4 of 4

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A P P E N D I X A

Laboratory Test Results and Chain of Custody Documentations (Asbestos)

Atlas Environmental Lab, Corp.
255 West 36th Street, Suite# 1503
New York, NY 10018
Phone:(212) 563-0400 Fax:(212) 563-0401
www.atlasenvironmentallab.com

Bulk Asbestos Report by PLM-TEM

Client: Langan
Collected by: Client
Project Name/No.: Somers Middle School / 190150513
Project Address: 250 US 202 East, Somers, NY
Work Area:

Lab ID: BK1026033
Date Received: 10/2/2026
PLM Date Analyzed: 10/5/2026
TEM Date Analyzed: 10/7/2026
Report Date: 10/7/2026

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
FT-1A	BK1026033-1A	Gray w/Grey Spots Floor Tile and Mastic | 131	Grey, Homogeneous, Non-Fibrous	12.8	42.7	44.6	0%	100%	**NAD** Inconclusive	**NAD**		X	X
FT-1A	BK1026033-1B	Gray w/Grey Spots Floor Tile and Mastic | 131	Black, Homogeneous, Non-Fibrous	29.1	2.7	68.1	0%	100%	**NAD** Inconclusive	**NAD**		X	X
FT-1B	BK1026033-2A	Gray w/Grey Spots Floor Tile and Mastic | 316	Grey, Homogeneous, Non-Fibrous	12.9	3.8	83.3	0%	100%	**NAD** Inconclusive	**NAD**		X	X
FT-1B	BK1026033-2B	Gray w/Grey Spots Floor Tile and Mastic | 316	Black, Homogeneous, Non-Fibrous	57.0	12.4	30.6	0%	100%	**NAD** Inconclusive	**NAD**		X	X
FT-1C	BK1026033-3A	Gray w/Grey Spots Floor Tile and Mastic | 236	Grey, Homogeneous, Non-Fibrous	13.4	4.4	82.2	0%	100%	**NAD** Inconclusive	**NAD**		X	X
FT-1C	BK1026033-3B	Gray w/Grey Spots Floor Tile and Mastic | 236	Black, Homogeneous, Non-Fibrous	31.7	10.7	57.7	0%	100%	**NAD** Inconclusive	**NAD**		X	X
FT-2A	BK1026033-4A	Dark Green Floor Tile and Mastic | 131	Dark Green, Homogeneous, Non-Fibrous	13.1	4.7	82.1	0%	100%	**NAD** Inconclusive	**NAD**		X	X
FT-2A	BK1026033-4B	Dark Green Floor Tile and Mastic | 131	Brown, Homogeneous, Non-Fibrous	31.1	28.6	40.4	0%	100%	**NAD** Inconclusive	**NAD**		X	X
FT-2B	BK1026033-5A	Dark Green Floor Tile and Mastic | 236	Dark Green, Homogeneous, Non-Fibrous	12.7	18.0	69.3	0%	100%	**NAD** Inconclusive	**NAD**		X	X
FT-2B	BK1026033-5B	Dark Green Floor Tile and Mastic | 236	Brown, Homogeneous, Non-Fibrous	29.6	25.3	45.1	0%	100%	**NAD** Inconclusive	**NAD**		X	X

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							Fibrous%	Non Fibrous%	Asbestos% &Type	Asbestos% &Type	PLM 198.1	PLM NOB 198.6	TEM 198.4
FT-3A	BK1026033-6A	12 by 12 Beige w/Multicolor Floor Tile and Mastic | 131 Hallway	Beige, Homogeneous, Non-Fibrous	14.3	3.0	82.7	0%	100%	**NAD** Inconclusive	**NAD**		X	X
FT-3A	BK1026033-6B	12 by 12 Beige w/Multicolor Floor Tile and Mastic | 131 Hallway	Grey, Homogeneous, Non-Fibrous	24.0	12.7	63.3	0%	100%	**NAD** Inconclusive	**NAD**		X	X
FT-3B	BK1026033-7A	12 by 12 Beige w/Multicolor Floor Tile and Mastic | 131 Hallway	Beige, Homogeneous, Non-Fibrous	12.6	2.5	85.0	0%	100%	**NAD** Inconclusive	**NAD**		X	X
FT-3B	BK1026033-7B	12 by 12 Beige w/Multicolor Floor Tile and Mastic | 131 Hallway	Grey, Homogeneous, Non-Fibrous	20.5	12.5	67.0	0%	100%	**NAD** Inconclusive	**NAD**		X	X
FT-4A	BK1026033-8A	Grey w/White Spots Floor Tile and Mastic | 317	Grey, Homogeneous, Non-Fibrous	19.4	44.9	35.7	0%	100%	**NAD** Inconclusive	**NAD**		X	X
FT-4A	BK1026033-8B	Grey w/White Spots Floor Tile and Mastic | 317	Yellow, Homogeneous, Non-Fibrous	61.3	20.9	17.8	0%	100%	**NAD** Inconclusive	**NAD**		X	X
FT-4B	BK1026033-9A	Grey w/White Spots Floor Tile and Mastic | 209	Grey, Homogeneous, Non-Fibrous	21.8	42.1	36.1	0%	100%	**NAD** Inconclusive	**NAD**		X	X
FT-4B	BK1026033-9B	Grey w/White Spots Floor Tile and Mastic | 209	Yellow, Homogeneous, Non-Fibrous	54.3	17.8	27.9	0%	100%	**NAD** Inconclusive	**NAD**		X	X
FT-5A	BK1026033-10	12 by 12 Grey Peel and Stick Floor Tile | 305	Grey/Black, Homogeneous, Non-Fibrous	32.8	3.8	63.4	0%	100%	**NAD** Inconclusive	**NAD**		X	X
FT-5B	BK1026033-11	12 by 12 Grey Peel and Stick Floor Tile | 305	Grey/Black, Homogeneous, Non-Fibrous	38.6	1.8	59.6	0%	100%	**NAD** Inconclusive	**NAD**		X	X

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							Fibrous%	Non Fibrous%	Asbestos% &Type	Asbestos% &Type	PLM 198.1	PLM NOB 198.6	TEM 198.4
FT-6A	BK1026033-12A	Off-White Floor Tile and Mastic | Bottom Layer Room 305	Off-White, Homogeneous, Non-Fibrous	15.8	8.1	76.1	0%	100%	**NAD** Inconclusive	**NAD**		X	X
FT-6A	BK1026033-12B	Off-White Floor Tile and Mastic | Bottom Layer Room 305	Yellow, Homogeneous, Non-Fibrous	28.6	7.2	64.2	0%	100%	**NAD** Inconclusive	**NAD**		X	X
FT-6B	BK1026033-13A	Off-White Floor Tile and Mastic | Bottom Layer Room 305	Off-White, Homogeneous, Non-Fibrous	14.2	1.1	84.7	0%	100%	**NAD** Inconclusive	**NAD**		X	X
FT-6B	BK1026033-13B	Off-White Floor Tile and Mastic | Bottom Layer Room 305	Yellow, Homogeneous, Non-Fibrous	41.1	10.4	48.6	0%	100%	**NAD** Inconclusive	**NAD**		X	X
FT-7A	BK1026033-14A	12 by 12 White w/Grey Floor Tile and Mastic | 303	White, Homogeneous, Non-Fibrous	25.9	13.7	60.5	0%	100%	**NAD** Inconclusive	**NAD**		X	X
FT-7A	BK1026033-14B	12 by 12 White w/Grey Floor Tile and Mastic | 303	Black, Homogeneous, Non-Fibrous	22.8	49.6	27.6	0%	100%	**NAD** Inconclusive	**NAD**		X	X
FT-7B	BK1026033-15A	12 by 12 White w/Grey Floor Tile and Mastic | 303	White, Homogeneous, Non-Fibrous	24.9	14.6	60.5	0%	100%	**NAD** Inconclusive	**NAD**		X	X
FT-7B	BK1026033-15B	12 by 12 White w/Grey Floor Tile and Mastic | 303	Black, Homogeneous, Non-Fibrous	60.2	28.4	11.4	0%	100%	**NAD** Inconclusive	**NAD**		X	X
FT-8A	BK1026033-16A	12 by 12 White with Green Streaks Floor Tile and Mastic | 302 on Terrazzo	White/Light Blue, Homogeneous, Non-Fibrous	25.5	24.5	50.0	0%	100%	**NAD** Inconclusive	**NAD**		X	X
FT-8A	BK1026033-16B	12 by 12 White with Green Streaks Floor Tile and Mastic | 302 on Terrazzo	Black, Homogeneous, Non-Fibrous	69.4	21.2	9.4	0%	100%	**NAD** Inconclusive	**NAD**		X	X

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							Fibrous%	Non Fibrous%	Asbestos% &Type	Asbestos% &Type	PLM 198.1	PLM NOB 198.6	TEM 198.4
FT-8B	BK1026033-17A	12 by 12 White with Green Streaks Floor Tile and Mastic | 302 on Terrazzo	White/Light Blue, Homogeneous, Non-Fibrous	27.7	23.2	49.1	0%	100%	**NAD** Inconclusive	**NAD**		X	X
FT-8B	BK1026033-17B	12 by 12 White with Green Streaks Floor Tile and Mastic | 302 on Terrazzo	Black, Homogeneous, Non-Fibrous	37.3	29.6	33.1	0%	100%	**NAD** Inconclusive	**NAD**		X	X
FT-9A	BK1026033-18A	White w/Green Spots Floor Tile and Mastic | 301 on Wood	White/Green, Homogeneous, Non-Fibrous	15.7	1.3	83.0	0%	100%	**NAD** Inconclusive	**NAD**		X	X
FT-9A	BK1026033-18B	White w/Green Spots Floor Tile and Mastic | 301 on Wood	Black, Homogeneous, Non-Fibrous	43.3	31.7	25.0	0%	100%	**NAD** Inconclusive	**NAD**		X	X
FT-9B	BK1026033-19A	White w/Green Spots Floor Tile and Mastic | 301 on Wood	White/Green, Homogeneous, Non-Fibrous	14.9	30.1	55.1	0%	100%	**NAD** Inconclusive	**NAD**		X	X
FT-9B	BK1026033-19B	White w/Green Spots Floor Tile and Mastic | 301 on Wood	Black, Homogeneous, Non-Fibrous	39.5	42.2	18.3	0%	100%	**NAD** Inconclusive	**NAD**		X	X
DSM-1A	BK1026033-20	Red Duct Seam Mastic | 107	Brown, Homogeneous, Non-Fibrous	61.8	11.7	26.5	0%	100%	**NAD** Inconclusive	**NAD**		X	X
DSM-1B	BK1026033-21	Red Duct Seam Mastic | 105	Brown, Homogeneous, Non-Fibrous	62.6	8.2	29.2	0%	100%	**NAD** Inconclusive	**NAD**		X	X
CT-1A	BK1026033-22	2 by 1 Rough White Ceiling Tile | 107 Above Drop Ceiling	Brown, Homogeneous, Non-Fibrous	92.1	6.8	1.0	0%	100%	**NAD** Inconclusive	**NAD**		X	X
CT-1B	BK1026033-23	2 by 1 Rough White Ceiling Tile | 105 Above Drop Ceiling	Brown, Homogeneous, Non-Fibrous	82.2	1.2	16.6	0%	100%	**NAD** Inconclusive	**NAD**		X	X

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							Fibrous%	Non Fibrous%	Asbestos% &Type	Asbestos% &Type	PLM 198.1	PLM NOB 198.6	TEM 198.4
CTGR-1A	BK1026033-24	Ceramic Fireplace Grout | 211	Light Grey, Homogeneous, Friable	Not Applicable			0%	100%	**NAD**		**X**		
CTGR-1B	BK1026033-25	Ceramic Fireplace Grout | 211	Light Grey, Homogeneous, Friable	Not Applicable			0%	100%	**NAD**		**X**		
CTSB-1A	BK1026033-26	Ceramic Fireplace Setting Bed | 211	Light Grey, Homogeneous, Friable	Not Applicable			0%	100%	**NAD**		**X**		
CTSB-1B	BK1026033-27	Ceramic Fireplace Setting Bed | 211	Light Grey, Homogeneous, Friable	Not Applicable			0%	100%	**NAD**		**X**		
BB-1A	BK1026033-28A	Dark Brown Cove Base with Mastic | 107	Black, Homogeneous, Non-Fibrous	43.7	54.3	1.9	0%	100%	**NAD** Inconclusive	**NAD**		**X**	**X**
BB-1A	BK1026033-28B	Dark Brown Cove Base with Mastic | 107	Brown, Homogeneous, Non-Fibrous	32.4	31.9	35.6	0%	100%	**NAD** Inconclusive	**NAD**		**X**	**X**
BB-1B	BK1026033-29A	Dark Brown Cove Base with Mastic | 105	Black, Homogeneous, Non-Fibrous	43.8	47.7	8.5	0%	100%	**NAD** Inconclusive	**NAD**		**X**	**X**
BB-1B	BK1026033-29B	Dark Brown Cove Base with Mastic | 105	Brown, Homogeneous, Non-Fibrous	38.1	32.0	29.9	0%	100%	**NAD** Inconclusive	**NAD**		**X**	**X**
BB-2A	BK1026033-30A	Beige Cove Base with Mastic | HW-1A	Brown, Homogeneous, Non-Fibrous	41.3	46.7	12.1	0%	100%	**NAD** Inconclusive	**NAD**		**X**	**X**
BB-2A	BK1026033-30B	Beige Cove Base with Mastic | HW-1A	Tan, Homogeneous, Non-Fibrous	43.0	32.3	24.7	0%	100%	**NAD** Inconclusive	**NAD**		**X**	**X**

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							Fibrous%	Non Fibrous%	Asbestos% &Type	Asbestos% &Type	PLM 198.1	PLM NOB 198.6	TEM 198.4
BB-2B	BK1026033-31A	Beige Cove Base with Mastic | HW-1A	Brown, Homogeneous, Non-Fibrous	41.0	29.2	29.8	0%	100%	**NAD** Inconclusive	**NAD**		X	X
BB-2B	BK1026033-31B	Beige Cove Base with Mastic | HW-1A	Tan, Homogeneous, Non-Fibrous	36.7	43.9	19.4	0%	100%	**NAD** Inconclusive	**NAD**		X	X
BB-3A	BK1026033-32A	Green Cove Base with Mastic | 131 Hallway	Green, Homogeneous, Non-Fibrous	53.5	11.2	35.3	0%	100%	**NAD** Inconclusive	**NAD**		X	X
BB-3A	BK1026033-32B	Green Cove Base with Mastic | 131 Hallway	Tan, Homogeneous, Non-Fibrous	39.5	21.5	39.0	0%	100%	**NAD** Inconclusive	**NAD**		X	X
BB-3B	BK1026033-33A	Green Cove Base with Mastic | 131 Hallway	Green, Homogeneous, Non-Fibrous	42.4	38.5	19.0	0%	100%	**NAD** Inconclusive	**NAD**		X	X
BB-3B	BK1026033-33B	Green Cove Base with Mastic | 131 Hallway	Tan, Homogeneous, Non-Fibrous	40.7	49.2	10.1	0%	100%	**NAD** Inconclusive	**NAD**		X	X
BB-4A	BK1026033-34A	Grey Cove Base with Mastic | 316	Grey, Homogeneous, Non-Fibrous	32.0	5.1	62.9	0%	100%	**NAD** Inconclusive	**NAD**		X	X
BB-4A	BK1026033-34B	Grey Cove Base with Mastic | 316	Tan, Homogeneous, Non-Fibrous	43.6	48.5	7.9	0%	100%	**NAD** Inconclusive	**NAD**		X	X
BB-4B	BK1026033-35A	Grey Cove Base with Mastic | 315	Grey, Homogeneous, Non-Fibrous	37.5	25.7	36.8	0%	100%	**NAD** Inconclusive	**NAD**		X	X
BB-4B	BK1026033-35B	Grey Cove Base with Mastic | 315	Tan, Homogeneous, Non-Fibrous	41.7	7.6	50.7	0%	100%	**NAD** Inconclusive	**NAD**		X	X

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BB-5A	BK1026033-36A	4" Black Cove Base with Mastic | 303	Black, Homogeneous, Non-Fibrous	40.5	40.5	19.0	0%	100%	**NAD** Inconclusive	**NAD**		X	X
BB-5A	BK1026033-36B	4" Black Cove Base with Mastic | 303	Tan, Homogeneous, Non-Fibrous	40.6	40.1	19.4	0%	100%	**NAD** Inconclusive	**NAD**		X	X
BB-5B	BK1026033-37A	4" Black Cove Base with Mastic | 211	Black, Homogeneous, Non-Fibrous	25.3	2.8	71.8	0%	100%	**NAD** Inconclusive	**NAD**		X	X
BB-5B	BK1026033-37B	4" Black Cove Base with Mastic | 211	Tan, Homogeneous, Non-Fibrous	42.3	15.5	42.2	0%	100%	**NAD** Inconclusive	**NAD**		X	X
FSC-1A	BK1026033-38	Firestop Caulk Red | Penthouse	Red, Homogeneous, Non-Fibrous	45.3	19.6	35.1	0%	100%	**NAD** Inconclusive	**NAD**		X	X
FSC-1B	BK1026033-39	Firestop Caulk Red | Penthouse	Red, Homogeneous, Non-Fibrous	47.8	22.5	29.8	0%	100%	**NAD** Inconclusive	**NAD**		X	X
ESM-1A	BK1026033-40	End Seam Mastic White | Penthouse	White, Homogeneous, Non-Fibrous	40.8	51.3	7.9	0%	100%	**NAD** Inconclusive	**NAD**		X	X
ESM-1B	BK1026033-41	End Seam Mastic White | Penthouse	White, Homogeneous, Non-Fibrous	40.6	49.9	9.5	0%	100%	**NAD** Inconclusive	**NAD**		X	X
EJC-1A	BK1026033-42	Expansion Joint Caulk on Wall Grey | Main Entrance	Light Grey, Homogeneous, Non-Fibrous	59.4	2.7	37.8	0%	100%	**NAD** Inconclusive	**NAD**		X	X
EJC-1B	BK1026033-43	Expansion Joint Caulk on Wall Grey | Main Entrance	Light Grey, Homogeneous, Non-Fibrous	55.8	3.9	40.4	0%	100%	**NAD** Inconclusive	**NAD**		X	X

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EJC-2A	BK1026033-44	Expansion Joint Caulk on Wall Pink | Lobby Entrance	Dark Pink, Homogeneous, Non-Fibrous	82.3	1.0	16.7	0%	100%	**NAD** Inconclusive	**NAD**		X	X
EJC-2B	BK1026033-45	Expansion Joint Caulk on Wall Pink | Lobby Entrance	Dark Pink, Homogeneous, Non-Fibrous	82.5	1.6	15.8	0%	100%	**NAD** Inconclusive	**NAD**		X	X
OWC-1A	BK1026033-46	Original Window Caulk | Bay Window #2	Off-White, Homogeneous, Non-Fibrous	23.4	5.3	71.2	0%	100%	**NAD** Inconclusive	**NAD**		X	X
OWC-1B	BK1026033-47	Original Window Caulk | Bay Window #2	Off-White, Homogeneous, Non-Fibrous	23.2	13.0	63.8	0%	100%	**NAD** Inconclusive	**NAD**		X	X
CFC-1A	BK1026033-48	Counter Flashing Caulk | Penthouse	Red, Homogeneous, Non-Fibrous	45.2	20.8	34.0	0%	100%	**NAD** Inconclusive	**NAD**		X	X
CFC-1B	BK1026033-49	Counter Flashing Caulk | Penthouse	Red, Homogeneous, Non-Fibrous	45.9	21.9	32.2	0%	100%	**NAD** Inconclusive	**NAD**		X	X
EJC-3A	BK1026033-50	Exterior Joint Caulk | Bay Window #2	Grey, Homogeneous, Non-Fibrous	24.9	5.7	69.4	0%	100%	**NAD** Inconclusive	**NAD**		X	X
EJC-3B	BK1026033-51	Exterior Joint Caulk | Bay Window #2	Grey, Homogeneous, Non-Fibrous	25.1	7.8	67.1	0%	100%	**NAD** Inconclusive	**NAD**		X	X

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. AO/ TC

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 uncertainty 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: KH TEM Analyst: MB Approved by:

LANGAN

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

CHAIN OF CUSTODY RECORD / ANALYSIS REQUEST

BK 1026033

Project Name:	SOMERS MIDDLE SCHOOL		
Address:	250 US 202 East, Somers NY	Auth. By:	Craig Napolitano
		Phone No:	646-210-6500
Langan Job No.:	190150513	Sampling Date:	
Sampled By/License #:	MIKE BENSON 26-61OUA-SHAB		

			Analysis Requested for Asbestos			Analysis Requested for Lead		Analysis Requested for PCB	
Sample ID Number	Description of Sample	Sample Location	PLM	PLM-NOB	TEM	AAS	TCLP	EPA Method 8082	Results
FT-1A	GRAY W/ GRAY SPOTS FLOOR TILE AND MASTIC	131		X	X				
FT-1B	GRAY W/ GRAY SPOTS FLOOR TILE AND MASTIC	316		X	X				
FT-1C	GRAY W/ GRAY SPOTS FLOOR TILE AND MASTIC	236		X	X				
FT-2A	DARK GREEN FLOOR TILE AND MASTIC	131		X	X				
FT-2B	DARK GREEN FLOOR TILE AND MASTIC	236		X	X				
FT-3A	12 BY 12 BEIGE W/MULTICOLOR FLOOR TILE AND MASTIC	131 HALLWAY		X	X				
FT-3B	12 BY 12 BEIGE W/MULTICOLOR FLOOR TILE AND MASTIC	131 HALLWAY		X	X				
FT-4A	GRAY W/WHITE SPOTS FLOOR TILE AND MASTIC	317		X	X				
FT-4B	GRAY W/WHITE SPOTS FLOOR TILE AND MASTIC	209		X	X				
FT-5A	12 BY 12 GRAY PEEL AND STICK FLOOR TILE	305		X	X				
FT-5B	12 BY 12 GRAY PEEL AND STICK FLOOR TILE	305		X	X				
FT-6A	OFF WHITE FLOOR TILE AND MASTIC	BOTTOM LAYER ROOM 305		X	X				

Total No. of Samples:

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: 9/30/26	Time: VIA FED EX	Received by: Amirai Hinde	Date: 10/2/26	Time: 9:52
Relinquished By:	Date:	Time:	Received by:	Date:	Time:
Relinquished By:	Date:	Time:	Received by:	Date:	Time:

NOTES:

KAYA HAMILTON Kaya Hamilton 10/5/26 2:30pm

TEM: MDaf 10.7.26

LANGAN

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

CHAIN OF CUSTODY RECORD / ANALYSIS REQUEST

BK1026033

Project Name:	SOMERS MIDDLE SCHOOL		
Address:	250 US 202 East, Somers NY	Auth. By:	Craig Napolitano
		Phone No:	646-210-6500
Langan Job No.:		Sampling Date:	
Sampled By/License #:	MIKE BENSON 26-61OUA-SHAB		

			Analysis Requested for Asbestos			Analysis Requested for Lead		Analysis Requested for PCB	
	Sample ID Number	Description of Sample	Sample Location	PLM	PLM-NOB	TEM	AAS	TCLP	EPA Method 8082	Results
13	FT-6B	OFF WHITE FLOOR TILE AND MASTIC	BOTTOM LAYER ROOM 305		X	X				
14	FT-7A	12 BY 12 WHITE W/GRAY FLOOR TILE AND MASTIC	303		X	X				
15	FT-7B	12 BY 12 WHITE W/GRAY FLOOR TILE AND MASTIC	303		X	X				
16	FT-8A	12 BY 12 WHITE WITH GREEN STREAKS FLOOR TILE AND MASTIC	302 ON TERRAZZO		X	X				
17	FT-8B	12 BY 12 WHITE WITH GREEN STREAKS FLOOR TILE AND MASTIC	302 ON TERRAZZO		X	X				
18	FT-9A	WHITE W/GREEN SPOTS FLOOR TILE AND MASTIC	301 ON WOOD		X	X				
19	FT-9B	WHITE W/GREEN SPOTS FLOOR TILE AND MASTIC	301 ON WOOD		X	X				
20	DSM-1A	RED DUCT SEAM MASTIC	107		X	X				
21	DSM-1B	RED DUCT SEAM MASTIC	105		X	X				
22	CT-1A	2 BY 1 ROUGH WHITE CEILING TILE	107 ABOVE DROP CEILING		X	X				
23	CT-1B	2 BY 1 ROUGH WHITE CEILING TILE	105 ABOVE DROP CEILING		X	X				
24	CTGR-1A	CERAMIC FIREPLACE GROUT	211	X						

Total No. of Samples:

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: 9/30/26	Time: VIA FED EX	Received by: Amrai Hamdi	Date: 10/2/26	Time: 9:52
Relinquished By:	Date:	Time:	Received by:	Date:	Time:
Relinquished By:	Date:	Time:	Received by:	Date:	Time:

NOTES:

KAYA HAMILTON Kaya Hamilton 10/5/26 2:30pm

LANGAN

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

CHAIN OF CUSTODY RECORD / ANALYSIS REQUEST

BK 1026033

Project Name:	SOMERS MIDDLE SCHOOL		
Address:	250 US 202 East, Somers NY	Auth. By:	Craig Napolitano
		Phone No:	646-210-6500
Langan Job No.:		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	CTGR-1B	CERAMIC FIREPLACE GROUT	211	X						
26	CTSB-1A	CERAMIC FIREPLACE SETTING BED	211	X						
27	CTSB-1B	CERAMIC FIREPLACE SETTING BED	211	X						
28	BB-1A	DARK BROWN COVE BASE WITH MASTIC A B	107		X	X				
29	BB-1B	DARK BROWN COVE BASE WITH MASTIC	105		X	X				
30	BB-2A	BEIGE COVE BASE WITH MASTIC	HW-1A		X	X				
31	BB-2B	BEIGE COVE BASE WITH MASTIC	HW-1A		X	X				
32	BB-3A	GREEN COVE BASE WITH MASTIC	131 HALLWAY		X	X				
33	BB-3B	GREEN COVE BASE WITH MASTIC	131 HALLWAY		X	X				
34	BB-4A	GRAY COVE BASE WITH MASTIC	316		X	X				
35	BB-4B	GRAY COVE BASE WITH MASTIC	315		X	X				
36	BB-5A	4" BLACK COVE BASE WITH MASTIC	303		X	X				

Total No. of Samples:

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: 9/30/26	Time: VIA FED EX	Received By: Amisa Hunde	Date: 10/2/26	Time: 9:52
Relinquished By:	Date:	Time:	Received by:	Date:	Time:
Relinquished By:	Date:	Time:	Received by:	Date:	Time:

NOTES:

KAYA HAMILTON Kaya Hamilton 10/5/26 2:30pm

LANGAN

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

CHAIN OF CUSTODY RECORD / ANALYSIS REQUEST

BK1026038

Project Name:	SOMERS MIDDLE SCHOOL		
Address:	250 US 202 East, Somers NY	Auth. By:	Craig Napolitano
		Phone No:	646-210-6500
Langan Job No.:		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 BB-5B	4" BLACK COVE BASE AND MASTIC	211		X	X				
38 FSC-1A	FIRESTOP CAULK RED	PENTHOUSE		X	X				
39 FSC-1B	FIRESTOP CAULK RED	PENTHOUSE		X	X				
40 ESM-1A	END SEAM MASTIC WHITE	PENTHOUSE		X	X				
41 ESM-1B	END SEAM MASTIC WHITE	PENTHOUSE		X	X				
42 EJC-1A	EXPANSION JOINT CAULK ON WALL GRAY	MAIN ENTRANCE		X	X				
43 EJC-1B	EXPANSION JOINT CAULK ON WALL GRAY	MAIN ENTRANCE		X	X				
44 EJC-2A	EXPANSION JOINT CAULK ON WALL PINK	LOBBY ENTRANCE		X	X				
45 EJC-2B	EXPANSION JOINT CAULK ON WALL PINK	LOBBY ENTRANCE		X	X				
46 OWC-1A	ORIGINAL WINDOW CAULK	BAY WINDOW #2		X	X				
47 OWC-1B	ORIGINAL WINDOW CAULK	BAY WINDOW #2		X	X				
48 CFC-1A	COUNTER FLASHING CAULK	PENTHOUSE		X	X				

Total No. of Samples:

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: 9/30/26	VIA FED EX	Received by: Amirai Hunda	Date: 10/2/26	Time: 9:52
Relinquished By:	Date:	Time:	Received by:	Date:	Time:
Relinquished By:	Date:	Time:	Received by:	Date:	Time:

NOTES:

KAYA HAMILTON Kaya Hamilton 10/3/26 2:30pm

LANGAN

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

CHAIN OF CUSTODY RECORD / ANALYSIS REQUEST

BK1026033

Project Name:	SOMERS MIDDLE SCHOOL		
Address:	250 US 202 East, Somers NY	Auth. By:	Craig Napolitano
		Phone No:	646-210-6500
Langan Job No.:		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 CFC-1B	COUNTER FLASHING CAULK	PENTHOUSE		X	X				
50 EJC-3A	EXTERIOR JOINT CAULK	BAY WINDOW #2		X	X				
51 EJC-3B	EXTERIOR JOINT CAULK	BAY WINDOW #2		X	X				

Total No. of Samples:

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: 9/30/26	VIA FED EX	Received by: Amira Hinds	Date: 10/2/26	Time: 9:52
Relinquished By:	Date:	Time:	Received by:	Date:	Time:
Relinquished By:	Date:	Time:	Received by:	Date:	Time:

NOTES:

KAYA HAMILTON Kaya Hamilton 10/5/26 2:30pm

A P P E N D I X B

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

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 09, 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	09/30/26	
Location Code:	LANGANNJ	Received by:	SR1	10/02/26	12:20
Rush Request:	5 Day	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCX26796
Phoenix ID: CX26796

Project ID: SOMERS MIDDLE SCHOOL
Client ID: CFC-1A

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Caulk Extraction for PCB	Completed				10/07/26	F/P	SW3545A
Polychlorinated Biphenyls							
PCB-1016	ND	840	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1221	ND	840	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1232	ND	840	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1242	ND	840	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1248	ND	840	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1254	ND	840	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1260	ND	840	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1262	ND	840	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1268	ND	840	ug/Kg	2	10/08/26	SC	SW8082A
QA/QC Surrogates							
% DCBP	73		%	2	10/08/26	SC	30 - 150 %
% DCBP (Confirmation)	58		%	2	10/08/26	SC	30 - 150 %
% TCMX	63		%	2	10/08/26	SC	30 - 150 %
% TCMX (Confirmation)	64		%	2	10/08/26	SC	30 - 150 %

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

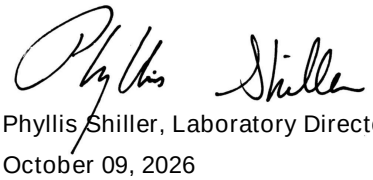
RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed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

Comments:

Sample received was a solid, bulk, or caulk matrix; dry weight is assumed.
If sample is a trip blank, dry weight is assumed.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.



Phyllis Shiller, Laboratory Director
October 09, 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 09, 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	09/30/26	
Location Code:	LANGANNJ	Received by:	SR1	10/02/26	12:20
Rush Request:	5 Day	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCX26796
Phoenix ID: CX26797

Project ID: SOMERS MIDDLE SCHOOL
Client ID: CFC-1B

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Caulk Extraction for PCB	Completed				10/07/26	F/P	SW3545A
Polychlorinated Biphenyls							
PCB-1016	ND	710	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1221	ND	710	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1232	ND	710	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1242	ND	710	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1248	ND	710	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1254	ND	710	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1260	ND	710	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1262	ND	710	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1268	ND	710	ug/Kg	2	10/08/26	SC	SW8082A
QA/QC Surrogates							
% DCBP	73		%	2	10/08/26	SC	30 - 150 %
% DCBP (Confirmation)	57		%	2	10/08/26	SC	30 - 150 %
% TCMX	63		%	2	10/08/26	SC	30 - 150 %
% TCMX (Confirmation)	65		%	2	10/08/26	SC	30 - 150 %

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

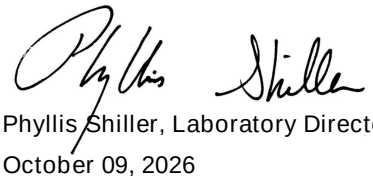
RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed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

Comments:

Sample received was a solid, bulk, or caulk matrix; dry weight is assumed.
If sample is a trip blank, dry weight is assumed.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.



Phyllis Shiller, Laboratory Director
October 09, 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 09, 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	09/30/26	
Location Code:	LANGANNJ	Received by:	SR1	10/02/26	12:20
Rush Request:	5 Day	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCX26796
Phoenix ID: CX26798

Project ID: SOMERS MIDDLE SCHOOL
Client ID: EJC-1A

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Caulk Extraction for PCB	Completed				10/07/26	F/P	SW3545A
Polychlorinated Biphenyls							
PCB-1016	ND	990	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1221	ND	990	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1232	ND	990	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1242	ND	990	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1248	ND	990	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1254	ND	990	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1260	ND	990	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1262	ND	990	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1268	ND	990	ug/Kg	2	10/08/26	SC	SW8082A
QA/QC Surrogates							
% DCBP	70		%	2	10/08/26	SC	30 - 150 %
% DCBP (Confirmation)	59		%	2	10/08/26	SC	30 - 150 %
% TCMX	64		%	2	10/08/26	SC	30 - 150 %
% TCMX (Confirmation)	66		%	2	10/08/26	SC	30 - 150 %

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

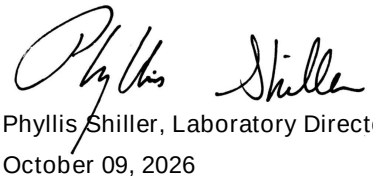
RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed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

Comments:

Sample received was a solid, bulk, or caulk matrix; dry weight is assumed.
If sample is a trip blank, dry weight is assumed.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.



Phyllis Shiller, Laboratory Director
October 09, 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 09, 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	09/30/26	
Location Code:	LANGANNJ	Received by:	SR1	10/02/26	12:20
Rush Request:	5 Day	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCX26796
Phoenix ID: CX26799

Project ID: SOMERS MIDDLE SCHOOL
Client ID: EJC-1B

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Caulk Extraction for PCB	Completed				10/07/26	F/P	SW3545A
Polychlorinated Biphenyls							
PCB-1016	ND	710	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1221	ND	710	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1232	ND	710	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1242	ND	710	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1248	ND	710	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1254	ND	710	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1260	ND	710	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1262	ND	710	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1268	ND	710	ug/Kg	2	10/08/26	SC	SW8082A
QA/QC Surrogates							
% DCBP	72		%	2	10/08/26	SC	30 - 150 %
% DCBP (Confirmation)	58		%	2	10/08/26	SC	30 - 150 %
% TCMX	67		%	2	10/08/26	SC	30 - 150 %
% TCMX (Confirmation)	68		%	2	10/08/26	SC	30 - 150 %

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

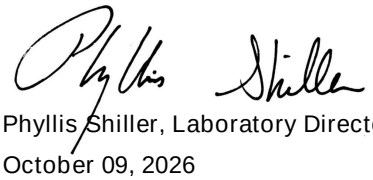
RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed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

Comments:

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Phyllis Shiller, Laboratory Director
October 09, 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 09, 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	09/30/26	
Location Code:	LANGANNJ	Received by:	SR1	10/02/26	12:20
Rush Request:	5 Day	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCX26796
Phoenix ID: CX26800

Project ID: SOMERS MIDDLE SCHOOL
Client ID: EJC-2A

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Caulk Extraction for PCB	Completed				10/07/26	F/P	SW3545A
Polychlorinated Biphenyls							
PCB-1016	ND	950	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1221	ND	950	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1232	ND	950	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1242	ND	950	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1248	ND	950	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1254	ND	950	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1260	ND	950	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1262	ND	950	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1268	ND	950	ug/Kg	2	10/08/26	SC	SW8082A
QA/QC Surrogates							
% DCBP	61		%	2	10/08/26	SC	30 - 150 %
% DCBP (Confirmation)	53		%	2	10/08/26	SC	30 - 150 %
% TCMX	59		%	2	10/08/26	SC	30 - 150 %
% TCMX (Confirmation)	59		%	2	10/08/26	SC	30 - 150 %

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

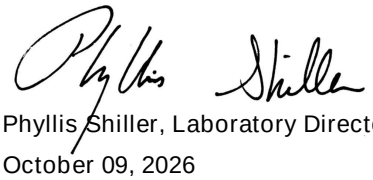
RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed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

Comments:

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Phyllis Shiller, Laboratory Director
October 09, 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 09, 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	09/30/26	
Location Code:	LANGANNJ	Received by:	SR1	10/02/26	12:20
Rush Request:	5 Day	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCX26796
Phoenix ID: CX26801

Project ID: SOMERS MIDDLE SCHOOL
Client ID: EJC-2B

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Caulk Extraction for PCB	Completed				10/07/26	F/P	SW3545A
Polychlorinated Biphenyls							
PCB-1016	ND	860	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1221	ND	860	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1232	ND	860	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1242	ND	860	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1248	ND	860	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1254	ND	860	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1260	ND	860	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1262	ND	860	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1268	ND	860	ug/Kg	2	10/08/26	SC	SW8082A
QA/QC Surrogates							
% DCBP	51		%	2	10/08/26	SC	30 - 150 %
% DCBP (Confirmation)	46		%	2	10/08/26	SC	30 - 150 %
% TCMX	54		%	2	10/08/26	SC	30 - 150 %
% TCMX (Confirmation)	52		%	2	10/08/26	SC	30 - 150 %

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

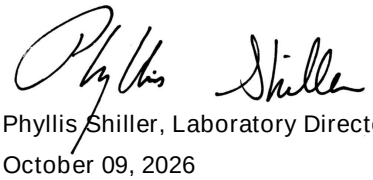
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BRL=Below Reporting Level L=Biased Low
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Comments:

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Phyllis Shiller, Laboratory Director
October 09, 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 09, 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	09/30/26	
Location Code:	LANGANNJ	Received by:	SR1	10/02/26	12:20
Rush Request:	5 Day	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCX26796
Phoenix ID: CX26802

Project ID: SOMERS MIDDLE SCHOOL
Client ID: OWC-2A

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Caulk Extraction for PCB	Completed				10/07/26	F/P	SW3545A
Polychlorinated Biphenyls							
PCB-1016	ND	680	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1221	ND	680	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1232	ND	680	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1242	ND	680	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1248	ND	680	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1254	ND	680	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1260	ND	680	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1262	ND	680	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1268	ND	680	ug/Kg	2	10/08/26	SC	SW8082A
QA/QC Surrogates							
% DCBP	58		%	2	10/08/26	SC	30 - 150 %
% DCBP (Confirmation)	52		%	2	10/08/26	SC	30 - 150 %
% TCMX	56		%	2	10/08/26	SC	30 - 150 %
% TCMX (Confirmation)	57		%	2	10/08/26	SC	30 - 150 %

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

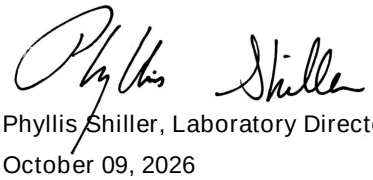
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BRL=Below Reporting Level L=Biased Low
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Comments:

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Phyllis Shiller, Laboratory Director
October 09, 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 09, 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	09/30/26	
Location Code:	LANGANNJ	Received by:	SR1	10/02/26	12:20
Rush Request:	5 Day	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCX26796
Phoenix ID: CX26803

Project ID: SOMERS MIDDLE SCHOOL
Client ID: OWC-2B

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Caulk Extraction for PCB	Completed				10/07/26	F/P	SW3545A
Polychlorinated Biphenyls							
PCB-1016	ND	690	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1221	ND	690	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1232	ND	690	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1242	ND	690	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1248	ND	690	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1254	ND	690	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1260	ND	690	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1262	ND	690	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1268	ND	690	ug/Kg	2	10/08/26	SC	SW8082A
QA/QC Surrogates							
% DCBP	68		%	2	10/08/26	SC	30 - 150 %
% DCBP (Confirmation)	57		%	2	10/08/26	SC	30 - 150 %
% TCMX	62		%	2	10/08/26	SC	30 - 150 %
% TCMX (Confirmation)	63		%	2	10/08/26	SC	30 - 150 %

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

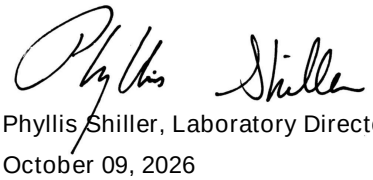
RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low
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Phyllis Shiller, Laboratory Director
October 09, 2026
Official Report Release To Follow

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

NY # 11301

Analysis Report

October 09, 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	09/30/26	
Location Code:	LANGANNJ	Received by:	SR1	10/02/26	12:20
Rush Request:	5 Day	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCX26796
Phoenix ID: CX26804

Project ID: SOMERS MIDDLE SCHOOL
Client ID: CFC-1A

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Caulk Extraction for PCB	Completed				10/07/26	F/P	SW3545A
Polychlorinated Biphenyls							
PCB-1016	ND	910	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1221	ND	910	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1232	ND	910	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1242	ND	910	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1248	ND	910	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1254	ND	910	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1260	ND	910	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1262	ND	910	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1268	ND	910	ug/Kg	2	10/08/26	SC	SW8082A
QA/QC Surrogates							
% DCBP	77		%	2	10/08/26	SC	30 - 150 %
% DCBP (Confirmation)	60		%	2	10/08/26	SC	30 - 150 %
% TCMX	66		%	2	10/08/26	SC	30 - 150 %
% TCMX (Confirmation)	67		%	2	10/08/26	SC	30 - 150 %

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

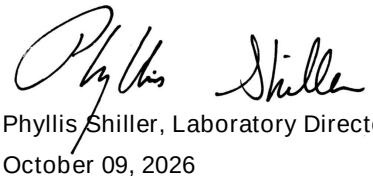
RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low
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October 09, 2026
Official Report Release To Follow

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

NY # 11301

Analysis Report

October 09, 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	09/30/26	
Location Code:	LANGANNJ	Received by:	SR1	10/02/26	12:20
Rush Request:	5 Day	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCX26796
Phoenix ID: CX26805

Project ID: SOMERS MIDDLE SCHOOL
Client ID: CFC-1B

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Caulk Extraction for PCB	Completed				10/07/26	F/P	SW3545A
Polychlorinated Biphenyls							
PCB-1016	ND	890	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1221	ND	890	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1232	ND	890	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1242	ND	890	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1248	ND	890	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1254	ND	890	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1260	ND	890	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1262	ND	890	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1268	ND	890	ug/Kg	2	10/08/26	SC	SW8082A
QA/QC Surrogates							
% DCBP	74		%	2	10/08/26	SC	30 - 150 %
% DCBP (Confirmation)	59		%	2	10/08/26	SC	30 - 150 %
% TCMX	63		%	2	10/08/26	SC	30 - 150 %
% TCMX (Confirmation)	65		%	2	10/08/26	SC	30 - 150 %

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

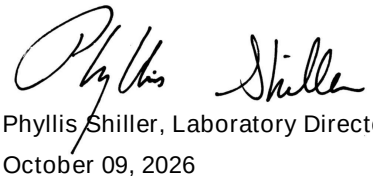
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Comments:

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Phyllis Shiller, Laboratory Director
October 09, 2026
Official Report Release To Follow

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 09, 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	09/30/26	
Location Code:	LANGANNJ	Received by:	SR1	10/02/26	12:20
Rush Request:	5 Day	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCX26796
Phoenix ID: CX26806

Project ID: SOMERS MIDDLE SCHOOL
Client ID: EJC-3A

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Caulk Extraction for PCB	Completed				10/07/26	F/P	SW3545A
Polychlorinated Biphenyls							
PCB-1016	ND	930	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1221	ND	930	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1232	ND	930	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1242	ND	930	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1248	ND	930	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1254	ND	930	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1260	ND	930	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1262	ND	930	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1268	ND	930	ug/Kg	2	10/08/26	SC	SW8082A
QA/QC Surrogates							
% DCBP	70		%	2	10/08/26	SC	30 - 150 %
% DCBP (Confirmation)	59		%	2	10/08/26	SC	30 - 150 %
% TCMX	59		%	2	10/08/26	SC	30 - 150 %
% TCMX (Confirmation)	60		%	2	10/08/26	SC	30 - 150 %

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

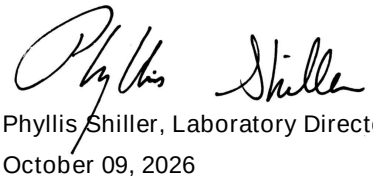
RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed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

Comments:

Sample received was a solid, bulk, or caulk matrix; dry weight is assumed.
If sample is a trip blank, dry weight is assumed.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.



Phyllis Shiller, Laboratory Director
October 09, 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 09, 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	09/30/26	
Location Code:	LANGANNJ	Received by:	SR1	10/02/26	12:20
Rush Request:	5 Day	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCX26796
Phoenix ID: CX26807

Project ID: SOMERS MIDDLE SCHOOL
Client ID: EJC-3B

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Caulk Extraction for PCB	Completed				10/07/26	F/P	SW3545A
Polychlorinated Biphenyls							
PCB-1016	ND	680	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1221	ND	680	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1232	ND	680	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1242	ND	680	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1248	ND	680	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1254	ND	680	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1260	ND	680	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1262	ND	680	ug/Kg	2	10/08/26	SC	SW8082A
PCB-1268	ND	680	ug/Kg	2	10/08/26	SC	SW8082A
QA/QC Surrogates							
% DCBP	62		%	2	10/08/26	SC	30 - 150 %
% DCBP (Confirmation)	55		%	2	10/08/26	SC	30 - 150 %
% TCMX	57		%	2	10/08/26	SC	30 - 150 %
% TCMX (Confirmation)	58		%	2	10/08/26	SC	30 - 150 %

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

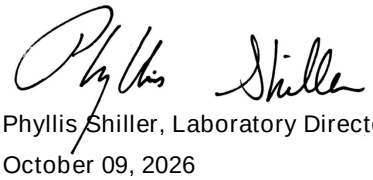
RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed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

Comments:

Sample received was a solid, bulk, or caulk matrix; dry weight is assumed.
If sample is a trip blank, dry weight is assumed.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

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Phyllis Shiller, Laboratory Director
October 09, 2026
Official Report Release To Follow

Sample Criteria Exceedances Report

GCX26796 - LANGANNJ

Criteria: None

State: NY

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

*** No Data to Display ***

Phoenix Laboratories does not assume responsibility for the data contained in this exceedance report. It is provided as an additional tool to identify requested criteria exceedences. All efforts are made to ensure the accuracy of the data (obtained from appropriate agencies). A lack of exceedence information does not necessarily suggest conformance to the criteria. It is ultimately the site professional's responsibility to determine appropriate compliance.

Jessica Gonzalez GCX 267960

From: Jessica Gonzalez
Sent: Friday, October 2, 2026 2:25 PM
To: Jessica Gonzalez
Subject: RE: Somers Middle School

No that means I shorted the asbestos bag the cfc samples.

I accidentally put both counter flashing caulks in your bag and both fire penetration caulks in the asbestos bag.

I will take the samples today and send them with the other samples I'm taking today, in a separate bags I apologize for my mistake and think you for letting me know about it.
Mike

Get Outlook for iOS

From: Monica Pellerin <monicap@phoenixlabs.com>
Sent: Friday, 02 October 2026 12:51:58
To: Michael Benson <mbenson@langan.com>
Subject: RE: Somers Middle School

We have 2 groups of bags labeled CFC-1A and CFC-1B, could one of those be the FSC sample??? Picture attached for reference.

Monica

Monica Pellerin
Client Services Representative/
Sample Receiving
Phoenix Environmental Laboratories, Inc.
587 East Middle Turnpike | Manchester, CT 06040
(860)-645-1102
www.phoenixlabs.com

PHOENIX
Environmental Laboratories, Inc.

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From: Michael Benson <mbenson@langan.com>
Sent: Friday, October 2, 2026 12:41 PM
To: Monica Pellerin <monicap@phoenixlabs.com>
Subject: RE: Somers Middle School

Good afternoon,

I will send additional FSC samples. I mistyped the chain, it should be CFC-1A and CFC-1B.

Thank You,
Michael Benson
Hazmat Building Materials Professional

LANGAN

Direct: 315.728.9525 x9501
File Sharing Link
www.langan.com

Technical Excellence • Practical Experience • Client Responsiveness

From: Monica Pellerin <monicap@phoenixlabs.com>
Sent: Friday, October 2, 2026 12:28 PM
To: Michael Benson <mbenson@langan.com>
Subject: Somers Middle School

Good afternoon,

We received the samples for the **Somers Middle School** project; however, there appear to be a few discrepancies between the samples received and the Chain of Custody.

- We received sample bags labeled **CFC-1A** and **CFC-1B**, which are not listed on the Chain of Custody.
- We did not receive sample bags **FSC-1A** and **FSC-1B**, which are listed on the Chain of Custody.

For reference, a copy of the Chain of Custody and a photograph of the additional samples received are attached.

Could you please review and advise how you would like us to proceed?

Monica
Monica Pellerin
Client Services Representative/
Sample Receiving
Phoenix Environmental Laboratories, Inc.

21.9° NIC

LANGAN

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

CHAIN OF CUSTODY RECORD / ANALYSIS REQUEST

Project Name:	SOMERS MIDDLE SCHOOL		
Address:	250 US 202 East, Somers NY	Auth. By:	Craig Napolitano
		Phone No:	646-210-6500
Langan Job No.:		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
CFC-1A	COUNTER FLASHING CAULK	PENTHOUSE						X	26796
CFC-1B	COUNTER FLASHING CAULK	PENTHOUSE						X	26797
EJC-1A	EXPANSION JOINT CAULK ON WALL GRAY	MAIN ENTRANCE						X	26798
EJC-1B	EXPANSION JOINT CAULK ON WALL GRAY	MAIN ENTRANCE						X	26799
EJC-2A	EXPANSION JOINT CAULK ON WALL PINK	CAFÉ ENTRANCE						X	26800
EJC-2B	EXPANSION JOINT CAULK ON WALL PINK	CAFÉ ENTRANCE						X	26801
OWC-2A	ORIGINAL WINDOW CAULK	BAY WINDOW #2						X	26802
OWC-2B	ORIGINAL WINDOW CAULK	BAY WINDOW #2						X	26803
* FSC-1A	FIRESTOP CAULK RED	PENTHOUSE						X	26804
* FSC-1B	FIRESTOP CAULK RED	PENTHOUSE						X	26805
EJC-3A	EXTERIOR JOINT CAULK	BAY WINDOW #2						X	26806
EJC-3B	EXTERIOR JOINT CAULK	BAY WINDOW #2						X	26807

Total No. of Samples:

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:	VIA FED EX	Received by:	Date:	Time:
Relinquished By: Fedex	Date: 9/30/26	Time:	Received by: Monica Pella	Date: 10/2-26	Time: 12:20
Relinquished By:	Date:	Time:	Received by:	Date:	Time:

NOTES:

** Sample bags labeled CFC-1A and CFC-2A received not listed on coc. (mp)

* Sample bags not received (mp)

GCX 26796

Monica Pellerin

To: mbenson@langan.com
Subject: Somers Middle School
Attachments: SKM_450i26100212150.pdf; 20261002_121542.jpg

Good afternoon,

We received the samples for the **Somers Middle School** project; however, there appear to be a few discrepancies between the samples received and the Chain of Custody.

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For reference, a copy of the Chain of Custody and a photograph of the additional samples received are attached.

Could you please review and advise how you would like us to proceed?

Monica
Monica Pellerin
Client Services Representative/
Sample Receiving
Phoenix Environmental Laboratories, Inc.
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PHOENIX
Environmental Laboratories, Inc.

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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



FRANK J ACCIARITO

CLASS(EXPIRES)

C ATEC (07/27) H PM (07/27)

D INSP (07/27)

CERT# 26-6TS1N-SHAB

DMV# 600811398

MUST BE CARRIED ON ASBESTOS PROJECTS

United States Environmental Protection Agency

This is to certify that



Frank J Acciarito

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

Risk Assessor

In the Jurisdiction of:

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

This certification is valid from the date of issuance and expires April 24, 2027

LBP-R-I220104-2

Certification #

April 05, 2024

Issued On

Ben Conetta, Manager

Chemicals and Multimedia Programs Branch

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

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Issued April 01, 2026

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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

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2026-10-01 through 2027-09-30

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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

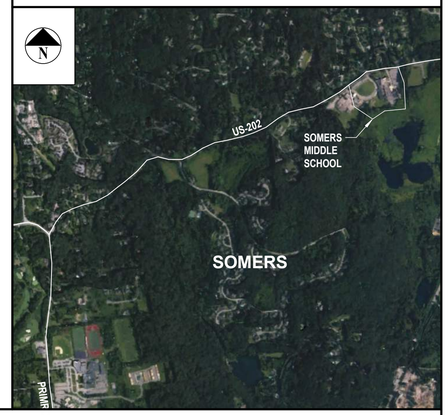
VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202, SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

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

LOCATION MAP



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

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
01-02 / 01-01 — DOOR NUMBER
CONCRETE BLOCK
PLYWOOD
12'-0" — PRIMARY CEILING HEIGHT TAG
X'-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

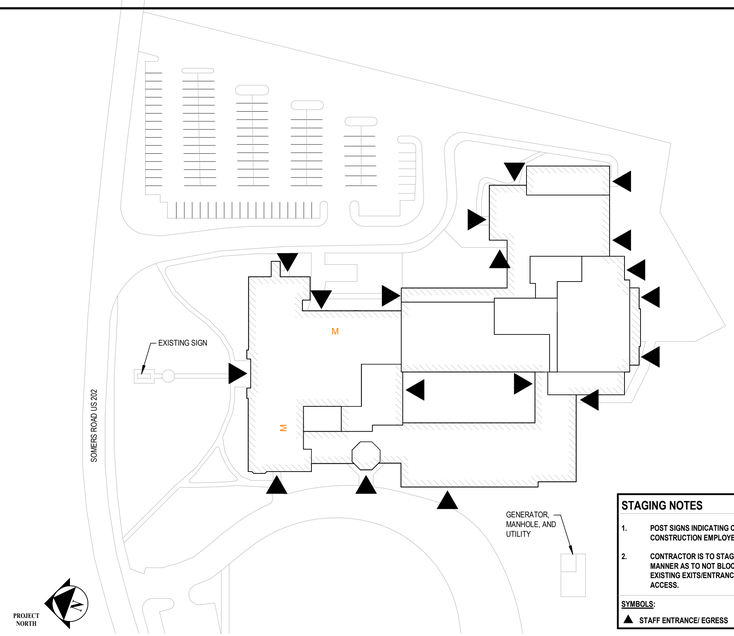
ABBREVIATIONS

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

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 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.
15. 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.

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	
MS-G 000.00	COVER SHEET
MS-G 100.00	EXISTING PLAN BASEMENT | (FOR INFORMATION ONLY)
MS-G 101.00	EXISTING PLAN LEVEL 1 | (FOR INFORMATION ONLY)
MS-G 102.00	EXISTING PLAN LEVEL 2 | (FOR INFORMATION ONLY)
MS-G 103.00	EXISTING PLAN LEVEL 3 | (FOR INFORMATION ONLY)
MS-G 104.00	CODE CHARTS
2) CIVIL	
MS-CD 100.00	EXISTING CONDITIONS & DEMOLITION PLAN
MS-CS 100.00	DIMENSIONAL SITE PLAN
MS-C 100.00	GRADING, DRAINAGE, & EROSION & SEDIMENT CONTROL PLAN
MS-C 500.00	SITE DETAILS
MS-C 501.00	SITE DETAILS
3) ARCHITECTURE	
MS-AD 100.00	BASEMENT DEMOLITION PLAN
MS-AD 101.00	DEMOLITION PLAN LEVEL 1
MS-AD 102.00	DEMOLITION PLAN LEVEL 2
MS-AD 103.00	DEMOLITION PLAN LEVEL 3
MS-AD 430.00	RESTROOM UPGRADES DEMOLITION PLAN
MS-A 100.00	FLOOR PLAN BASEMENT
MS-A 101.00	FLOOR PLAN FIRST FLOOR
MS-A 102.00	FLOOR PLAN SECOND FLOOR
MS-A 103.00	FLOOR PLAN THIRD FLOOR
MS-A 120.00	ENLARGED RCP PLANS
MS-A 121.00	ENLARGED RCP PLANS
MS-A 122.00	ENLARGED RCP PLANS
MS-A 123.00	ENLARGED RCP PLANS
MS-A 130.00	ROOF PLAN - PROPOSED CONDITION
MS-A 200.00	BUILDING ELEVATIONS
MS-A 201.00	BUILDING ELEVATIONS
MS-A 202.00	BUILDING ELEVATIONS
MS-A 203.00	BUILDING ELEVATIONS
MS-A 400.00	ENLARGED PLANS & ELEVATIONS CLASSROOM UPGRADES | TYPE A
MS-A 401.00	ENLARGED PLANS & ELEVATIONS CLASSROOM UPGRADES | TYPE B - RM 131
MS-A 402.00	ENLARGED PLANS & ELEVATIONS CLASSROOM UPGRADES | TYPE C - RM 209
MS-A 403.00	ENLARGED PLANS & ELEVATIONS CLASSROOM UPGRADES | TYPE D - RM 211
MS-A 404.00	ENLARGED PLANS & ELEVATIONS CLASSROOM UPGRADES | TYPE E
MS-A 405.00	ENLARGED PLANS & ELEVATIONS CLASSROOM UPGRADES | TYPE F
MS-A 406.00	ENLARGED PLANS & ELEVATIONS CLASSROOM UPGRADES | TYPE G
MS-A 407.00	ENLARGED PLANS & ELEVATIONS CLASSROOM UPGRADES | TYPE H - RM 315
MS-A 408.00	ENLARGED PLANS & ELEVATIONS CLASSROOM UPGRADES | TYPE I - RM 316
MS-A 409.00	ENLARGED PLANS & ELEVATIONS CLASSROOM UPGRADES | TYPE J - RM 317
MS-A 430.00	RESTROOM UPGRADES PROPOSED PLAN
MS-A 500.00	ARCHITECTURAL DETAILS
MS-A 501.00	ARCHITECTURAL CASEWORK DETAILS
MS-A 510.00	WINDOW DETAILS
MS-A 520.00	DOOR DETAILS
MS-A 540.00	ROOF DETAILS
MS-A 541.00	ROOF DETAILS
MS-A 620.00	DOOR SCHEDULE
4) PLUMBING	
MS-P 001.00	GENERAL, NOTES, LEGEND, AND ABBREVIATIONS
MS-P 100.00	FIRST FLOOR OVERALL PLAN
MS-P 101.00	SECOND FLOOR OVERALL PLAN
MS-P 102.00	THIRD FLOOR OVERALL PLAN
MS-P 200.00	PLUMBING ENLARGEMENT PLANS
MS-P 500.00	PLUMBING SCHEDULES AND DETAILS
5) MECHANICAL	
MS-M 001.00	MECHANICAL GENERAL NOTES, LEGENDS, AND ABBREVIATIONS
MS-MD 110.00	MECHANICAL PARTIAL FIRST FLOOR DEMOLITION PLAN
MS-MD 111.00	MECHANICAL PARTIAL FIRST FLOOR AUDITORIUM DEMOLITION PLAN
MS-MD 112.00	MECHANICAL PARTIAL SECOND FLOOR DEMOLITION PLAN
MS-MD 113.00	MECHANICAL PARTIAL SECOND FLOOR ADMINISTRATION OFFICE DEMOLITION PLAN
MS-MD 114.00	MECHANICAL PARTIAL SECOND FLOOR SPECIAL EDUCTION/HR OFFICE DEMOLITION PLAN
MS-MD 115.00	MECHANICAL PARTIAL THIRD FLOOR DEMOLITION PLAN
MS-MD 116.00	MECHANICAL PARTIAL ROOF DEMOLITION PLAN
MS-MD 117.00	MECHANICAL PARTIAL AUDITORIUM ROOF DEMOLITION PLAN
MS-MD 118.00	MECHANICAL PARTIAL THIRD FLOOR DEMOLITION PLAN
MS-MD 119.00	MECHANICAL ROOF DEMOLITION PLAN
MS-M 110.00	MECHANICAL PARTIAL FIRST FLOOR NEW WORK PLAN
MS-M 111.00	MECHANICAL PARTIAL FIRST FLOOR AUDITORIUM NEW WORK PLAN
MS-M 112.00	MECHANICAL PARTIAL SECOND FLOOR NEW WORK PLAN
MS-M 113.00	MECHANICAL PARTIAL SECOND FLOOR ADMINISTRATION OFFICE NEW WORK PLAN
MS-M 114.00	MECHANICAL PARTIAL SECOND FLOOR SPECIAL EDUCTION/HR OFFICE NEW WORK PLAN
MS-M 115.00	MECHANICAL PARTIAL SECOND FLOOR LANGUAGE WING RESTROOM NEW WORK PLAN
MS-M 116.00	MECHANICAL PARTIAL THIRD FLOOR NEW WORK PLAN
MS-M 117.00	MECHANICAL PARTIAL ROOF NEW WORK PLAN
MS-M 118.00	MECHANICAL PARTIAL AUDITORIUM ROOF NEW WORK PLAN
MS-M 119.00	MECHANICAL PARTIAL THIRD FLOOR NEW WORK PLAN
MS-M 120.00	MECHANICAL PARTIAL THIRD FLOOR NEW WORK PLAN
MS-M 121.00	MECHANICAL ROOF WORK PLAN
MS-M 122.00	MECHANICAL FIRST FLOOR CORRIDOR NEW WORK PLAN
MS-M 123.00	MECHANICAL SECOND FLOOR CORRIDOR NEW WORK PLAN
MS-M 500.00	MECHANICAL DETAILS
MS-M 501.00	MECHANICAL DETAILS
MS-M 502.00	MECHANICAL DETAILS
MS-M 600.00	MECHANICAL SCHEDULES
MS-M 601.00	MECHANICAL SCHEDULES
MS-M 602.00	MECHANICAL SCHEDULES
MS-M 603.00	MECHANICAL SCHEDULES
MS-M 650.00	MECHANICAL CONTROL DIAGRAMS
MS-M 651.00	MECHANICAL CONTROL DIAGRAMS
6) ELECTRICAL	
MS-E 001.00	ELECTRICAL LEGENDS
MS-ED 100.00	ELECTRICAL BASEMENT DEMOLITION PLAN
MS-ED 101.00	ELECTRICAL FIRST FLOOR DEMOLITION PLAN
MS-ED 102.00	ELECTRICAL SECOND FLOOR DEMOLITION PLAN
MS-ED 103.00	ELECTRICAL THIRD FLOOR DEMOLITION PLAN
MS-ED 104.00	ELECRTICAL ROOF DEMOLITION PLAN
MS-E 100.00	ELECTRICAL BASEMENT NEW WORK PLAN
MS-E 101.00	ELECTRICAL FIRST FLOOR NEW WORK PLAN
MS-E 102.00	ELECTRICAL SECOND FLOOR NEW WORK PLAN
MS-E 103.00	ELECTRICAL THIRD FLOOR NEW WORK PLAN
MS-E 104.00	ELECTRICAL ROOF NEW WORK PLAN
MS-E 105.00	ELECTRICAL ENLARGED ELECTRICAL ROOM PLANS
MS-E 500.00	ELECTRICAL DETAILS
MS-E 600.00	ELECTRICAL SCHEDULES

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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S. MANDIC	M. LUCK	S. MANDIC	K. PACHECO

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202, SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT: ALL CONTRACTS

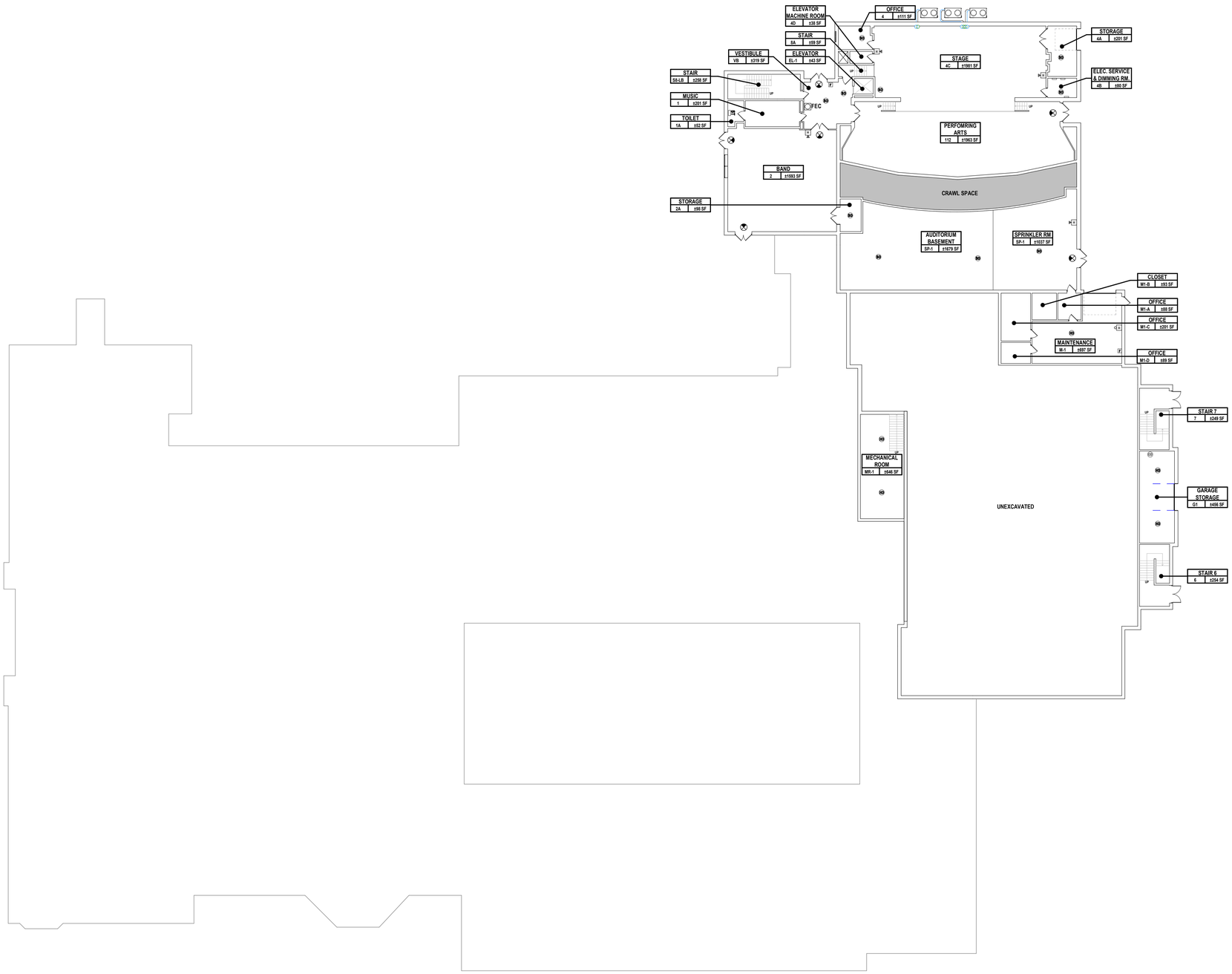
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SHEET TITLE: COVER SHEET

DRAWING No.: **MS-G 000.00**

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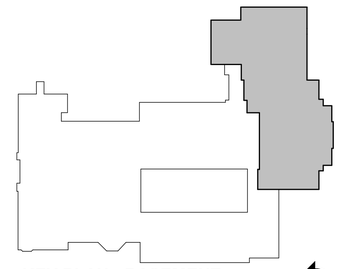
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1 EXISTING PLAN - BASEMENT (FOR INFORMATION ONLY)

SCALE: 1" = 20'-0"

PROJECT NORTH



2 KEY PLAN - BASEMENT

SCALE: 1" = 100'-0"

PROJECT NORTH

LEGEND

NOT ALL SYMBOLS MAY BE USED

ROOM NAME / ROOM / 000 ± S.F. / ROOM NUMBER / AREA	ROOM NUMBER DESIGNATION TAG NOTE: * ASTERISK INDICATES ITEM REQUIRES FIELD VERIFICATION # HASH INDICATES ROOM NUMBER TO BE ASSIGNED BY DISTRICT
FE / FEC	EXISTING FIRE EXTINGUISHER & EXISTING FIRE EXTINGUISHER CABINET
F	EXISTING PULL STATION
ST	EXISTING FIRE ALARM STROBE
H	EXISTING HORN / STROBE COMBO
H	EXISTING FIRE ALARM HORN
H	EXISTING BELL STROBE
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 RESCUE WINDOW LOCATIONS
HD	EXISTING HEAT DETECTOR
CO	EXISTING CARBON MONOXIDE DETECTOR
GD	EXISTING GAS DETECTOR
RAL	REMOTE ALARM LAMP
CM	CONTROL MODULE

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CONSULTANTS:

MARK	DATE	DESCRIPTION

REGISTERED ARCHITECT
KATRINA PACHECO
041183
STATE OF NEW YORK

09/30/2029
Exp. Date

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CONTRACT

ALL CONTRACTS

STATUS

SED SUBMISSION

SHEET TITLE

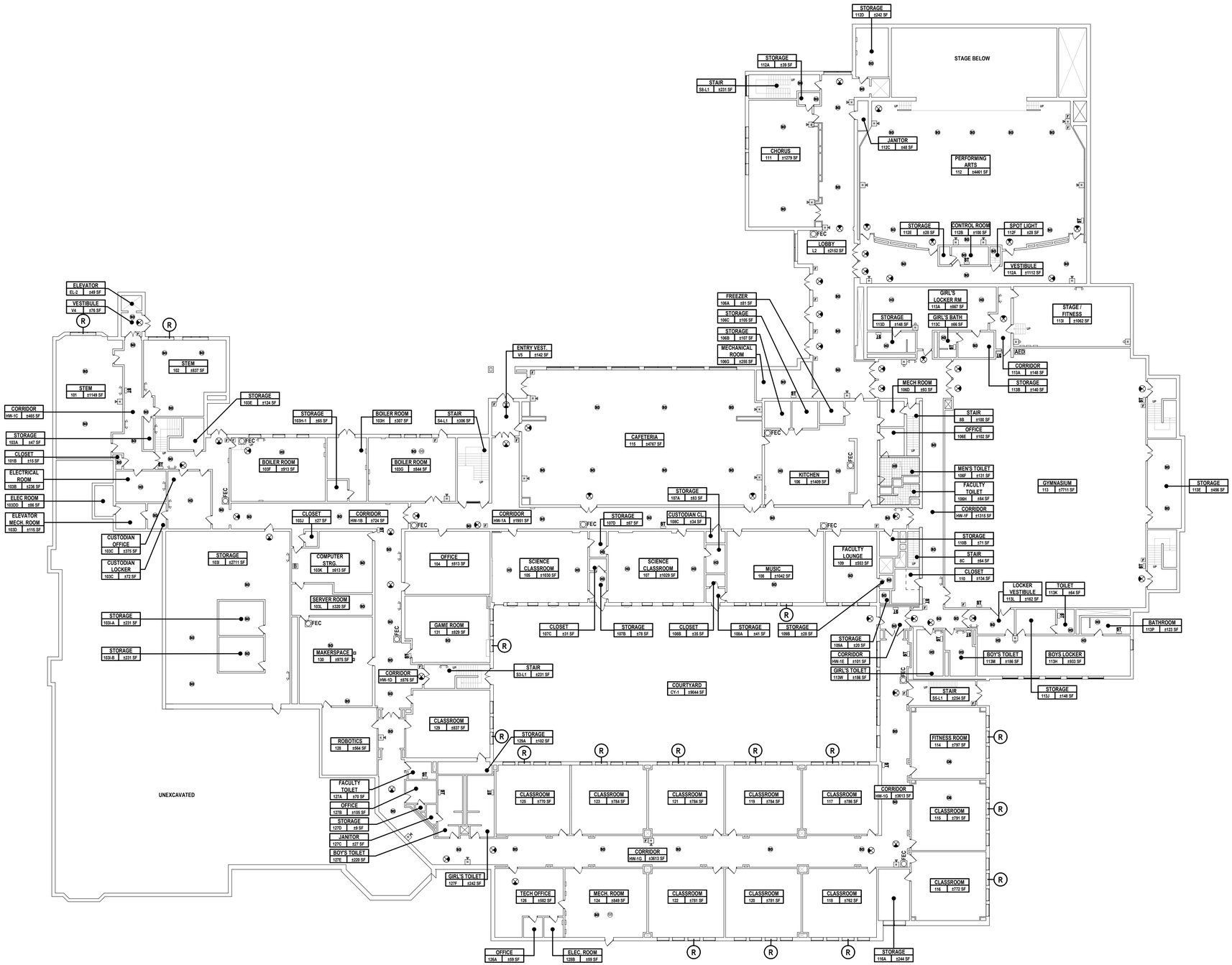
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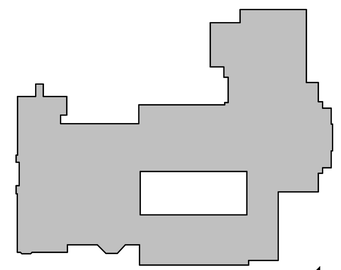
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1 EXISTING PLAN - LEVEL 1 (FOR INFORMATION ONLY)

SCALE: 1" = 20'-0"

PROJECT NORTH



2 KEY PLAN - LEVEL 1

SCALE: 1" = 100'-0"

PROJECT NORTH

LEGEND

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H	EXISTING HORN / STROBE COMBO
H	EXISTING FIRE ALARM HORN
H	EXISTING BELL STROBE
B	EXISTING FIRE ALARM BELL
AED	EXISTING AUTOMATED EXTERNAL DEFIBRILLATOR
SD	EXISTING SMOKE DETECTOR
	EXISTING EXIT SIGN
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Katrina N. Pacheco 09/30/2029
KATRINA N. PACHECO, R.A.
NY PROFESSIONAL ARCHITECT Lic. No. 041183 Exp. Date

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SHEET TITLE

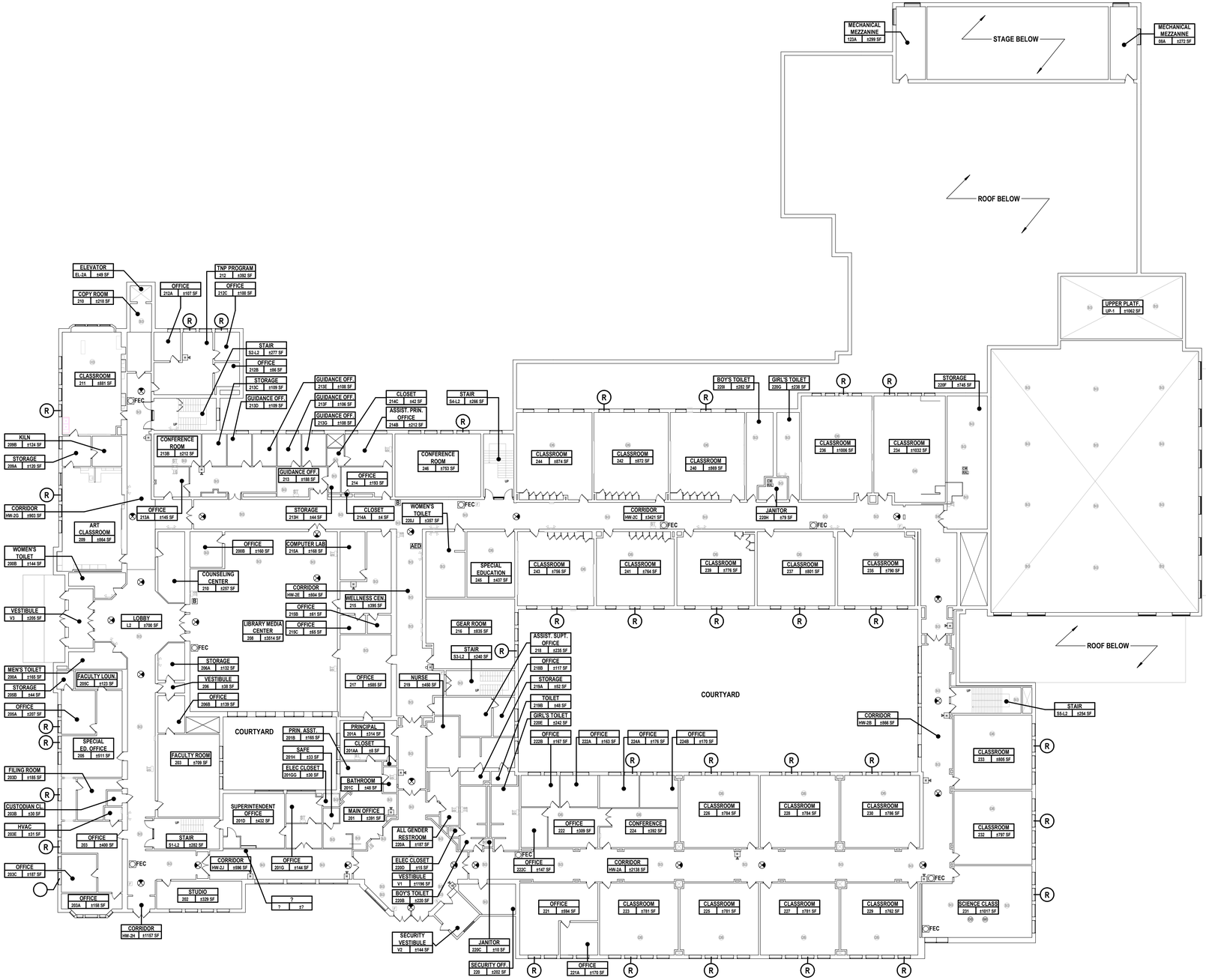
EXISTING PLAN LEVEL 1 (FOR INFORMATION ONLY)

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MS-G 101.00

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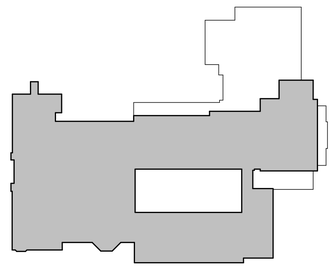
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1 EXISTING PLAN - LEVEL 2 (FOR INFORMATION ONLY)

SCALE: 1" = 20'-0"

PROJECT NORTH



2 KEY PLAN - LEVEL 2

SCALE: 1" = 100'-0"

PROJECT NORTH

LEGEND

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H	EXISTING BELL STROBE
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
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GD	EXISTING GAS DETECTOR
RAL	REMOTE ALARM LAMP
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SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202, SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

ALL CONTRACTS

STATUS

SED SUBMISSION

SHEET TITLE

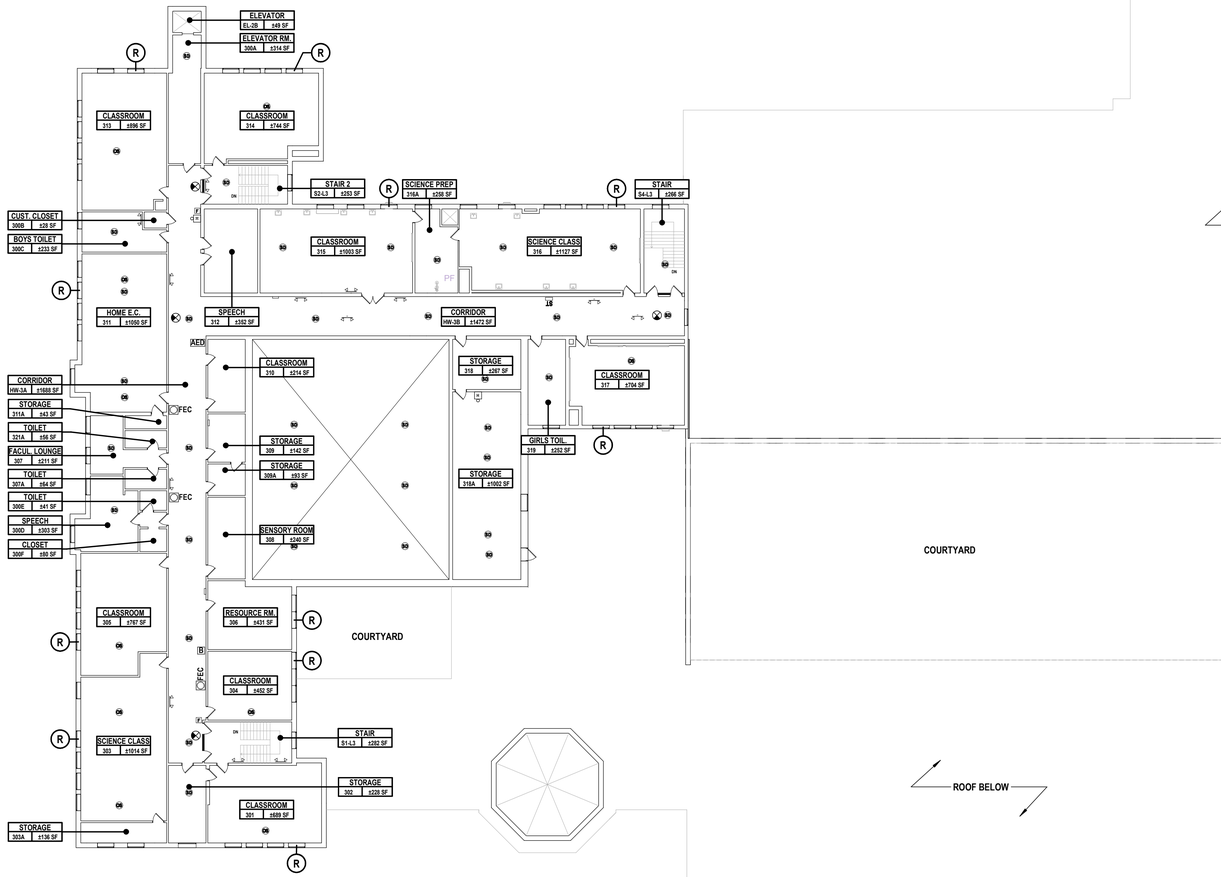
EXISTING PLAN LEVEL 2 (FOR INFORMATION ONLY)

DRAWING No.

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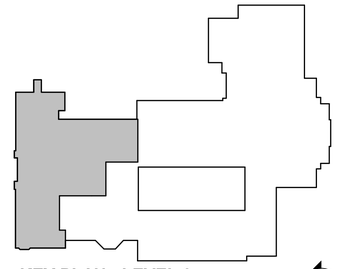
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1 EXISTING PLAN - LEVEL 3 (FOR INFORMATION ONLY)

SCALE: 1" = 20'-0"

PROJECT NORTH



2 KEY PLAN - LEVEL 3

SCALE: 1" = 100'-0"

PROJECT NORTH

LEGEND

NOT ALL SYMBOLS MAY BE USED

ROOM NAME / ROOM / 000 ± S.F. (ROOM NUMBER, AREA)	ROOM NUMBER DESIGNATION TAG NOTE: * ASTERISK INDICATES ITEM REQUIRES FIELD VERIFICATION # HASH INDICATES ROOM NUMBER TO BE ASSIGNED BY DISTRICT
FE / FEC	EXISTING FIRE EXTINGUISHER & EXISTING FIRE EXTINGUISHER CABINET
F	EXISTING PULL STATION
ST	EXISTING FIRE ALARM STROBE
H	EXISTING HORN / STROBE COMBO
H	EXISTING FIRE ALARM HORN
H	EXISTING BELL STROBE
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 RESCUE WINDOW LOCATIONS
HD	EXISTING HEAT DETECTOR
CO	EXISTING CARBON MONOXIDE DETECTOR
GD	EXISTING GAS DETECTOR
RAL	REMOTE ALARM LAMP
CM	CONTROL MODULE

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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:
S. MANDIC	A. DUNN	S. MANDIC	K. PACHECO

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202, SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

ALL CONTRACTS

STATUS

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EXISTING PLAN LEVEL 3 (FOR INFORMATION ONLY)

DRAWING No.

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BUILDING CODE OF NEW YORK STATE

(NYS BUILDING CODE TABLE 504.3 & 504.4)

	ALLOWED	EXISTING	PROPOSED
BUILDING OCCUPANCY	EDUCATIONAL (GROUP E)	EDUCATIONAL (GROUP E)	NO CHANGE
CONSTRUCTION CLASSIFICATION	IIA / IIB	IIA / IIB	NO CHANGE
HEIGHT (STORIES)	3 / 2	3 ABOVE GRADE	NO CHANGE
HEIGHT (FEET)	65 / 55	33 / 35	NO CHANGE

NOTES

1. EDUCATIONAL GROUP 'E' OCCUPANCY INCLUDES, AMONG OTHERS, THE USE OF A BUILDING OR STRUCTURE, OR A PORTION THEREOF, BY SIX OR MORE PERSONS AT ANY ONE TIME FOR EDUCATIONAL PURPOSES THROUGH THE 12TH GRADE.

APPLICABLE BUILDING CODES

- NEW YORK STATE EDUCATION DEPARTMENT MANUAL OF PLANNING STANDARDS 2022
- 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

GENERAL CODE NOTES

(NYS EXISTING BUILDING CODE)

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 NYSEBC 2025 SECTION 602.1.
2. LEVEL 2 ALTERATIONS INCLUDE "THE RECONFIGURATION OF SPACE, THE ADDITION OR ELIMINATION OF ANY DOOR OR WINDOW, THE RECONFIGURATION OR EXTENSION OF ANY SYSTEM, OR THE INSTALLATION OF ANY ADDITIONAL EQUIPMENT." PER NYSEBC 2025 SECTION 603.1.
3. EXISTING EGRESS SHALL BE MAINTAINED. EXISTING EXIT SIGNS TO REMAIN (TYP. FOR ALL)
4. EXISTING ACCESSIBILITY SHALL BE MAINTAINED. IT IS CONSIDERED TECHNICALLY INFEASIBLE TO INCREASE ACCESSIBILITY FOR EXISTING DOORS RECESSED WITHIN EXISTING CONSTRUCTION AS EXISTING CONDITIONS PROHIBIT MODIFICATION NECESSARY TO PROVIDE ACCESSIBILITY.
5. EXISTING SMOKE DETECTORS TO REMAIN (TYP. FOR ALL).
6. EXISTING FIRE EXTINGUISHERS TO REMAIN (TYP. FOR ALL).
7. 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 2406.1.
8. ACCESSIBLE ENTRANCES ARE PROVIDED AS REQUIRED INTO THE BUILDING FROM THE EXTERIOR PER 1105.1.
9. INTERIOR GLAZING SIZES AND TYPES SHALL COMPLY WITH FIRE RATING (UL 263, ASTM E119) PER 703.6.

FIRE-RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS

(NYS BUILDING CODE TABLE 601)

EXISTING BUILDING OCCUPANCY CLASSIFICATION: BUSINESS GROUP E - EDUCATIONAL
EXISTING CONSTRUCTION CLASSIFICATION: TYPE IIA AND IIB

BUILDING ELEMENT	HOURS	
	IIA	IIB
STRUCTURAL FRAME	1	0
EXTERIOR BEARING WALLS	1	0
EXTERIOR NON-BEARING WALLS	-	-
FIRE SEPARATION DISTANCE: X < 5	1	1
FIRE SEPARATION DISTANCE: 5 ≤ X < 10	1	1
FIRE SEPARATION DISTANCE: 10 ≤ X < 30	1	0
FIRE SEPARATION DISTANCE: X ≥ 30	0	0
INTERIOR BEARING WALLS	1	1
INTERIOR NON-BEARING WALLS	0	0
FLOOR CONSTRUCTION	1	0
ROOF CONSTRUCTION	1	0

NOTE:
1. THE EXISTING BUILDING CONSTRUCTION CLASSIFICATION IS ASSUMED TO BE TYPE IIA AND IIB

CHAPTER 6 - CLASSIFICATION OF WORK

CODE SECTION	REQUIRED/ALLOWED	ACTUAL AND PROPOSED
SECTION 601.2 WORK AREA	APPLIES- THE WORK AREA AS DEFINED IN CHAPTER 2, SHALL BE IDENTIFIED ON THE CONSTRUCTION DOCUMENTS	REFER TO "PROJECT SCOPE" DESCRIPTION FOR WORK DONE WITHIN THE EXISTING BUILDING AND INCLUDED UNDER THIS APPLICATION.
SECTION 604.1 ALTERATION-LEVEL 2	APPLIES- LEVEL 2 ALTERATIONS COMPLIES WITH THE APPLICABLE PROVISIONS OF SECTIONS 602 AND 603.	EXISTING BUILDING TO COMPLY, REFER TO 'PROJECT SCOPE' DESCRIPTION.

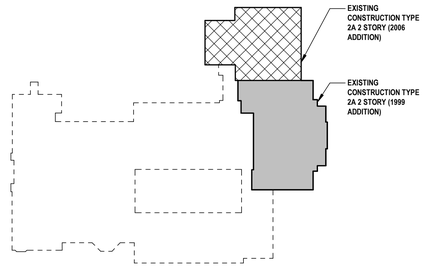
ALTERATION WORK AT THIS BUILDING CONSISTS OF THE FOLLOWING:

PHASE 1: EXTERIOR
1. IMPROVEMENTS TO BUILDING ENVELOPE INCLUDING THE FOLLOWING ELEMENTS: STEEL LINTELS, WINDOW SILLS, BRICK REPOINTING, AND RESETTING FRONT ENTRY STEPS.
2. REPLACEMENT OF ROOFING.
3. REPAIR OF BAY WINDOWS AND REPLACEMENT OF WINDOWS TO BAY WINDOW ON EAST FACADE.
4. REPLACEMENT OF LOWER FIELD TURF.
5. REPLACEMENT OF EXTERIOR DOOR AND FRAME AT SOUTH GYM EXIT.

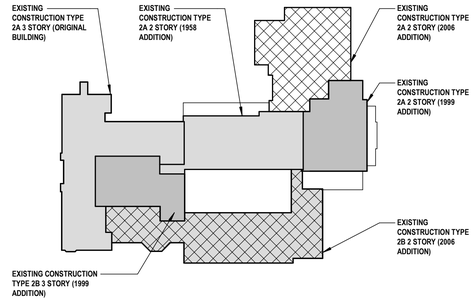
INTERIOR
1. VARIOUS UPGRADES TO HVAC SYSTEM THROUGHOUT THE BUILDING.
2. UPGRADES TO VARIOUS ELEMENTS F CLASSROOMS THROUGHOUT.
3. REPLACEMENT OF ANTIQUATED ELECTRICAL EQUIPMENT AND PANEL BOARDS.
4. UPGRADES TO KITCHEN FACULTY BATHROOMS.
5. REPLACEMENT OF DOORS ON SECOND AND THIRD FLOOR.
6. REPLACEMENT OF WIRE GLASS WITH FIRE RATING, DOOR CLOSERS, AND WOOD DOORS AT STAIRS ON THIRD FLOOR.

2025 EBCNYS CHAPTER 8 ALTERATIONS - LEVEL 2

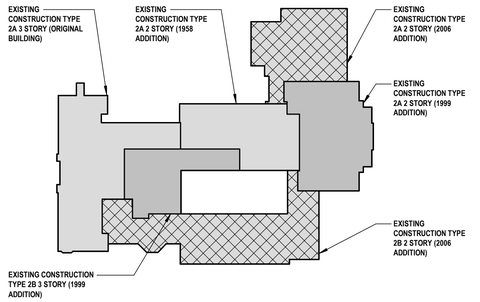
CODE SECTION	REQUIRED/ALLOWED	ACTUAL AND PROPOSED
SECTION 801.2 COMPLIANCE	IN ADDITION TO THE REQUIREMENTS OF CHAPTER 8, ALL WORK SHALL COMPLY WITH THE REQUIREMENTS OF CHAPTER 7	NEW WORK SHALL COMPLY WITH THE BUILDING CODE OF NEW YORK STATE
SECTION 802 BUILDING ELEMENTS AND MATERIALS	EXISTING VERTICAL OPENINGS SHALL COMPLY WITH THE PROVISIONS OF SECTION 802.2.1, 802.2.2, AND 802.2.3 FROM THE HIGHEST WORK AREA FLOOR TO THE LEVEL OF EXIST DISCHARGE AND FLOORS BELOW.	DOES NOT APPLY
SECTION 803.4 FIRE ALARM AND DETECTION	AN APPROVED FIRE ALARM SYSTEM AND DETECTION SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH THIS SECTION OF THE BUILDING CODE OF NYS.	COMPLIES
SECTION 805 MEANS OF EGRESS	MEANS OF EGRESS SHALL COMPLY WITH THE REQUIREMENTS OF SECTION 804.2, 804.4, AND 804.5	COMPLIES
SECTION 806 STRUCTURAL	ANY EXISTING GRAVITY LOAD-CARRYING STRUCTURALLY ELEMENT FOR WHICH AN ALTERNATION CAUSES AN INCREASE IN DESIGN DEAD LOAD, LIVE, OR SNOW LOAD INCLUDING SNOW DRIFT EFFECTS, OR MORE THAN 5% SHALL REPLACED OR ALTERED AS NEEDED TO CARRY THE GRAVITY LOAD REQUIREMENTS OF NFPA 70 EXCEPT AS REQUIRED FOR IN SECTION 807.3	COMPLIES
SECTION 809 ENERGY CONSERVATION	LEVEL 2 ALTERATIONS TO EXISTING BUILDINGS ARE PERMITTED WITHOUT REQUIRING THE ENTIRE BUILDING TO COMPLY WITH THE ENERGY REQUIREMENTS. THE ALTERATIONS SHALL CONFORM TO THE ENERGY REQUIREMENTS OF THE IECC.	COMPLIES



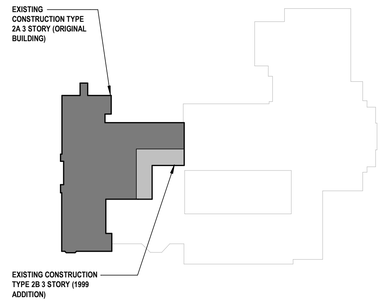
1 CONSTRUCTION TYPE KEY PLAN - BASEMENT
SCALE: 1" = 100'-0"



2 CONSTRUCTION TYPE KEY PLAN - LEVEL 2
SCALE: 1" = 100'-0"



3 CONSTRUCTION TYPE KEY PLAN - LEVEL 1
SCALE: 1" = 100'-0"



4 CONSTRUCTION TYPE KEY PLAN - LEVEL 3
SCALE: 1" = 100'-0"

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CONSULTANTS:

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09/30/2029
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Exp. Date

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S. MANDIC	A. DUNN	S. MANDIC	K. PACHECO

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

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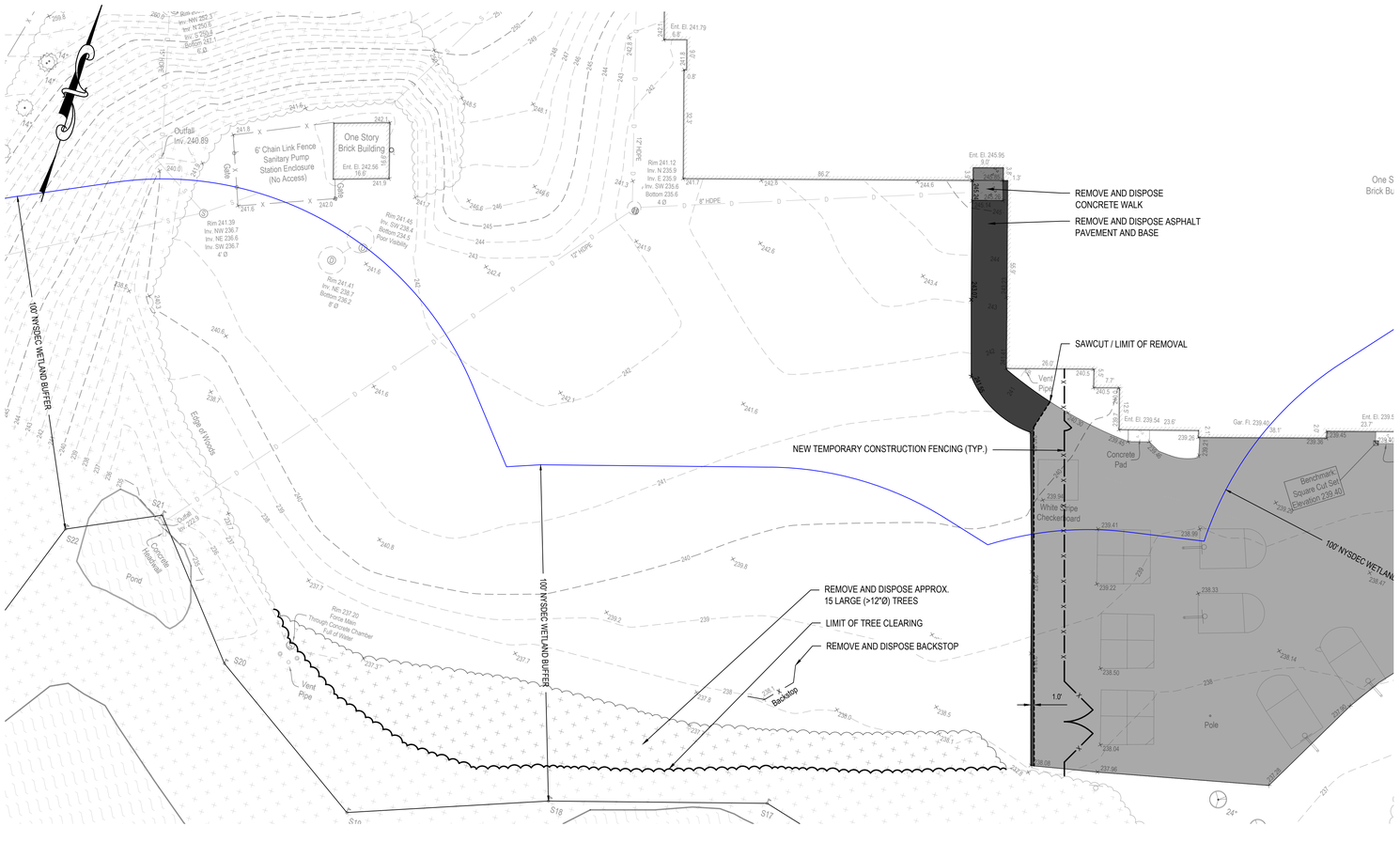
CONTRACT
ALL CONTRACTS

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EXISTING CONDITIONS LEGEND

DESCRIPTION	SYMBOL
BENCHMARK	
DRAINAGE MANHOLE	
INLET	
SANITARY MANHOLE	
WETLAND MARKER	
100' WETLAND BUFFER	
DECIDUOUS TREE	
STORM DRAIN	D D
SANITARY SEWER	S S
FENCE	X X
CONTOUR	100
SPOT ELEVATION	100.0
ASPHALT PAVEMENT	
CONCRETE PAVEMENT	

DEMOLITION LEGEND

DESCRIPTION	SYMBOL
TREE CLEARING LINE	
SAWCUT PAVEMENT LINE	
REMOVE AND DISPOSE EXISTING ASPHALT PAVEMENT AND BASE	
REMOVE AND DISPOSE EXISTING CONCRETE SIDEWALK	

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/ 2⅜" 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

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 - (SQUARE CUT SET IN CONCRETE PAD, EAST OF PROPOSED TURF FIELD, EL. 239.40).
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.
14. PRIOR TO ANY WORK WITHIN RIGHT-OF-WAY, CONTRACTOR TO FINALIZE OBTAINING A HIGHWAY PERMIT FROM NYSDOT.
15. CONTRACTOR TO PROTECT ALL EXISTING SITE FEATURES THROUGHOUT DURATION OF CONSTRUCTION. EXISTING BUILDING TO BE PROTECTED IN ALL AREAS WHERE DEMOLITION AND NEW SITE WORK ABUTS BUILDING.
16. CONTRACTOR TO EXERCISE CAUTION WHEN PERFORMING WORK IN AREAS OF OVERHEAD WIRES. ALL MATERIAL AND EQUIPMENT DELIVERIES AND OPERATIONS TO BE MONITORED TO AVOID CONFLICTS.
17. LOCATION OF TEMPORARY CONSTRUCTION FENCING IS APPROXIMATE. CONTRACTOR TO PROVIDE A FINAL CONSTRUCTION PHASING AND STAGING PLAN SHOWING ALL TEMPORARY FENCING, GATE LOCATIONS AND NECESSARY SIGNAGE TO THE SATISFACTION OF ENGINEER AND CM.

GRAPHIC SCALE
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CONSULTANTS:

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

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

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SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202, SOMERS, NY 10589

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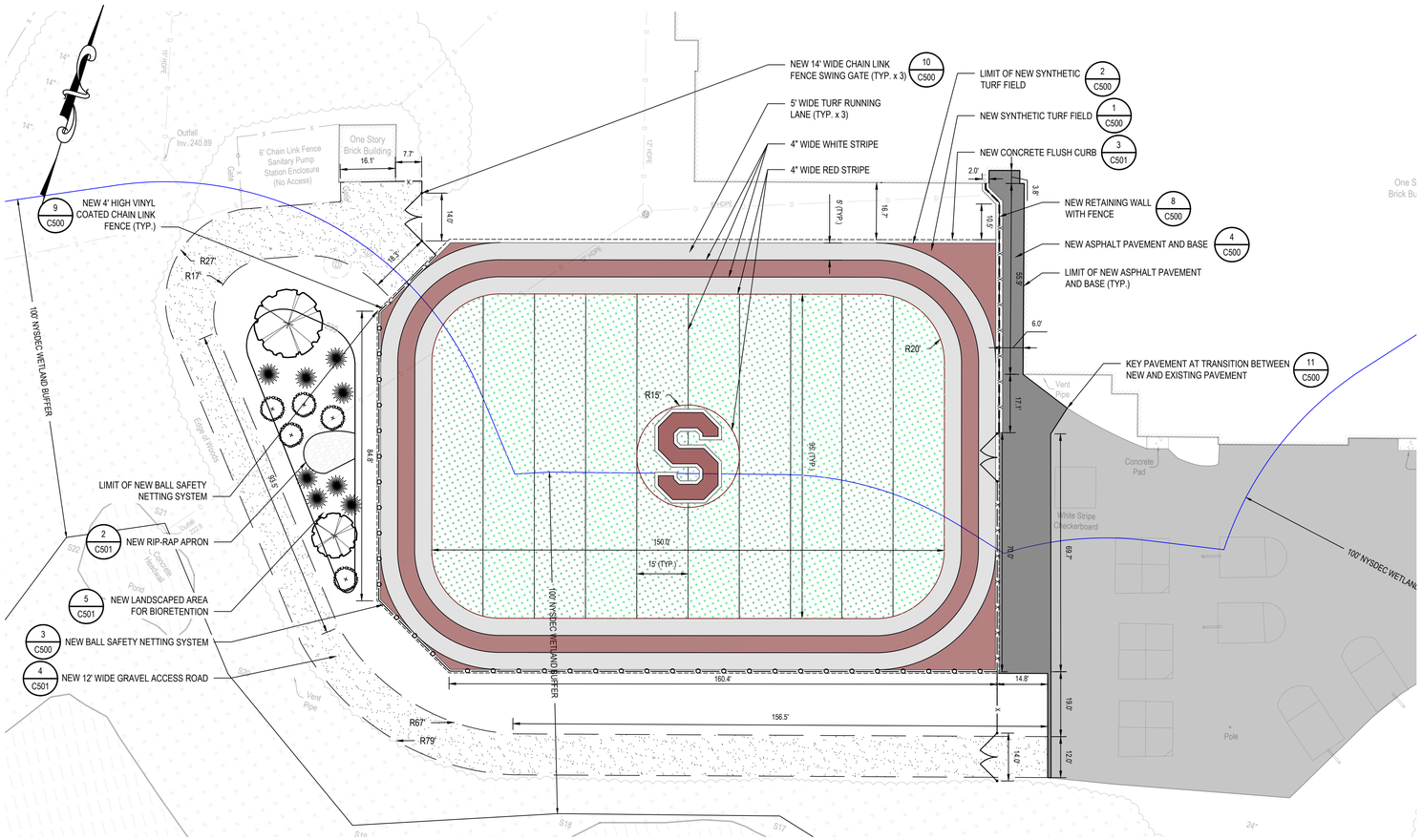
CONTRACT
CONTRACT C
CIVIL / SITE CONSTRUCTION

STATUS
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SHEET TITLE
EXISTING CONDITIONS & DEMOLITION PLAN

DRAWING No.
MS-CD 100.00

C:\Users\speters\appdata\local\temp\AcPublish_19752\01_CD100 Existing Conditions & Demolition Plan.dwg Last Modified: Jul 20, 2026 - 11:15am Plotted on: Jul 20, 2026 - 11:17am By speters



LEGEND

DESCRIPTION	SYMBOL
CURB	
CONCRETE DROP CURB	
RETAINING WALL	
ASPHALT PAVEMENT	
SYNTHETIC TURF PLAYING SURFACE	
GRAVEL	
CHAIN LINK FENCE	x x
BALL SAFETY NETTING	

SITE PLAN NOTES:

1. INSPECT THE SITE PRIOR TO SUBMISSION OF BIDS AND MAKE NO ADDITIONAL CLAIMS REGARDING SITE CONDITIONS THEREAFTER.
2. 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.
3. COMPLETE ALL SURVEY AND STAKEOUT AS REQUIRED TO PROPERLY COMPLETE THE WORK.
4. PERFORM DAILY CLEANUP OPERATIONS INCLUDING REMOVAL OF DEBRIS AND EXCESS CONSTRUCTION MATERIAL, AND DRIVEWAY/STREET CLEANING TO THE SATISFACTION OF THE OWNER.
5. DURING ALL NON-WORKING HOURS, STORE ALL EQUIPMENT AND MATERIALS WITHIN AN AREA DESIGNATED BY THE OWNER AT THE PROJECT SITE.
6. ALL CURB DIMENSIONS SHOWN REFER TO THE FACE OF CURB.
7. ALL CONSTRUCTION TO CONFORM WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL CODE REQUIREMENTS.
8. COORDINATE CONSTRUCTION ACTIVITIES WITH OWNER TO MINIMIZE INTERRUPTION TO THE OWNER'S OPERATIONS.
9. RESTORE SURROUNDING AREAS DAMAGED OR DISTURBED DURING CONSTRUCTION. RESTORE TO NEW CONDITIONS AT NO ADDITIONAL COST TO THE OWNER.
10. RESTORE ALL DISTURBED GRASS AREAS AND ALL AREAS NOT SPECIFICALLY IDENTIFIED FOR OTHER IMPROVEMENTS WITH 4 INCHES OF TOPSOIL AND SEED.
11. REMOVE ALL ASPHALT FROM EXISTING CASTINGS.
12. SEAL ALL JOINTS BETWEEN NEW ASPHALT AND EXISTING ASPHALT WITH HOT ASPHALT CEMENT.

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

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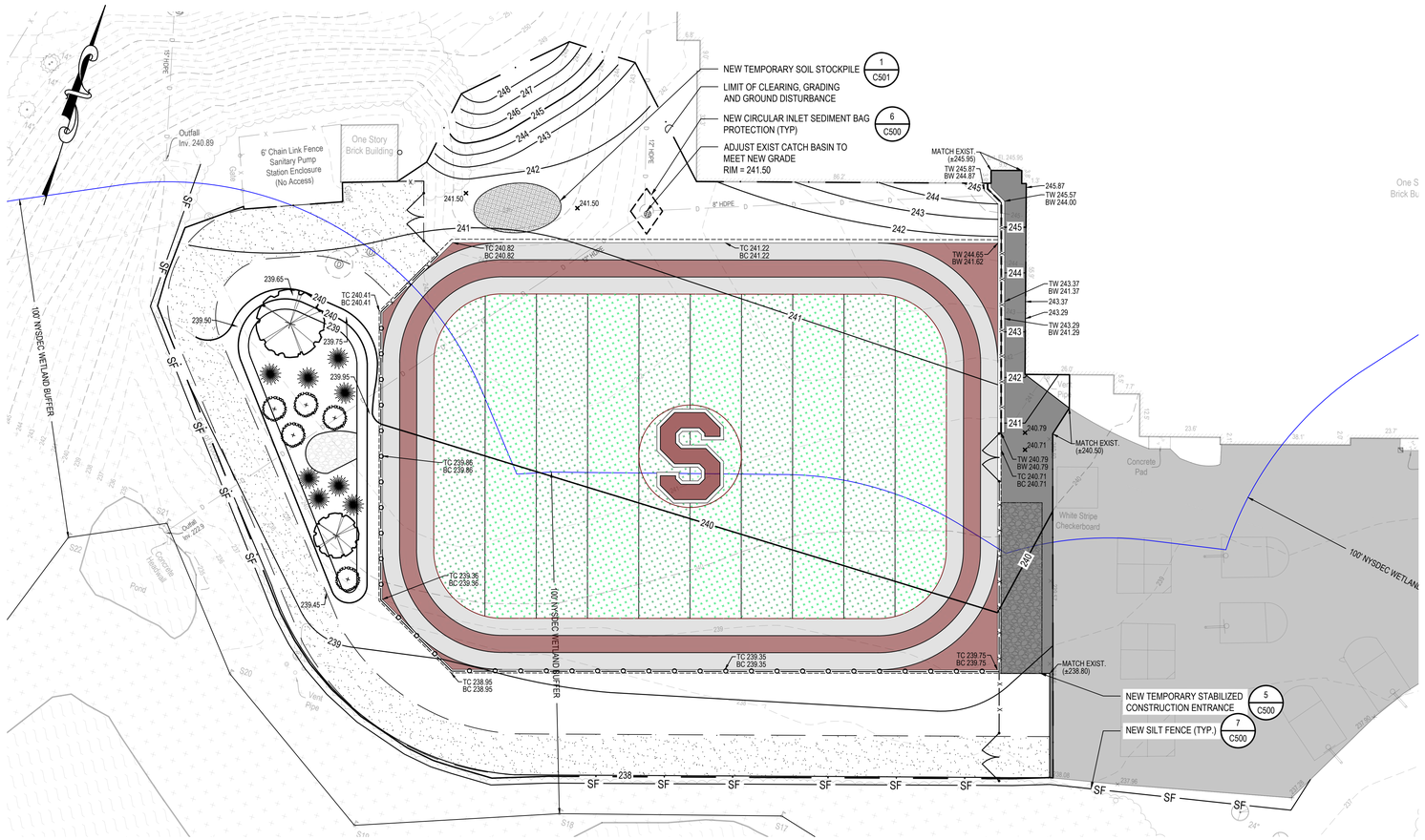
CONTRACT
CONTRACT C
CIVIL / SITE CONSTRUCTION

STATUS
SED SUBMISSION

SHEET TITLE
DIMENSIONAL SITE PLAN

DRAWING No.
MS-CS 100.00

X:\SMSD Somers School District\SMSD2507 (SMS Phase 2 Various Upgrades)\02-BIM-CADD\Cov-Docs\05 Civil\02_CS100 Dimensional Site Plan.dwg Last Modified: Jul 29, 2026 - 1:18pm Plotted on: Jul 29, 2026 - 1:19pm By eyeters



LEGEND

DESCRIPTION	SYMBOL
SPOT ELEVATION	+121.50
TOP AND BOTTOM CURB ELEVATION	TC140.00 BC139.50
MAJOR CONTOUR	240
MINOR CONTOUR	241
DRAINAGE LINE	D
NEW SILT FENCE	SF SF
LIMIT OF CLEARING, GRADING, AND GROUND DISTURBANCE	
NEW INLET SEDIMENT BAG PROTECTION	
NEW STABILIZED CONSTRUCTION ENTRANCE	

GRADING AND DRAINAGE NOTES:

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

PIPE MATERIAL SPECIFICATIONS:

- DRAINAGE CONNECTIONS: 6-24"Ø SMOOTH INTERIOR HDPE (N-12)

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	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.

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.

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.

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.

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

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CONSULTANTS:

MARK	DATE	DESCRIPTION

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

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:
SMSD2507	JULY 2026	AS SHOWN

CLIENT
SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202, SOMERS, NY 10589

SED #: 66-21-01-06-0-001-021

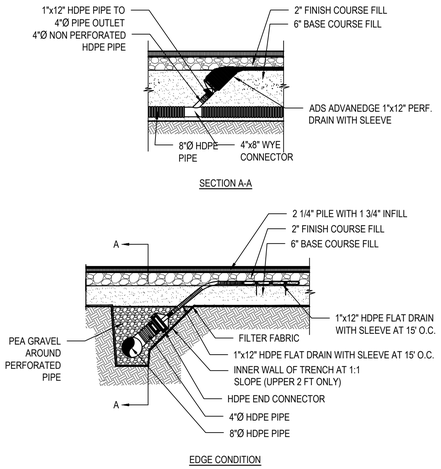
CONTRACT
CONTRACT C
CIVIL / SITE CONSTRUCTION

STATUS
SED SUBMISSION

SHEET TITLE
GRADING, DRAINAGE, & EROSION & SEDIMENT CONTROL PLAN

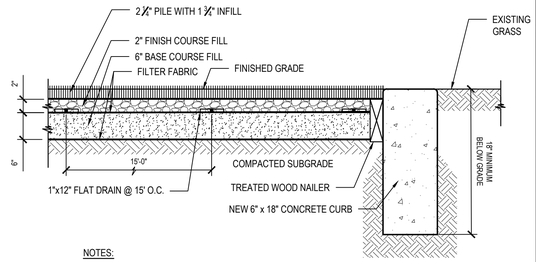
DRAWING No.
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1 Synthetic Turf Field Section

SCALE: NTS

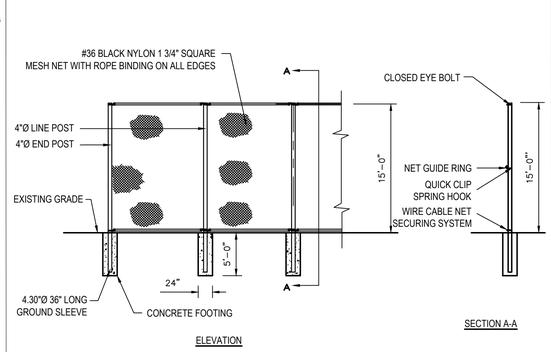


NOTES:

1. CONCRETE TO BE 4,000 PSI STRENGTH AT 28 DAYS, AIR ENTRAINED.
2. EXPANSION JOINTS CONSISTING OF 1/2" PRE-MOULDED BITUMINOUS JOINT FILLER REQUIRED AT 20' CC.
3. SUBGRADE SHALL BE COMPACTED TO 95% MIN. AASHTO T-99.

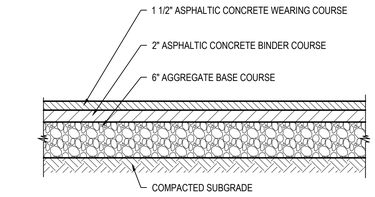
2 Synthetic Turf Edge Section

NTS



3 Ball Safety Netting System

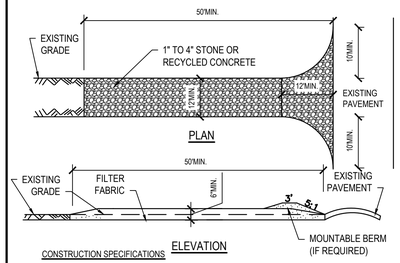
NTS



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

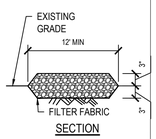
4 Asphalt Pavement - Standard Duty

SCALE: NTS (321216.13 H2MX1) - U



CONSTRUCTION SPECIFICATIONS

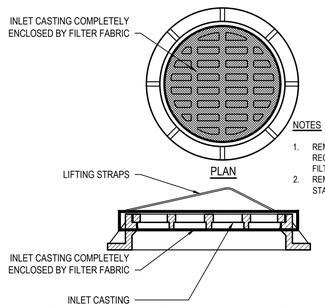
1. STONE OR RECYCLED CONCRETE SIZE TO BE 1" TO 4".
2. LENGTH - NOT LESS THAN 50 FEET (UNLESS INDICATED OTHERWISE ON PLANS).
3. THICKNESS - NOT LESS THAN SIX (6) INCHES.
4. WIDTH - TWELVE (12) FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS. TWENTY-FOUR (24) FOOT 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.
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. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.



5 Stabilized Construction Entrance

SCALE: NTS (312513.19 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 Resistance	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

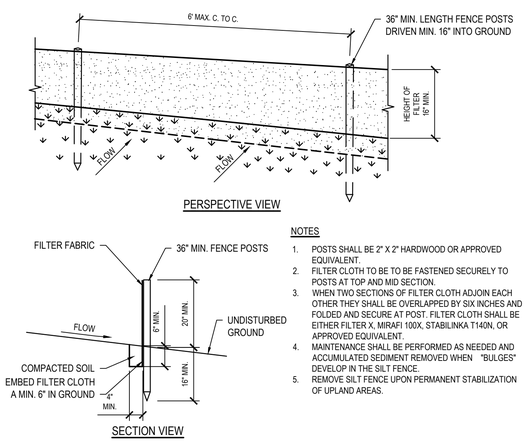


NOTES

1. REMOVE ACCUMULATED SEDIMENT AND DEBRIS AS REQUIRED TO MAINTAIN ADEQUATE FLOW THROUGH FILTER FABRIC.
2. REMOVE INLET PROTECTION UPON PERMANENT STABILIZATION OF CONSTRUCTION SITE.

6 Circular Inlet Sediment Bag Protection

SCALE: NTS 312553.13 H2MX2

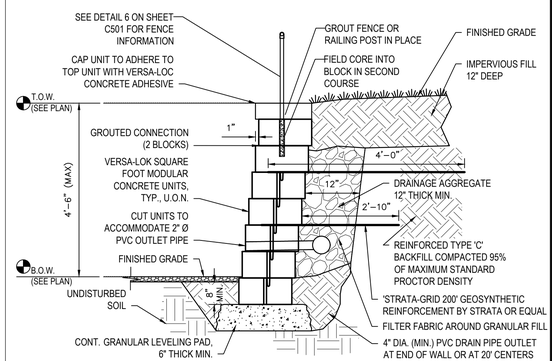


NOTES

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. 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.

7 Silt Fence - Standard

SCALE: NTS 312513.13 NYDC1-U

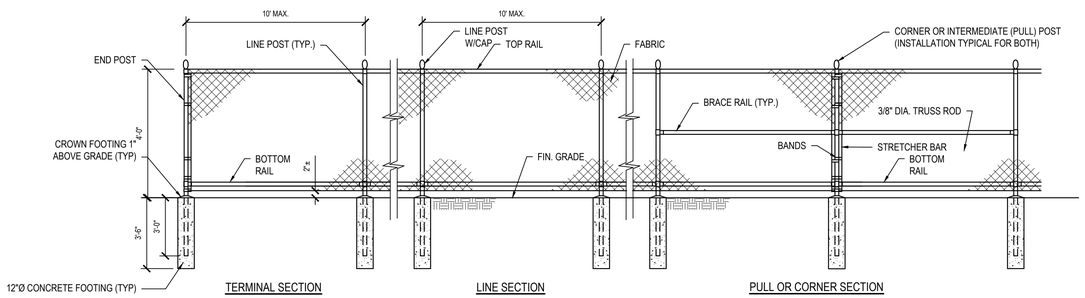


NOTES:

1. WALLS LESS THAN 2'-0" IN HEIGHT DO NOT REQUIRED GEOSYNTHETIC REINFORCEMENT.
2. DESIGN SHOWN IS BASED ON VERSA-LOK SQUARE FOOT MODULAR UNITS. IF SUBSTITUTION IS DESIRED, CONTRACTOR SHALL SUBMIT PRODUCT DATA WITH CALCULATIONS SIGNED AND SEALED BY A REGISTERED ENGINEER IN THE STATE OF NEW YORK.
3. CONTRACTOR TO SUBMIT PRODUCT INFORMATION SHEET TO OWNER FOR SELECTION OF COLOR AND FINISH.

8 Retaining Wall Section with Fence Mounting (2'-0" to 4'-6" Height)

SCALE: NTS SPECIFICATION #

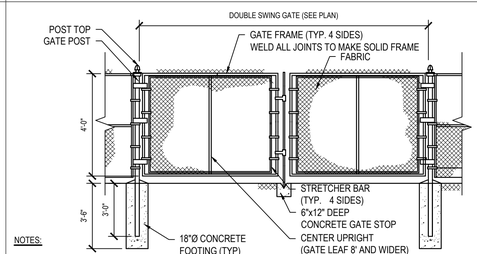


NOTES:

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.

9 Chain Link Fence - Vinyl Coated - 4' Height

SCALE: NTS 323113.15 H2MX1



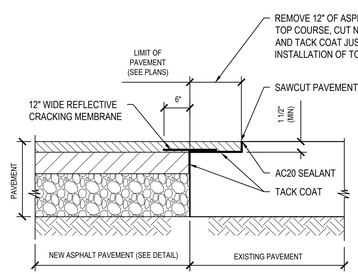
NOTES:

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, 1.66" 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

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

SCALE: NTS 323113.25 H2MX1



11 New Asphalt Pavement Key to Existing Asphalt Pavement - Standard Duty

NTS

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

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

PROJECT No.:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202, SOMERS, NY 10589

SED #: 66-21-01-06-0-001-021

CONTRACT

CONTRACT C CIVIL / SITE CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

SITE DETAILS

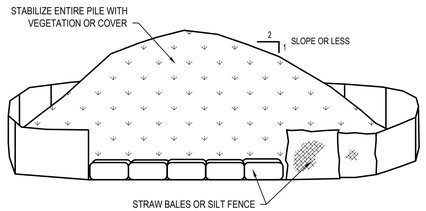
DRAWING No.

MS-C 500.00

X:\SUSMSD\ [Somers School District]\SMSD2507 (SMS Phase 2 Various Upgrades)\02-BIM-CAD\Civil\ce-Docs\05-Civil\04 - C500 Site Details.dwg Last Modified: - Jul 20, 2026 - 12:06pm Plotted on: Jul 20, 2026 - 12:06pm By cpeters

NOTES:

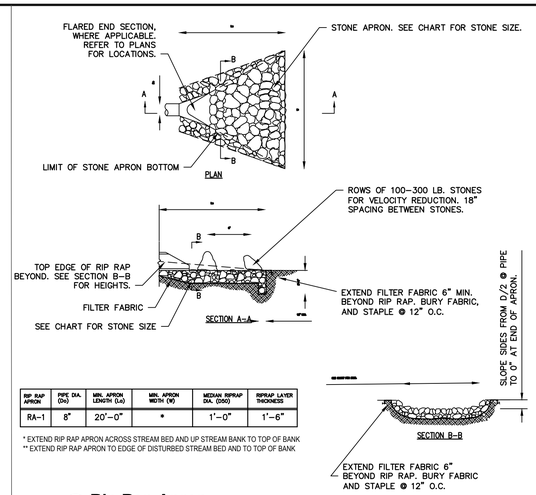
1. AREA CHOSEN FOR STOCKPILING OPERATIONS SHALL BE DRY AND STABLE.
2. MAXIMUM SLOPE OF STOCKPILE SHALL BE 2:1.
3. UPON COMPLETION OF SOIL STOCKPILING, EACH PILE SHALL BE SURROUNDED WITH EITHER SILT FENCING OR STRAW BALES, THEN STABILIZED WITH VEGETATION OR COVERED.



TO BE USED WHERE TOPSOIL IS NECESSARY FOR REGRADING AND VEGETATING DISTURBED AREAS. TEMPORARY STOCKPILE STABILIZATION MEASURES INCLUDE VEGETATIVE COVER, MULCH, NONVEGETATIVE COVER, AND PERIPHERAL SEDIMENT TRAPPING BARRIERS. THE STABILIZATION MEASURE(S) SELECTED SHOULD BE APPROPRIATE FOR THE TIME OF YEAR, SITE CONDITIONS, AND REQUIRED PERIOD OF USE.

1 Temporary Soil Stockpile

SCALE: NTS (312513.23 NYDC1) - U

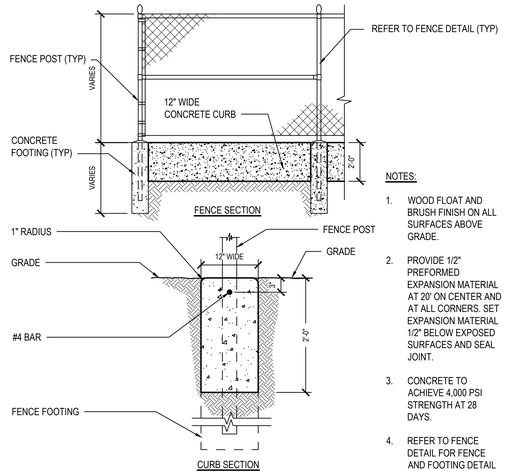


RIP RAP APRON	PIPE DIA. (Do)	MIN. APRON LENGTH (La)	MIN. APRON WIDTH (W)	MEDIAN RIPRAP DIA. (D50)	RIPRAP LAYER THICKNESS
RA–1	8"	20'–0"	*	1'–0"	1'–6"

* EXTEND RIP RAP APRON ACROSS STREAM BED AND UP STREAM BANK TO TOP OF BANK
** EXTEND RIP RAP APRON TO EDGE OF DISTURBED STREAM BED AND TO TOP OF BANK

2 Rip Rap Apron

NTS

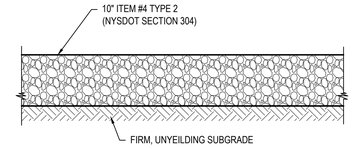


NOTES:

1. WOOD FLOAT AND BRUSH FINISH ON ALL SURFACES ABOVE GRADE.
2. 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.
3. CONCRETE TO ACHIEVE 4,000 PSI STRENGTH AT 28 DAYS.
4. REFER TO FENCE DETAIL FOR FENCE AND FOOTING DETAIL

3 Concrete Flush Curb with Fence Mounting

SCALE: NTS | H2M: 2 321613

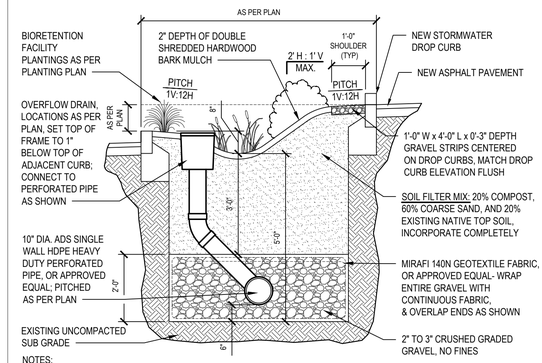


NOTES:

1. PROVIDE SMOOTH TRANSITION BETWEEN EXISTING SURFACES AND PROPOSED GRAVEL AREAS.
2. COMPACT SUBGRADE TO 92% MAXIMUM DENSITY IN ACCORDANCE WITH ASTM D1557.

4 Gravel Access Section

SCALE: NTS



NOTES:

1. PRIOR TO AMENDING EXISTING SOIL, THE CONTRACTOR SHALL REFER TO RECENT SOIL BORING TEST(S) AND VERIFY PROPOSED METHOD WITH THE LANDSCAPE ARCHITECT.
2. INSTALL 1'-0" SHOULDER ALONG ALL BACK SIDES OF CURBS IN BIORETENTION FACILITIES.
3. NO AUTOMATIC IRRIGATION SYSTEM REQUIRED WITHIN BIORETENTION FACILITY, ONLY MANUAL IRRIGATION DURING ESTABLISHMENT PERIOD AND DRY PERIODS (NO RAIN) OVER 2 WEEKS.
4. BIO-SWALE SHALL ENTIRELY DRAIN WITHIN 6 -12 HOURS AFTER A STORM EVENT.
5. PERIODIC MAINTENANCE OF BIO-SWALE SHALL INVOLVE HAND REMOVAL OF ACCUMULATED SILT & SEDIMENT AND INSPECTING & CLEANING OVERFLOW DRAINS.

5 Bioretention Facility

SCALE: NTS 334699 (H2MX 1) -U

H 2 M architects + engineers

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X:\SSMS\Somers School District\SMSD2507 (SMS Phase 2-Various Upgrades)\02-BIM-CAD\Civil+Dwn\05 Civil\05_C501 Site Details.dwg Last Modified: Jul 20, 2026 - 12:12pm Plotted on - Jul 20, 2026 - 12:12pm By rpeters

DEMOLITION LEGEND

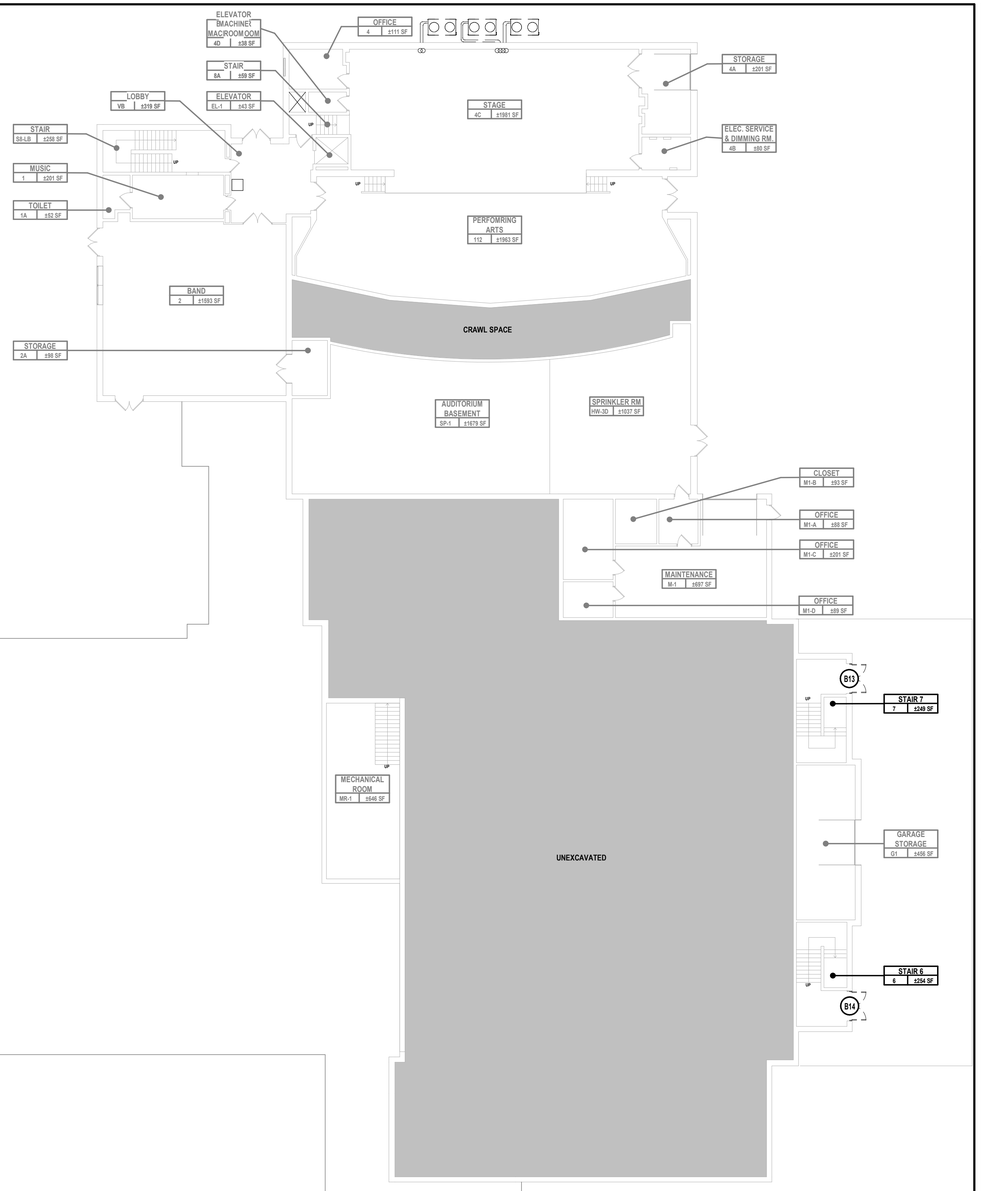
ROOM 000 / SF			
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(R)	EXISTING RESCUE WINDOW		EXISTING DOOR AND FRAME TO REMAIN
(#)	INDICATES DOOR TAGS FOR WORK IN CONTRACT - FIELD VERIFY ALL DOOR SIZES		REMOVE AND DISPOSE OF EXISTING DOOR AND ASSOCIATED HARDWARE, U.N.O.
(FS)	INDICATES EXISTING FIRE SHUTTER LOCATION TO REMAIN - REMOVE, PROTECT, AND STORE FOR RE-INSTALLATION		NON-WORK AREA

LEAD ABATEMENT NOTES

1. ALL LEAD ABATEMENT WORK SHALL CONFORM TO ALL APPLICABLE CODE REQUIREMENTS ALONG WITH SPECIFICATION SECTION 028200 AND INDUSTRIAL CODE RULE 56.
2. 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, AND KEEP REQUIRED POSTINGS AT SITE.
3. 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.
4. ALL MATERIALS ASSOCIATED WITH PROJECT HAVE BEEN TESTED FOR THE PRESENCE OF LEAD. NO MATERIAL HAS BEEN FOUND TO CONTAIN LEAD. REFER TO TESTING REPORT IN SPECIFICATIONS.

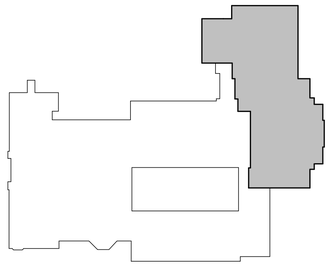
ASBESTOS ABATEMENT NOTES

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:
   - 12" X 12" FLOOR TILE & MASTIC
   - 9" X 9" FLOOR TILE & MASTIC
   - METAL DOOR CORE INSULATION
   - WOOD DOOR CORE INSULATION
   - BLACKBOARD GLUE & MASTIC
   - PIPE INSULATION
   - PIPE FITTINGS
   - ROOF FLASHING MATERIALS
   - CONCEALED WATERPROOFING MATERIALS ON EXTERIOR WALLS
   - EXTERIOR WINDOW CAULK
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 **BASEMENT DEMOLITION FLOOR PLAN**
SCALE: 1/16" = 1'-0"

PROJECT NORTH



2 **KEY PLAN - BASEMENT**
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
Exp. Date

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

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M. LUCK	M. LUCK	S. MANDIC	K. PACHECO

PROJECT No:	DATE:	SCALE:
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250 US-202, SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT G
GENERAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

BASEMENT DEMOLITION PLAN

DRAWING No.

MS-AD 100.00

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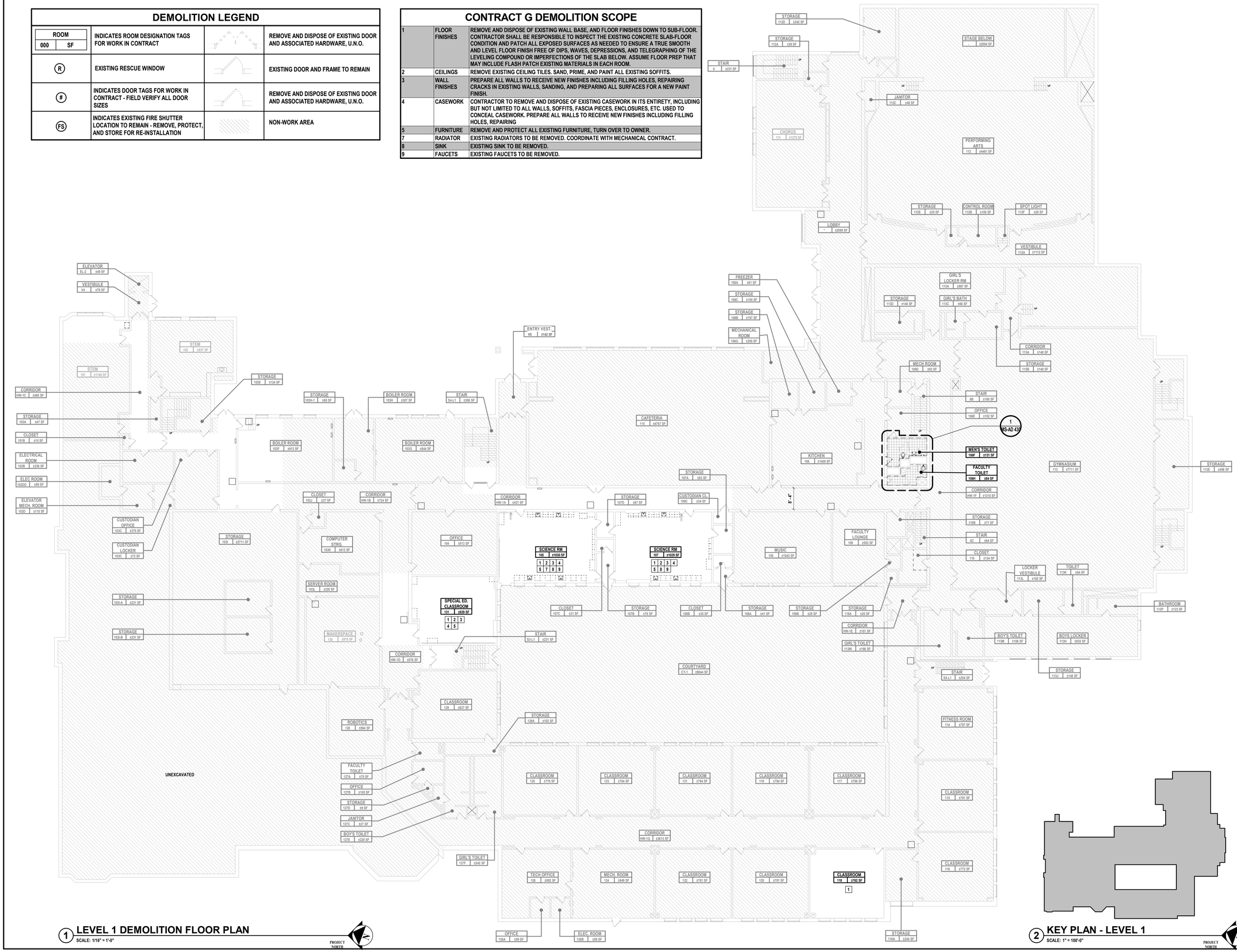
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DEMOLITION LEGEND

ROOM 000 SF	INDICATES ROOM DESIGNATION TAGS FOR WORK IN CONTRACT		REMOVE AND DISPOSE OF EXISTING DOOR AND ASSOCIATED HARDWARE, U.N.O.
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CONTRACT G DEMOLITION SCOPE

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2	CEILINGS	REMOVE EXISTING CEILING TILES. SAND, PRIME, AND PAINT ALL EXISTING SOFFITS.
3	WALL FINISHES	PREPARE ALL WALLS TO RECEIVE NEW FINISHES INCLUDING FILLING HOLES, REPAIRING CRACKS IN EXISTING WALLS, SANDING, AND PREPARING ALL SURFACES FOR A NEW PAINT FINISH.
4	CASEWORK	CONTRACTOR TO REMOVE AND DISPOSE OF EXISTING CASEWORK IN ITS ENTIRETY, INCLUDING BUT NOT LIMITED TO ALL WALLS, SOFFITS, FASCIA PIECES, ENCLOSURES, ETC. USED TO CONCEAL CASEWORK. PREPARE ALL WALLS TO RECEIVE NEW FINISHES INCLUDING FILLING HOLES, REPAIRING
5	FURNITURE	REMOVE AND PROTECT ALL EXISTING FURNITURE, TURN OVER TO OWNER.
7	RADIATOR	EXISTING RADIATORS TO BE REMOVED. COORDINATE WITH MECHANICAL CONTRACT.
8	SINK	EXISTING SINK TO BE REMOVED.
9	FAUCETS	EXISTING FAUCETS TO BE REMOVED.



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

PROJECT NORTH

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

PROJECT NORTH

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SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT G GENERAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

DEMOLITION PLAN LEVEL 1

DRAWING No.

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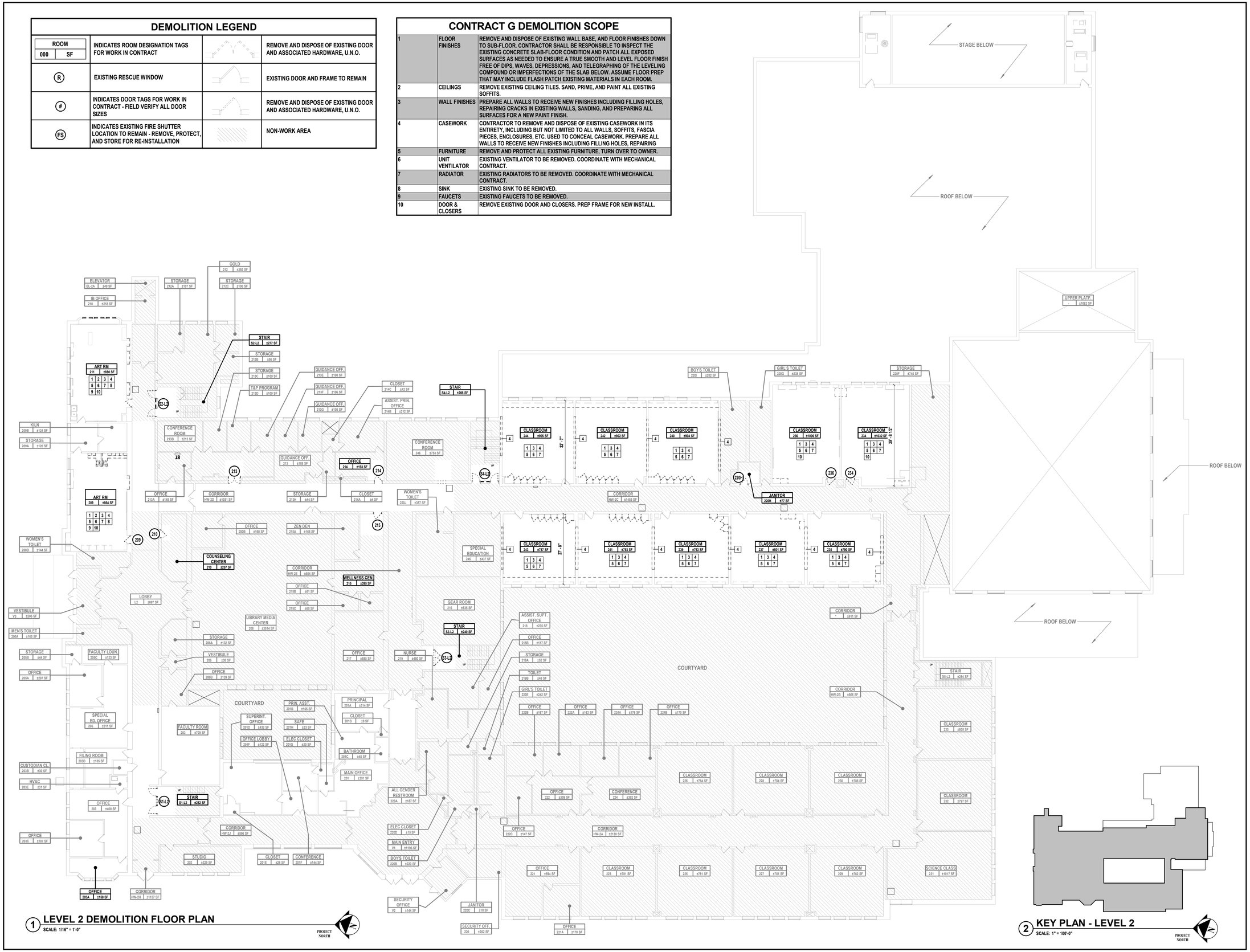
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DEMOLITION LEGEND

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7	RADIATOR	EXISTING RADIATORS TO BE REMOVED. COORDINATE WITH MECHANICAL CONTRACT.
8	SINK	EXISTING SINK TO BE REMOVED.
9	FAUCETS	EXISTING FAUCETS TO BE REMOVED.
10	DOOR & CLOSERS	REMOVE EXISTING DOOR AND CLOSERS. PREP FRAME FOR NEW INSTALL.



1 LEVEL 2 DEMOLITION FLOOR PLAN
SCALE: 1/16" = 1'-0"

PROJECT NORTH

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

PROJECT NORTH

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SHEET TITLE

DEMOLITION PLAN LEVEL 2

DRAWING No.

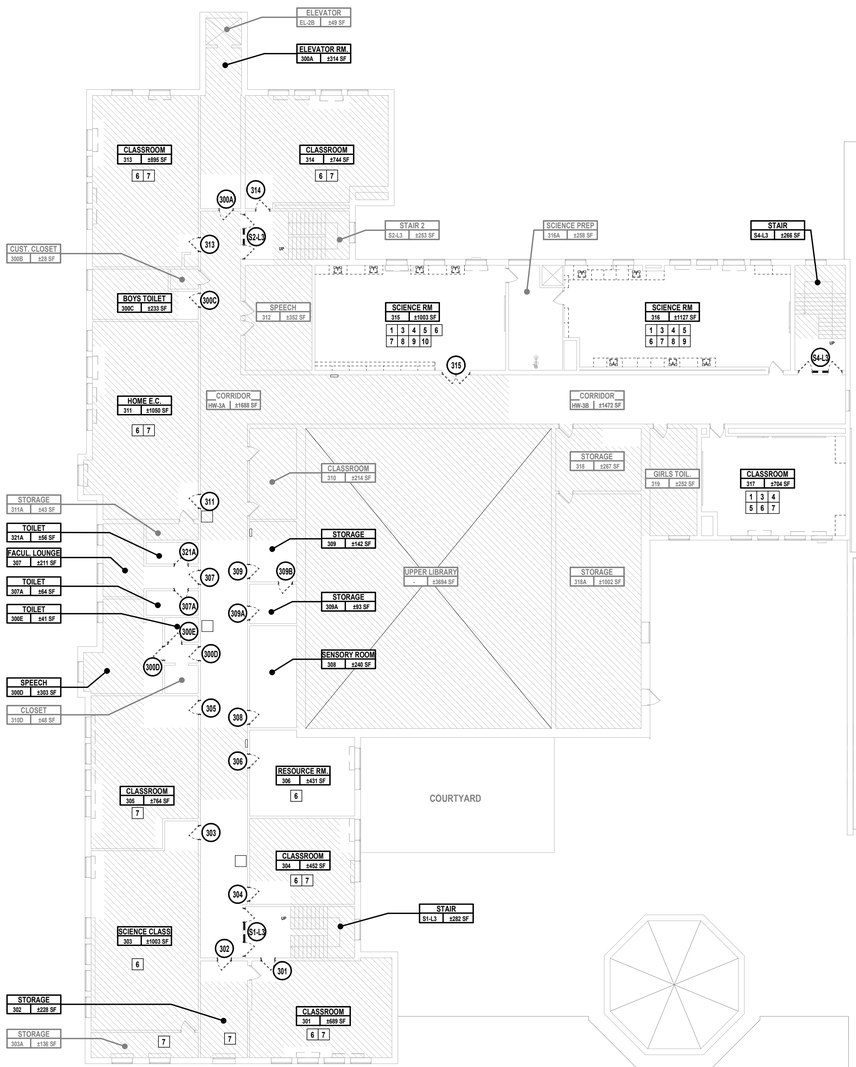
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DEMOLITION LEGEND

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CONTRACT G DEMOLITION SCOPE

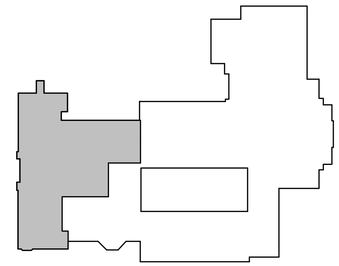
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1 LEVEL 3 DEMOLITION FLOOR PLAN

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

PROJECT NORTH



2 KEY PLAN - LEVEL 3

SCALE: 1" = 100'-0"

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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:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202, SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT G GENERAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

DEMOLITION PLAN LEVEL 3

DRAWING No.

MS-AD 103.00

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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 PARTIONS TO BE REMOVED AND DISPOSED OF. SEE DEMOLITION NOTES FOR ADDITIONAL INFORMATION

DEMOLITION NOTES - CONTRACT G

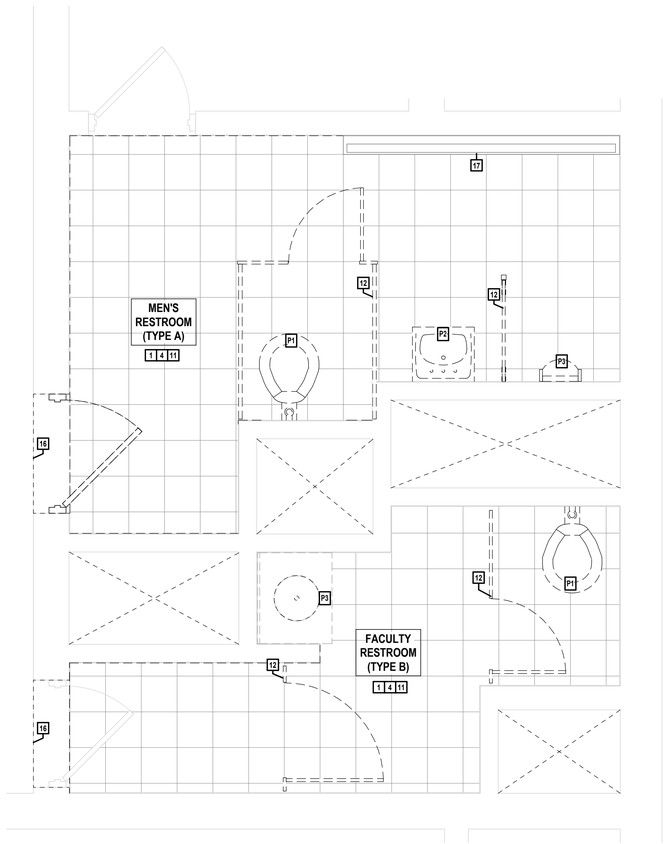
1	FLOOR FINISH	EXISTING TILE FLOOR TO BE REMOVED AND ABATE COMPLETELY DOWN TO EXISTING CONCRETE FLOOR SLAB BELOW. REMOVELS SHALL INCLUDE TILE, MASTIC, GROUT, REINFORCING MESH, AND ALL DEVICES / MATERIALS USED TO SECURE THE TILE FINISH IN PLACE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSPECTING THE CONDITION 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. UPON COMPLETION OF WALL PREPARATION, REINSTALL EXISTING WALL MOUNTED ITEMS.
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 EPOXY WALL FINISH.
12	PARTITION SYSTEM	REMOVE AND DISPOSE OF EXISTING TOILET PARTITION SYSTEM
16	DOOR THRESHOLD	REMOVE AND DISPOSE OF EXISTING DOOR THRESHOLD. PREPARE FLOOR SURFACE FOR NEW THRESHOLD TO BE INSTALLED.
17	RADIATOR COVER	REMOVE AND DISPOSE OF EXISTING RADIATOR COVER.

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 NOTES - CONTRACT P

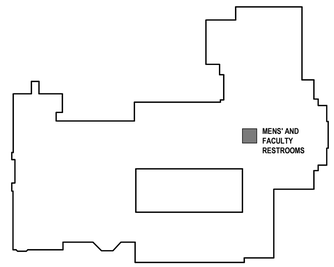
P1	FLOOR MOUNTED TOILET	REMOVE AND DISPOSE OF EXISTING TOILET.
P2	WALL HUNG SINGLE SINK	REMOVE AND DISPOSE OF EXISTING SINK AND CARRIER ARMS.
P3	SINK AND VANITY	REMOVE AND DISPOSE OF EXISTING SINK AND VANITY.
P4	WALL HUNG URINAL	REMOVE AND DISPOSE OF EXISTING URINAL.
P5	FLOOR DRAIN COVER	REMOVE AND DISPOSE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



1 RESTROOM TYPES A & B - DEMOLITION
SCALE: 1/2" = 1'-0"

KEY PLAN LEGEND

ALTERATION LEVEL 1 AREAS OF WORK



2 KEY PLAN - FIRST FLOOR
SCALE: 1" = 100'-0"

H2M architects + engineers
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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

09/30/2029
KATRINA N. PACHECO, R.A.
NY PROFESSIONAL ARCHITECT Lic. No. 041163 Exp. Date

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M. LUCK	M. LUCK	S. MANDIC	K. PACHECO

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202, SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT G GENERAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

RESTROOM UPGRADES DEMOLITION PLAN

DRAWING No.

MS-AD 430.00

X:\SMSD (Somers School District)\SMSD2507 (SMS Phase 2-Various Upgrades)\02-BIM-CADD\Con-Docs\08 Architectural\Bathroom Upgrades\SMSD2507_Bathroom Upgrades.rvt

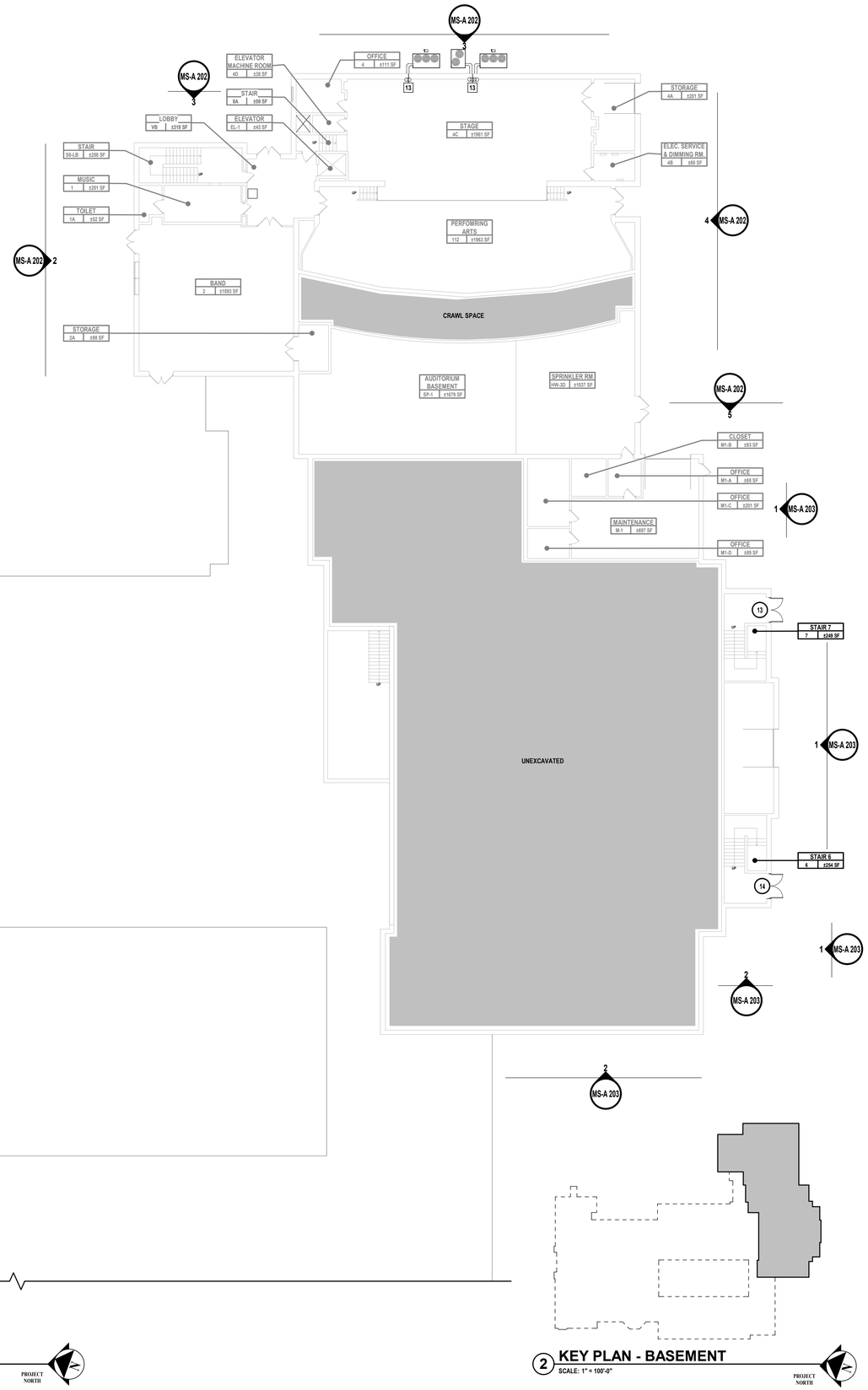
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FLOOR PLAN LEGEND

A101 / TYPE A	ROOM NUMBER ROOM TYPE		EXISTING WINDOW TO REMAIN		NEW CHASE WALL
11	KEYED SCOPE NOTE INDICATOR		EXISTING WALL TO REMAIN	##	WALL TAG- REFER TO ARCHITECTURAL DETAILS
	EXISTING DOOR AND DOOR FRAME TO REMAIN. PAINT DOOR FRAME AS SELECTED BY DISTRICT		FURNISH NEW DOOR AND FRAME. PAINT DOOR FRAME AS SELECTED BY DISTRICT		NON-WORK AREA

CONTRACT G SCOPE

13	NEW PENETRATIONS	COORDINATE NEW PIPING PENETRATIONS WITH MC.



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

PROJECT NORTH

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

PROJECT NORTH

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REGISTERED ARCHITECT KATRINA PACHECO 041183 STATE OF NEW YORK

09/30/2029
Exp. Date

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SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202, SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT G
GENERAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

FLOOR PLAN BASEMENT

DRAWING No.

MS-A 100.00

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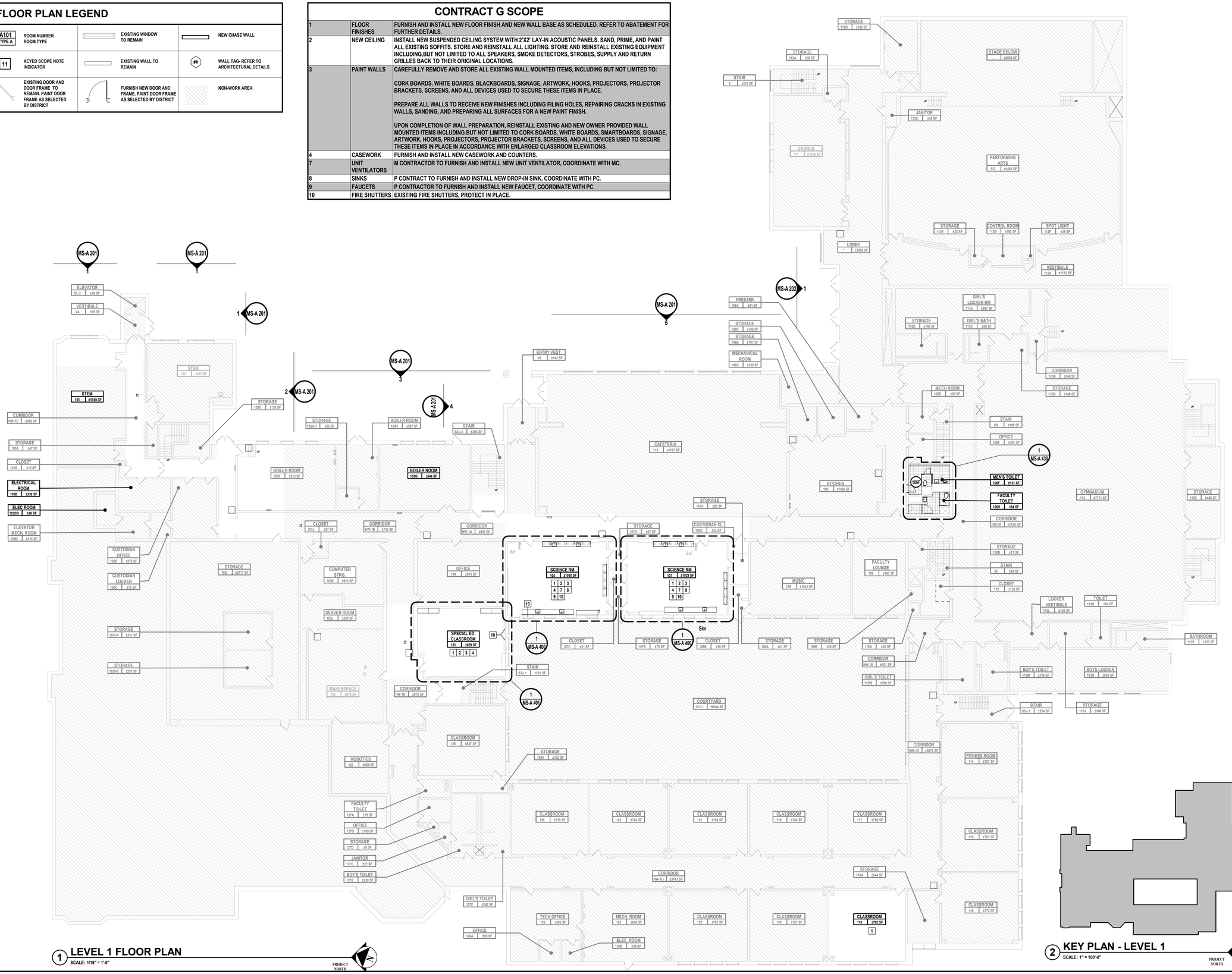
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FLOOR PLAN LEGEND

A101 / TYPE A	ROOM NUMBER ROOM TYPE		EXISTING WINDOW TO REMAIN		NEW CHASE WALL
11	KEYED SCOPE NOTE INDICATOR		EXISTING WALL TO REMAIN	##	WALL TAG- REFER TO ARCHITECTURAL DETAILS
	EXISTING DOOR AND DOOR FRAME TO REMAIN. PAINT DOOR FRAME AS SELECTED BY DISTRICT		FURNISH NEW DOOR AND FRAME. PAINT DOOR FRAME AS SELECTED BY DISTRICT		NON-WORK AREA

CONTRACT G SCOPE

1	FLOOR FINISHES	FURNISH AND INSTALL NEW FLOOR FINISH AND NEW WALL BASE AS SCHEDULED. REFER TO ABATEMENT FOR FURTHER DETAILS.
2	NEW CEILING	INSTALL NEW SUSPENDED CEILING SYSTEM WITH 2'X2' LAY-IN ACOUSTIC PANELS. SAND, PRIME, AND PAINT ALL EXISTING SOFFITS. STORE AND REINSTALL ALL LIGHTING. STORE AND REINSTALL EXISTING EQUIPMENT INCLUDING,BUT NOT LIMITED TO ALL SPEAKERS, SMOKE DETECTORS, STROBES, SUPPLY AND RETURN GRILLES BACK TO THEIR ORIGINAL LOCATIONS.
3	PAINT WALLS	CAREFULLY REMOVE AND STORE ALL EXISTING WALL MOUNTED ITEMS, INCLUDING BUT NOT LIMITED TO: CORK BOARDS, WHITE BOARDS, BLACKBOARDS, SIGNAGE, ARTWORK, HOOKS, PROJECTORS, PROJECTOR BRACKETS, SCREENS, AND ALL DEVICES USED TO SECURE THESE ITEMS IN PLACE. PREPARE ALL WALLS TO RECEIVE NEW FINISHES INCLUDING FILING HOLES, REPAIRING CRACKS IN EXISTING WALLS, SANDING, AND PREPARING ALL SURFACES FOR A NEW PAINT FINISH. UPON COMPLETION OF WALL PREPARATION, REINSTALL EXISTING AND NEW OWNER PROVIDED WALL MOUNTED ITEMS INCLUDING BUT NOT LIMITED TO CORK BOARDS, WHITE BOARDS, SMARTBOARDS, SIGNAGE, ARTWORK, HOOKS, PROJECTORS, PROJECTOR BRACKETS, SCREENS, AND ALL DEVICES USED TO SECURE THESE ITEMS IN PLACE IN ACCORDANCE WITH ENLARGED CLASSROOM ELEVATIONS.
4	CASEWORK	FURNISH AND INSTALL NEW CASEWORK AND COUNTERS.
7	UNIT VENTILATORS	M CONTRACTOR TO FURNISH AND INSTALL NEW UNIT VENTILATOR, COORDINATE WITH MC.
8	SINKS	P CONTRACT TO FURNISH AND INSTALL NEW DROP-IN SINK, COORDINATE WITH PC.
9	FAUCETS	P CONTRACTOR TO FURNISH AND INSTALL NEW FAUCET, COORDINATE WITH PC.
10	FIRE SHUTTERS	EXISTING FIRE SHUTTERS, PROTECT IN PLACE.



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

PROJECT NORTH

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

PROJECT NORTH

H 2 M architects + engineers

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CONSULTANTS:

MARK	DATE	DESCRIPTION

REGISTERED ARCHITECT KATRINA PACHECO 041183 STATE OF NEW YORK

09/30/2029
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A.PAPPAS	A. PAPPAS	S. MANDIC	K. PACHECO

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202, SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT G GENERAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

FLOOR PLAN FIRST FLOOR

DRAWING No.

MS-A 101.00

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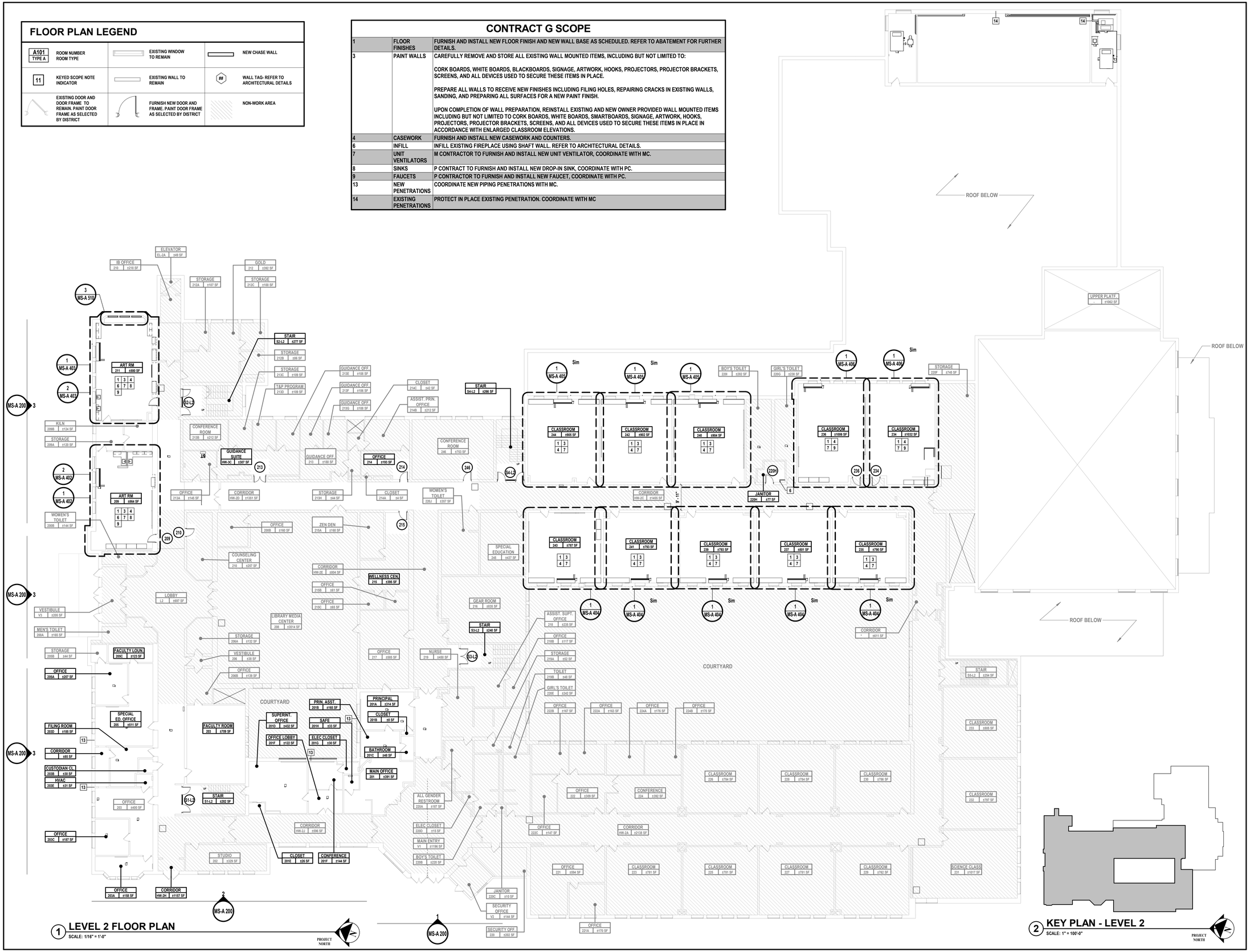
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FLOOR PLAN LEGEND

A101 / TYPE A	ROOM NUMBER ROOM TYPE		EXISTING WINDOW TO REMAIN		NEW CHASE WALL
11	KEYED SCOPE NOTE INDICATOR		EXISTING WALL TO REMAIN	##	WALL TAG- REFER TO ARCHITECTURAL DETAILS
	EXISTING DOOR AND DOOR FRAME TO REMAIN. PAINT DOOR FRAME AS SELECTED BY DISTRICT		FURNISH NEW DOOR AND FRAME. PAINT DOOR FRAME AS SELECTED BY DISTRICT		NON-WORK AREA

CONTRACT G SCOPE

1	FLOOR FINISHES	FURNISH AND INSTALL NEW FLOOR FINISH AND NEW WALL BASE AS SCHEDULED. REFER TO ABATEMENT FOR FURTHER DETAILS.
3	PAINT WALLS	CAREFULLY REMOVE AND STORE ALL EXISTING WALL MOUNTED ITEMS, INCLUDING BUT NOT LIMITED TO: CORK BOARDS, WHITE BOARDS, BLACKBOARDS, SIGNAGE, ARTWORK, HOOKS, PROJECTORS, PROJECTOR BRACKETS, SCREENS, AND ALL DEVICES USED TO SECURE THESE ITEMS IN PLACE. PREPARE ALL WALLS TO RECEIVE NEW FINISHES INCLUDING FILING HOLES, REPAIRING CRACKS IN EXISTING WALLS, SANDING, AND PREPARING ALL SURFACES FOR A NEW PAINT FINISH. UPON COMPLETION OF WALL PREPARATION, REINSTALL EXISTING AND NEW OWNER PROVIDED WALL MOUNTED ITEMS INCLUDING BUT NOT LIMITED TO CORK BOARDS, WHITE BOARDS, SMARTBOARDS, SIGNAGE, ARTWORK, HOOKS, PROJECTORS, PROJECTOR BRACKETS, SCREENS, AND ALL DEVICES USED TO SECURE THESE ITEMS IN PLACE IN ACCORDANCE WITH ENLARGED CLASSROOM ELEVATIONS.
4	CASEWORK	FURNISH AND INSTALL NEW CASEWORK AND COUNTERS.
6	INFILL	INFILL EXISTING FIREPLACE USING SHAFT WALL. REFER TO ARCHITECTURAL DETAILS.
7	UNIT VENTILATORS	M CONTRACTOR TO FURNISH AND INSTALL NEW UNIT VENTILATOR, COORDINATE WITH MC.
8	SINKS	P CONTRACT TO FURNISH AND INSTALL NEW DROP-IN SINK, COORDINATE WITH PC.
9	FAUCETS	P CONTRACTOR TO FURNISH AND INSTALL NEW FAUCET, COORDINATE WITH PC.
13	NEW PENETRATIONS	COORDINATE NEW PIPING PENETRATIONS WITH MC.
14	EXISTING PENETRATIONS	PROTECT IN PLACE EXISTING PENETRATION. COORDINATE WITH MC



1 **LEVEL 2 FLOOR PLAN**
SCALE: 1/16" = 1'-0"

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

PROJECT NORTH

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CONSULTANTS:

MARK	DATE	DESCRIPTION

REGISTERED ARCHITECT KATRINA PACHECO 041183 STATE OF NEW YORK

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A. PAPPAS	A. PAPPAS	S. MANDIC	K. PACHECO

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202, SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT
CONTRACT G GENERAL CONSTRUCTION

STATUS
SED SUBMISSION

SHEET TITLE
FLOOR PLAN SECOND FLOOR

DRAWING No.
MS-A 102.00

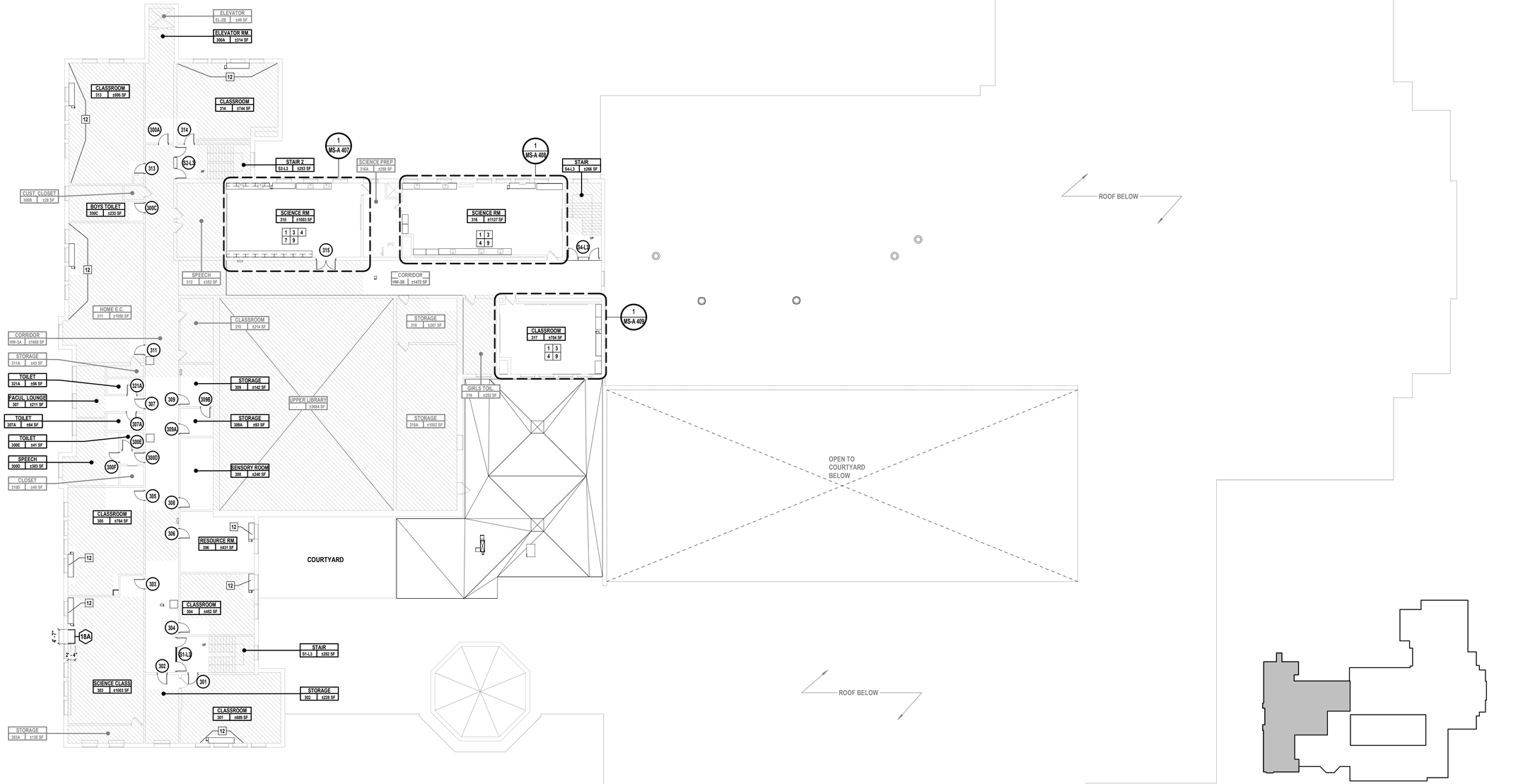
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FLOOR PLAN LEGEND

A101 / TYPE A — ROOM NUMBER ROOM TYPE	EXISTING WINDOW TO REMAIN	NEW CHASE WALL
11 — KEYED SCOPE NOTE INDICATOR	EXISTING WALL TO REMAIN	## — WALL TAG- REFER TO ARCHITECTURAL DETAILS
EXISTING DOOR AND DOOR FRAME TO REMAIN. PAINT DOOR FRAME AS SELECTED BY DISTRICT	FURNISH NEW DOOR AND FRAME. PAINT DOOR FRAME AS SELECTED BY DISTRICT	NON-WORK AREA

CONTRACT G SCOPE

1	FLOOR FINISHES	FURNISH AND INSTALL NEW FLOOR FINISH AND NEW WALL BASE AS SCHEDULED. REFER TO ABATEMENT FOR FURTHER DETAILS.
3	PAINT WALLS	CAREFULLY REMOVE AND STORE ALL EXISTING WALL MOUNTED ITEMS, INCLUDING BUT NOT LIMITED TO: CORK BOARDS, WHITE BOARDS, BLACKBOARDS, SIGNAGE, ARTWORK, HOOKS, PROJECTORS, PROJECTOR BRACKETS, SCREENS, AND ALL DEVICES USED TO SECURE THESE ITEMS IN PLACE. PREPARE ALL WALLS TO RECEIVE NEW FINISHES INCLUDING FILING HOLES, REPAIRING CRACKS IN EXISTING WALLS, SANDING, AND PREPARING ALL SURFACES FOR A NEW PAINT FINISH. UPON COMPLETION OF WALL PREPARATION, REINSTALL EXISTING AND NEW OWNER PROVIDED WALL MOUNTED ITEMS INCLUDING BUT NOT LIMITED TO CORK BOARDS, WHITE BOARDS, SMARTBOARDS, SIGNAGE, ARTWORK, HOOKS, PROJECTORS, PROJECTOR BRACKETS, SCREENS, AND ALL DEVICES USED TO SECURE THESE ITEMS IN PLACE IN ACCORDANCE WITH ENLARGED CLASSROOM ELEVATIONS.
4	CASEWORK	FURNISH AND INSTALL NEW CASEWORK AND COUNTERS.
7	UNIT VENTILATORS	M CONTRACTOR TO FURNISH AND INSTALL NEW UNIT VENTILATOR, COORDINATE WITH MC.
9	FAUCETS	P CONTRACTOR TO FURNISH AND INSTALL NEW FAUCET, COORDINATE WITH PC.
12	PATCH & REPAIR	PATCH & REPAIR ALL EXISTING FINISHES IMPACTED BY M-CONTRACT.



1 **LEVEL 3 FLOOR PLAN**
SCALE: 1/16" = 1'-0"

PROJECT NORTH

2 **KEY PLAN - LEVEL 3**
N.T.S.

PROJECT NORTH

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SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202, SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT G
GENERAL CONSTRUCTION

STATUS

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SHEET TITLE

FLOOR PLAN THIRD FLOOR

DRAWING No.

MS-A 103.00

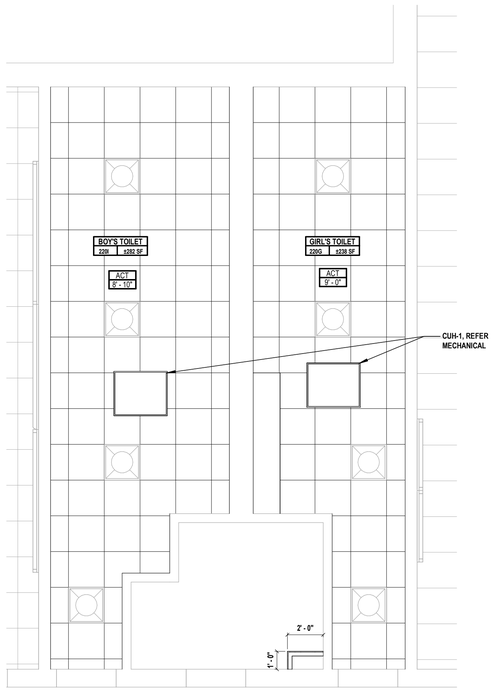
REFLECTED CEILING PLAN LEGEND

A101 / TYPE A / 9'-0" — ROOM NUMBER, ROOM TYPE, ROOM HEIGHT	2'x2' CEILING AND GRID SYSTEM
1X4 LINEAR DROP LIGHTING- EXISTING RETAIN AND REINSTALL. COORDINATE WITH ELECTRICAL CONTRACTOR FOR MORE INFO.	2X4 TROFFER- EXISTING RETAIN AND REINSTALL. COORDINATE WITH ELECTRICAL CONTRACTOR FOR MORE INFO.
DIFUSSER - SEE 'M' DRAWINGS FOR MORE INFO.	RETURN DIFFUSER - SEE 'M' DRAWINGS FOR MORE INFO.

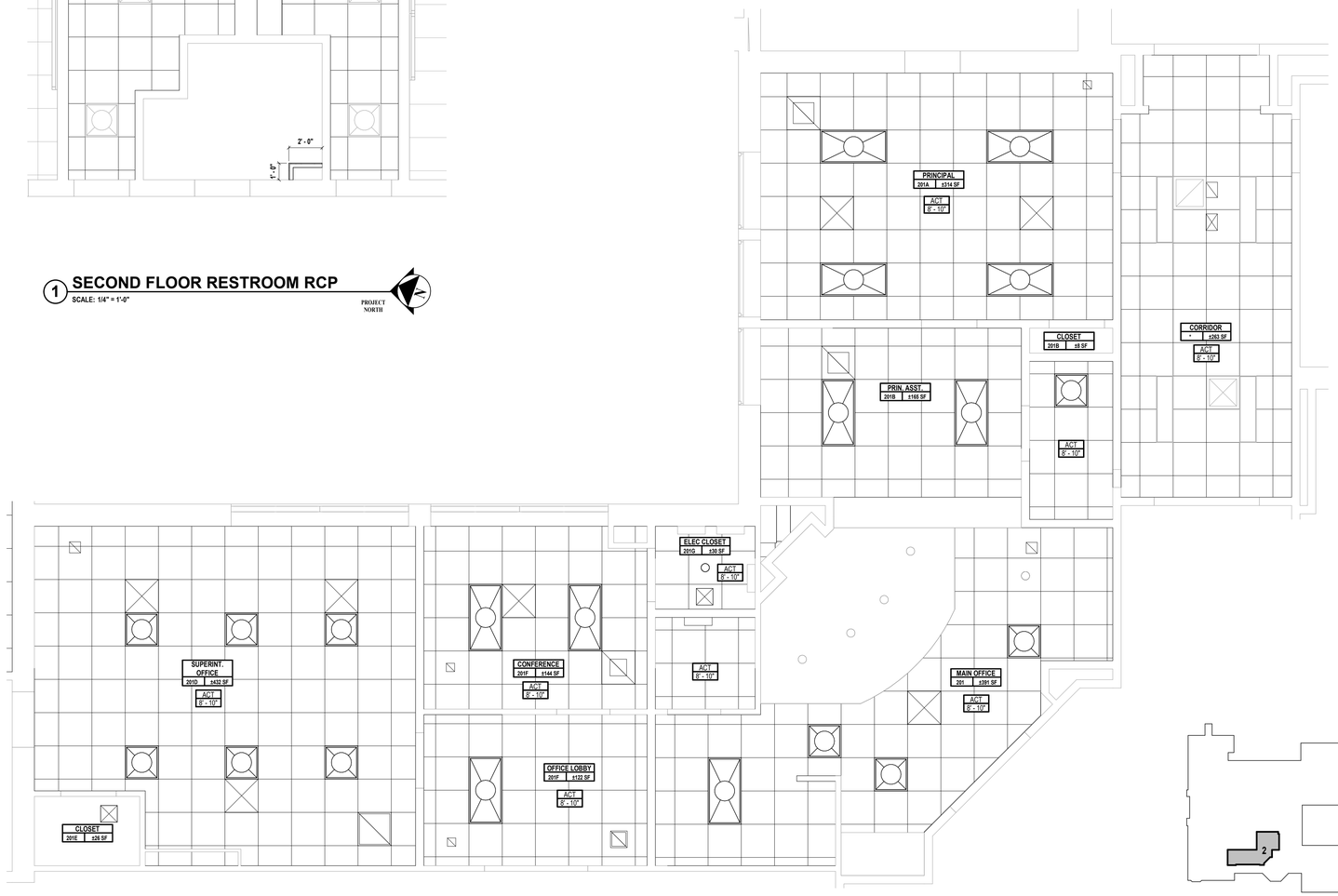
GENERAL RCP DEMOLITION NOTES

1. ALL EXISTING CEILING-MOUNTED DEVICES INCLUDING BUT NOT LIMITED TO EXIT SIGNS, EMERGENCY LIGHTS, SMOKE DETECTORS, (ETC.) TO BE REMOVED, STORED, AND PROTECTED. REINSTALL ALL EXISTING CEILING MOUNTED DEVICES IN THEIR EXISTING LOCATION. SEE REFLECTED CEILING PLANS.

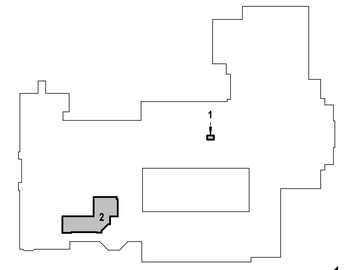
2. ALL EXISTING WALL-MOUNTED EMERGENCY LIGHTS AS INDICATED SHALL REMAIN; PROTECT ALL DEVICES DURING CONSTRUCTION SEE REFLECTED CEILING PLANS.



1 SECOND FLOOR RESTROOM RCP
SCALE: 1/4" = 1'-0"



2 SECOND FLOOR ENLARGED RCP- ADMINISTRATION SUITES
SCALE: 1/4" = 1'-0"



3 KEY PLAN-2ND FLR
SCALE: 1" = 100'-0"

PROJECT NORTH

H 2 M 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
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:
A. PAPPAS	A. PAPPAS	S. MANDIC	K. PACHECO

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202, SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT G GENERAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

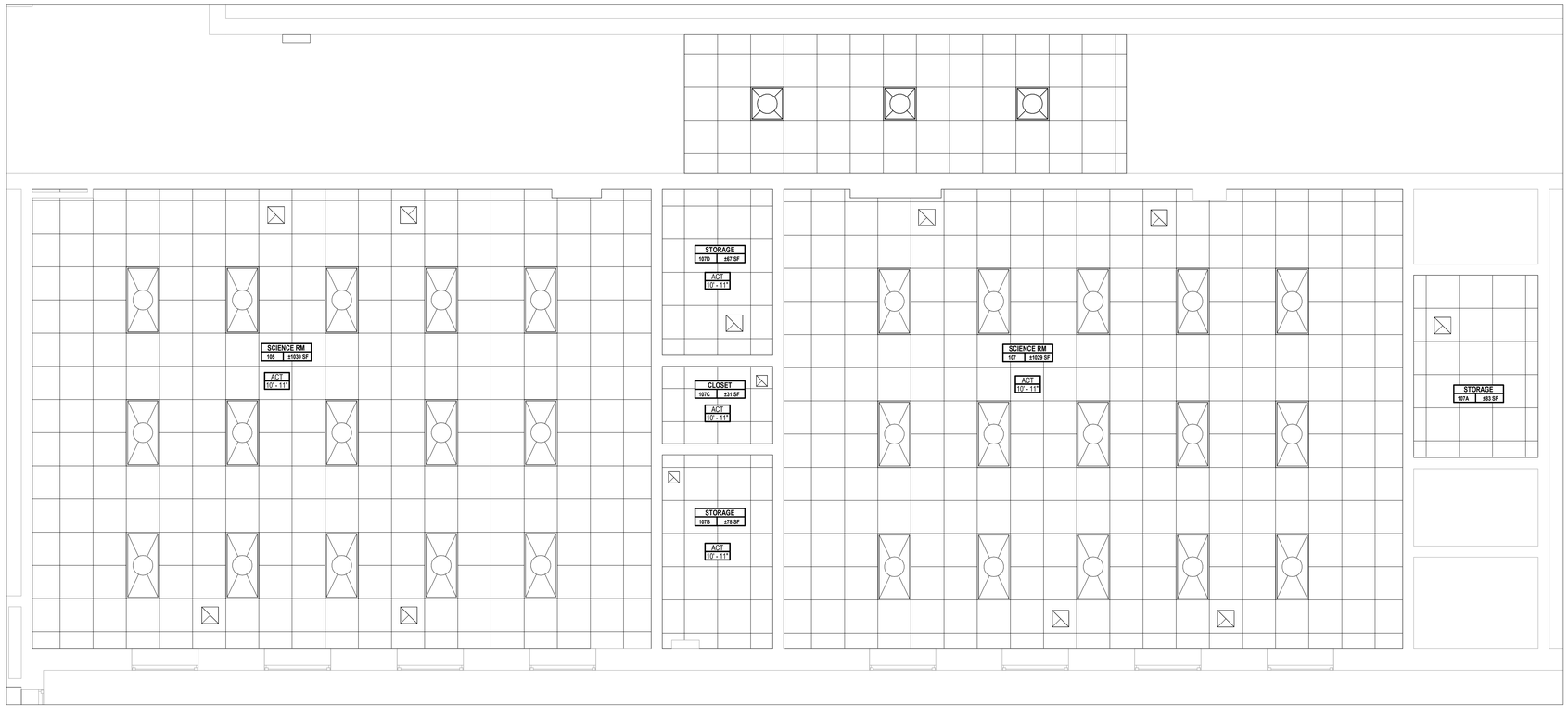
ENLARGED RCP PLANS

DRAWING No.

MS-A 120.00

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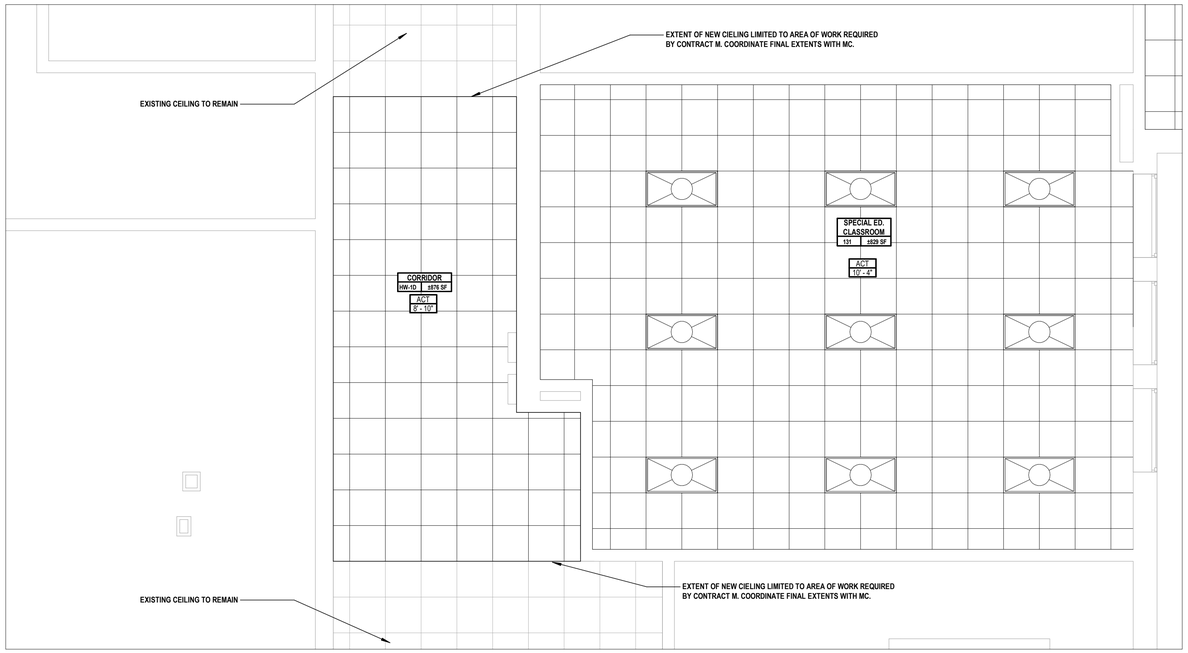
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1 FIRST FLOOR SCIENCE CLASSROOM RCP

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

PROJECT NORTH



2 FIRST FLOOR RM 131 CLASSROOM RCP

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

PROJECT NORTH

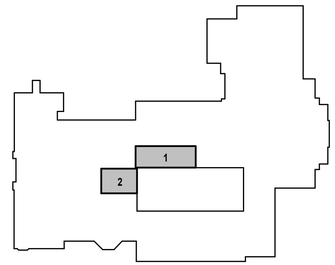
REFLECTED CEILING PLAN LEGEND

A101 TYPE A 9'-0" — ROOM NUMBER, ROOM TYPE, ROOM HEIGHT	2'x2' CEILING AND GRID SYSTEM
1X4 LINEAR DROP LIGHTING- EXISTING RETAIN AND REINSTALL. COORDINATE WITH ELECTRICAL CONTRACTOR FOR MORE INFO.	2X4 TROFFER- EXISTING RETAIN AND REINSTALL. COORDINATE WITH ELECTRICAL CONTRACTOR FOR MORE INFO.
DIFUSSER - SEE 'M' DRAWINGS FOR MORE INFO.	RETURN DIFFUSER - SEE 'M' DRAWINGS FOR MORE INFO.

GENERAL RCP DEMOLITION NOTES

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2. ALL EXISTING WALL-MOUNTED EMERGENCY LIGHTS AS INDICATED SHALL REMAIN; PROTECT ALL DEVICES DURING CONSTRUCTION SEE REFLECTED CEILING PLANS.



3 KEY PLAN

SCALE: 1" = 100'-0"

PROJECT NORTH

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250 US-202, SOMERS, NY 10589

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CONTRACT

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STATUS

SED SUBMISSION

SHEET TITLE

ENLARGED RCP PLANS

DRAWING No.

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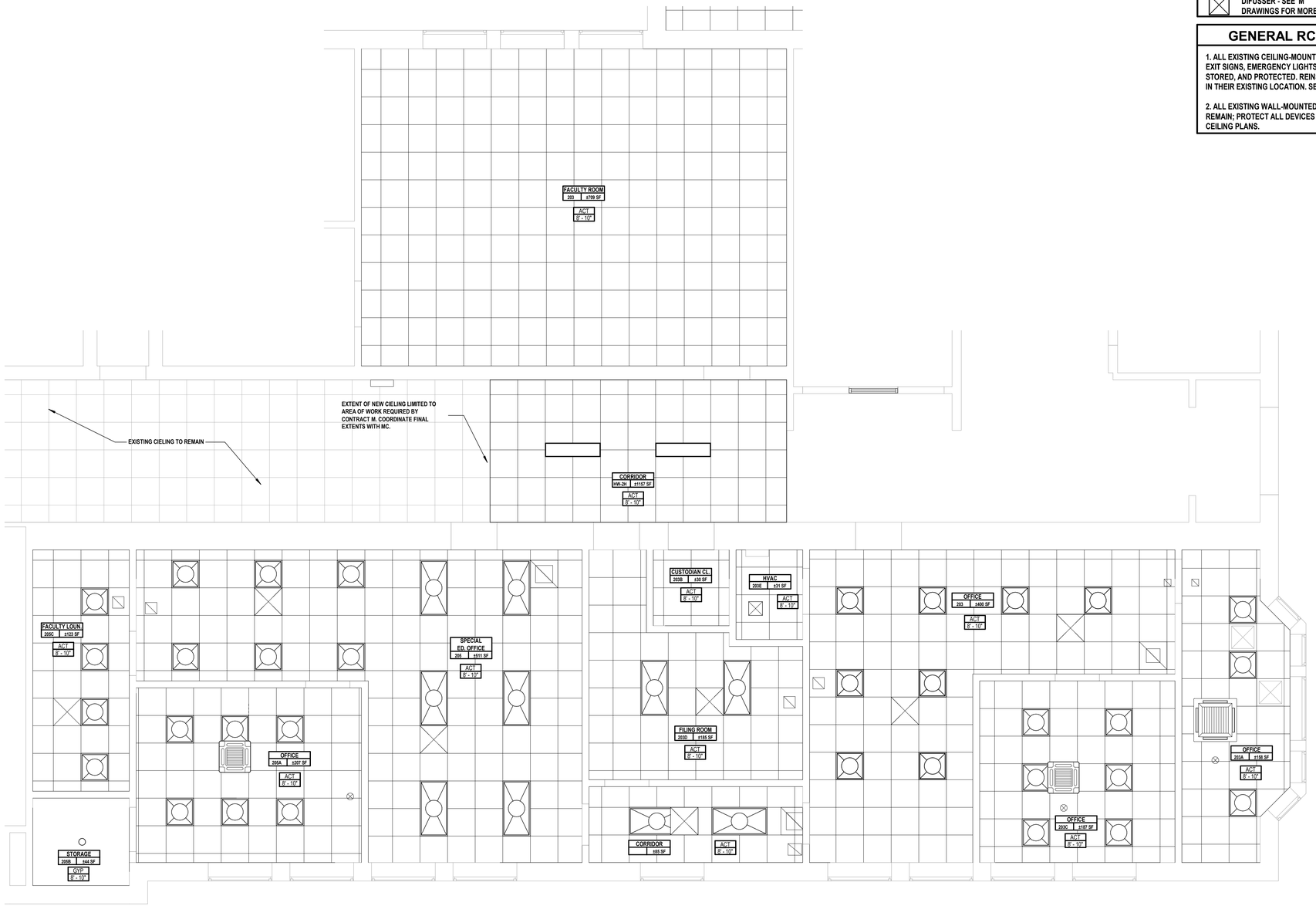
REFLECTED CEILING PLAN LEGEND

A101 / TYPE A / 9'-0" — ROOM NUMBER, ROOM TYPE, ROOM HEIGHT	2'x2' CEILING AND GRID SYSTEM
1X4 LINEAR DROP LIGHTING- EXISTING RETAIN AND REINSTALL. COORDINATE WITH ELECTRICAL CONTRACTOR FOR MORE INFO.	2X4 TROFFER- EXISTING RETAIN AND REINSTALL. COORDINATE WITH ELECTRICAL CONTRACTOR FOR MORE INFO.
DIFUSSER - SEE 'M' DRAWINGS FOR MORE INFO.	RETURN DIFFUSER - SEE 'M' DRAWINGS FOR MORE INFO.

GENERAL RCP DEMOLITION NOTES

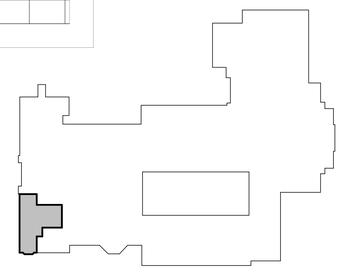
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1 **SECOND FLOOR ENLARGED RCP- SPECIAL EDUCATION OFFICES**
SCALE: 1/4" = 1'-0"

PROJECT NORTH



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

PROJECT NORTH

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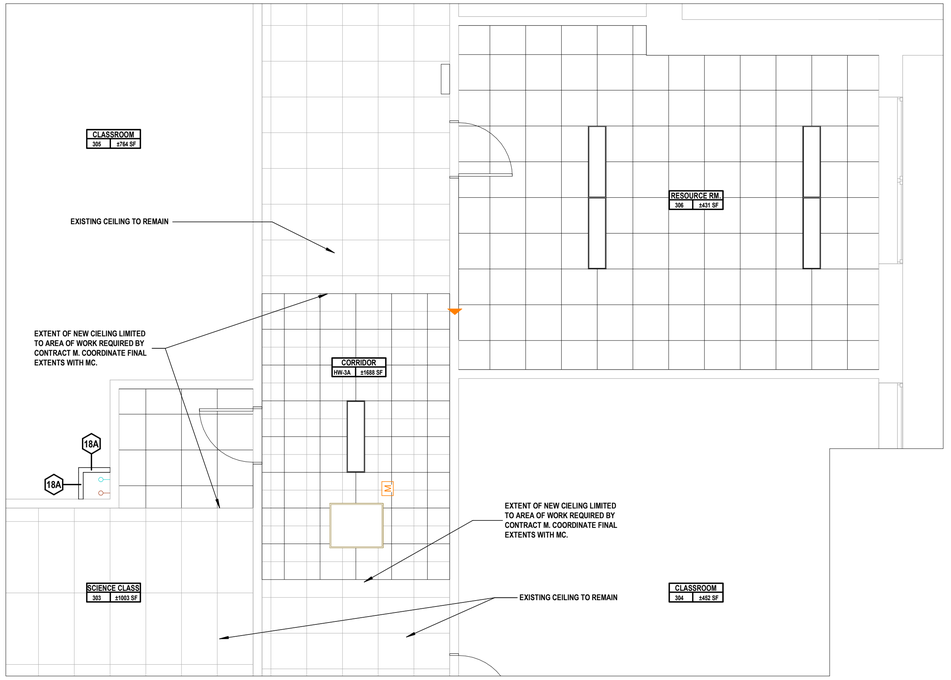
ENLARGED RCP PLANS

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MS-A 122.00

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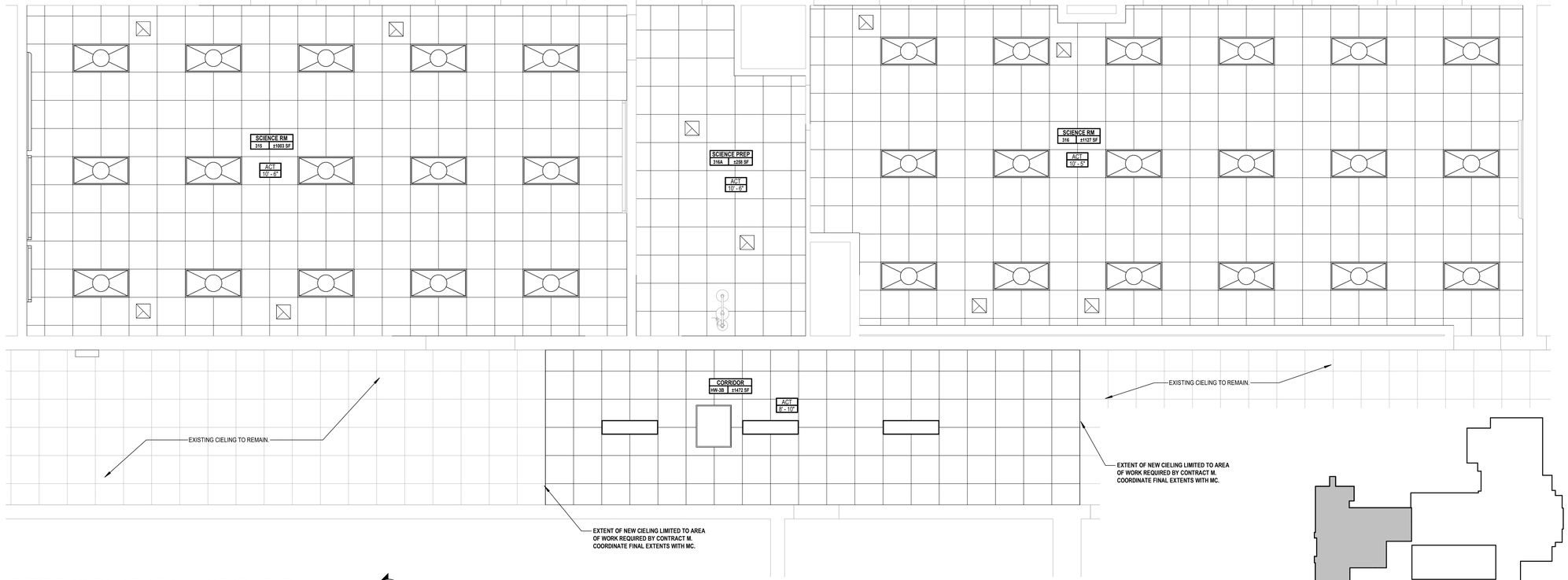
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2 PARTIAL THIRD FLOOR CLASSROOM RCP

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

PROJECT NORTH



1 THIRD FLOOR SCIENCE CLASSROOM RCP

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

PROJECT NORTH

3 KEY PLAN - LEVEL 3 RCP

SCALE: 1" = 100'-0"

PROJECT NORTH

REFLECTED CEILING PLAN LEGEND

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SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

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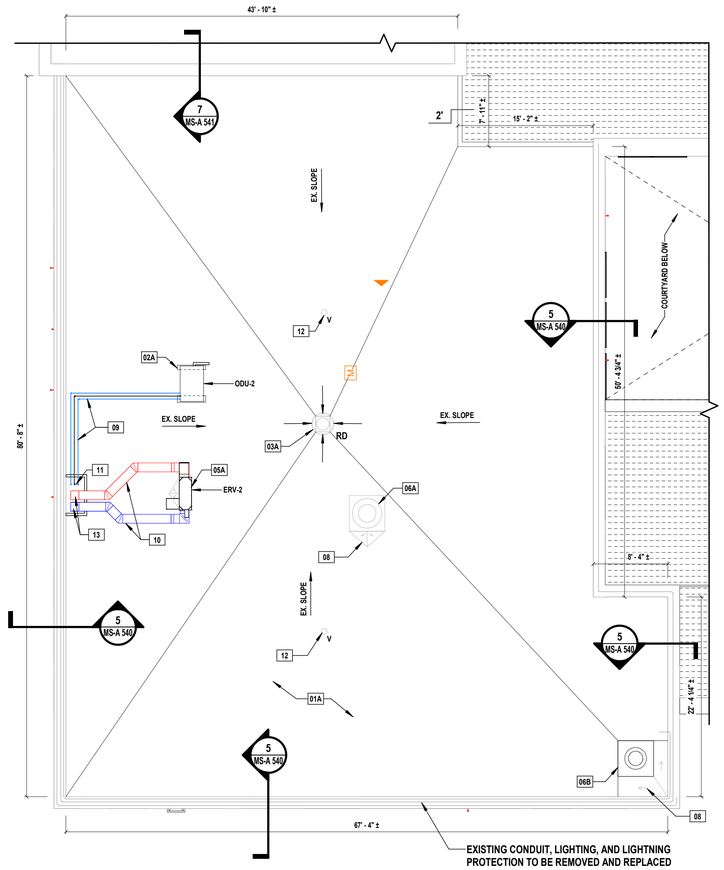
ENLARGED RCP PLANS

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MS-A 123.00

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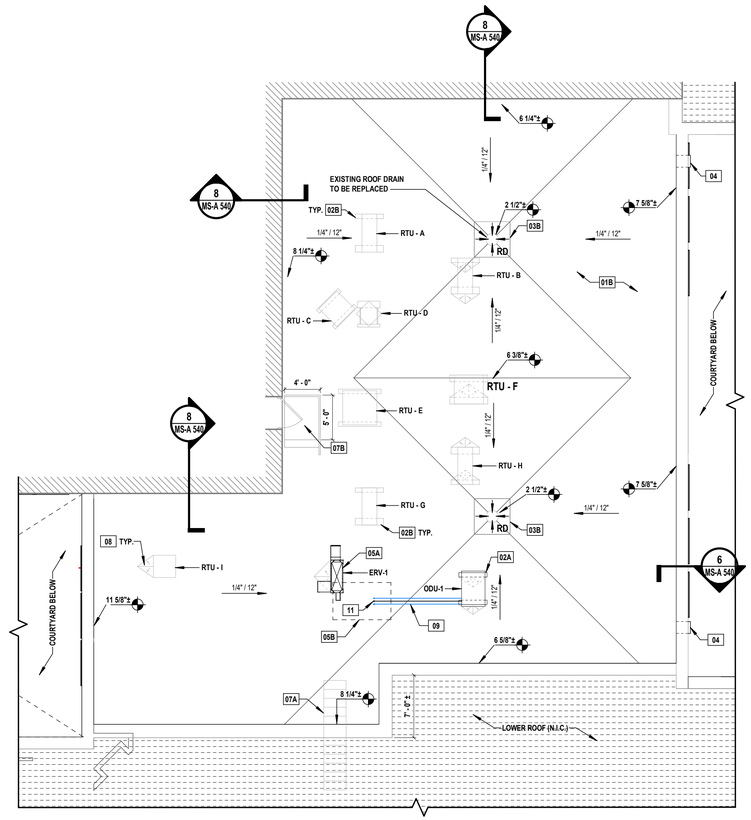
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1 PROPOSED ROOF PLAN A

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

PROJECT NORTH



2 PROPOSED ROOF PLAN B

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

PROJECT NORTH

ROOFING KEY NOTES

Mark	Description
01A	PROVIDE NEW FULLY ADHERED SINGLE-PLY ROOFING MEMBRANE SYSTEM AS INDICATED. PROVIDE NEW VAPOR BARRIER, MINIMUM 2 LAYERS RIGID INSULATION BOARDS (TOTAL: R-34 MIN.), COVER BOARD, MECHANICAL ATTACHMENTS, PRIMERS AND ADHESIVES, MEMBRANE ROOFING, FLASHINGS, SEALANTS, AND MISCELLANEOUS ACCESSORIES AS REQUIRED FOR A TOTAL SYSTEM WARRANTY BY THE MANUFACTURER.
01B	PROVIDE NEW FULLY ADHERED SINGLE-PLY ROOFING MEMBRANE SYSTEM AS INDICATED. PROVIDE NEW VAPOR BARRIER, TAPERED RIGID INSULATION BOARDS (AVERAGE R-39 MIN.), COVER BOARD, MECHANICAL ATTACHMENTS, PRIMERS AND ADHESIVES, MEMBRANE ROOFING, FLASHINGS, SEALANTS, AND MISCELLANEOUS ACCESSORIES AS REQUIRED FOR A TOTAL SYSTEM WARRANTY BY THE MANUFACTURER. SEE ASSEMBLY 2/A 540
02A	NEW MECHANICAL UNIT WITH NEW EQUIPMENT RAILS PROVIDED BY CONTRACT "M" AND INSTALLED BY CONTRACT "G". PROVIDE NEW CRICKET USING TAPERED RIGID INSULATION (3/8" SLOPE MIN.) AS REQUIRED TO DIVERT STORM DRAINAGE AROUND NEW EQUIPMENT RAILS. SEE DETAIL 2/MS-A 541.
02B	EXISTING EQUIPMENT RAILS, PROVIDE NEW CRICKET USING TAPERED RIGID INSULATION (3/8" / FT SLOPE MIN.) AS REQUIRED TO DIVERT STORM DRAINAGE AROUND NEW EQUIPMENT RAILS. SEE DETAIL 1/MS-A 541.
03A	REMOVE AND REPLACE ROOF DRAIN, PROVIDE PRE-FORMED POLYISO DRAIN TARGET SUMP - SEE DETAIL 3/MS-A 540
03B	REMOVE AND REPLACE ROOF DRAIN, PROVIDE PRE-FORMED POLYISO DRAIN TARGET SUMP - SEE DETAIL 4/MS-A 540
04	REMOVE AND REPLACE EXISTING OVER FLOW THROUGH WALL SCUPPER AND FLASHING - SEE DETAIL 7/MS-A 540
05A	NEW RTU AND EQUIPMENT CURB - SEE DETAIL 4/MS-A 541
05B	EXISTING RTU AND EQUIPMENT CURB TO BE REMOVED BY CONTRACT 'G'- COORDINATE WITH CONTRACT 'M' AND 'E' FOR DECOMMISSIONING OF MECHANICAL UNIT. SEE STRUCTURAL DRAWINGS FOR ROOF DECK OPENING INFILL.
06A	EXISTING EXHUAST FAN AND EQUIPMENT CURB TO REMAIN. TIE IN AND FLASHING NEW ROOFING SYSTEM TO EXISTING EQUIPEMENT CURB - SEE DETAIL 3/MS-A 541
06B	NEW EXHUAST FAN AND EQUIPMENT CURB - SEE DETAIL 4/MS-A 541
07A	REMOVE EXISTING WOODEN AND REPLACE WITH NEW PRE-FABRICATED PARAPET CROSS OVER PLATFORM STAIR (BASIS-OF-DESIGN: KEE STEP, CROSSOVER WITH NON-PENETRATING RUBBER BASE AT STANDARD 2 FOOT WIDTH) PROVIDE MINIMUM 5 RISERS ON HIGH SIDE AND 6 RISERS ON LOW SIDE WITH 39" LONG LANDING. CONTINUOUS OSHA COMPLIANT GUARD AND HAND RAILS SHALL BE PROVIDED ON EACH SIDE. PLACE LOOSE LAID EPDM MEMBRANE BETWEEN RUBBER BASE PADS AND FINISHED EPDM MEMBRANE.
07B	REMOVE EXISTING WOODEN DOOR LANDING AND REPLACE WITH NEW PRE-FABRICATED PLATFORM BASIS-OF-DESIGN: KEE STEP, CROSSOVER WITH NON-PENTRATING RUBBER BASE AT 4 FOOT WIDTH) PROVIDE 4' x 5' LANDING AT DOOR WITH MINUMUM 1 RISERS FROM LANDING WITH FINISHED ROOF. CONTINUOUS OSHA COMPLIANT GUARD AND HAND RAILS SHALL BE PROVIDED ON EACH SIDE. PLACE LOOSE LAID EPDM MEMBRANE BETWEEN RUBBER BASE PADS AND FINISHED EPDM MEMBRANE.
08	PROVIDED NEW CRICKET USING TAPERED RIGID INSULATION (3/8" / FT SLOPE MIN.) AS REQUIRED TO DIVERT STORM DRAINAGE AROUND EQUIPMENT RAILS AND CURBS.
09	NEW CONDENSATE PIPING, COORDINATE WITH CONTRACT "M" FOR EQUIPMENT RAIL SUPPORT QTY. AND LOCATIONS. EQUIPMENT RAILS TO BE PROVIDED BY CONTRACT "M" AND INSTALLED BY CONTRACT "G". REFER TO DETAIL 2/MS-A 541
10	NEW MECHANICAL DUCTWORK, COORDINATE WITH CONTRACT "M" FOR EQUIPMENT RAIL SUPPORT QTY. AND LOCATIONS. EQUIPMENT RAILS TO BE PROVIDED BY CONTRACT "M" AND INSTALLED BY CONTRACT "G". REFER TO DETAIL 2/MS-A 541
11	NEW PIPE CURB PROVIDED BY CONTRACT "M" AND INSTALLED BY CONTRACT "G", REFER TO SIMILAR DETAIL 4/MS-A 541.
12	EXISTING VENT PIPE WITH NEW PREFORMED PIPE BOOT. PROVIDE NEW PIPE EXTENSION AS REQUIRED TO MAINTAIN 18" MINIMUM HEIGHT ABOVE FINISHED ROOF, REFER TO DETAIL 5/MS-A 541
13	NEW THROUGH ROOF DUCT CURB PROVIDED BY CONTRACT "M" AND INSTALLED BY CONTRACT "G", REFER TO DETAIL 6/MS-A 541.

GENERAL CONSTRUCTION NOTES

1. THESE DRAWINGS SERVE AS A GRAPHICAL REPRESENTATION OF THE INTENDED SCOPE OF THE WORK AND CONSTITUTE ONE PORTION OF THE CONSTRUCTION DOCUMENTS MAKING UP THE PROJECT MANUAL. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION BETWEEN THESE DRAWINGS AND THE SPECIFICATIONS, AND WITH WORK BY OTHER TRADES.
2. THE INTENDED SCOPE OF WORK INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING:
   A. AT ROOFS 'A' AND 'B': THE COMPLETE REMOVAL AND DISPOSAL OF THE EXISTING MODIFIED BITUMEN ROOFING SYSTEM DOWN TO THE EXISTING ROOF DECK; AND THE INSTALLATION OF A NEW EPDM ROOFING SYSTEM (AS INDICATED ON DRAWINGS), INCLUDING ALL ROOFING MEMBRANES, COVER BOARDS, INSULATION, ADHESIVES, FLASHINGS, VAPOR BARRIER UNDERLAYMENTS, STACK/PIPE FLASHINGS AND COVERS, AND MISCELLANEOUS ACCESSORIES AS REQUIRED FOR A TOTAL SYSTEM WARRANTY.
   B. THE REMOVAL OF EXISTING ROOF EDGE-METALS AND TRIMS; AND THE INSTALLATION OF A NEW EDGE METALS SYSTEM (AS INDICATED ON DRAWINGS), INCLUDING SNAP-ON FASCIA COVERS, ATTACHMENT CLEATS, FASCIA EXTENSIONS, FASTENERS AND ATTACHMENTS, SEALANTS, BLOCKING, AND MISCELLANEOUS ACCESSORIES AS REQUIRED FOR A COMPLETE SYSTEM.
   C. THE INSTALLATION OF NEW DOOR LANDING PLATFORM (AS INDICATED ON DRAWINGS) AND PARAPET CROSS OVER PLATFORM STAIR (AS INDICATED ON DRAWINGS).
   D. THE MAINTENANCE OF ALL EXISTING ROOFTOP EQUIPMENT, CURBS AND DUNNAGE, SUPPORTS, ROOF DRAINS, VENT STACKS, PENETRATIONS, ROOF HATCHES, SKYLIGHTS, AND EXPANSION JOINTS. ANY AREAS OR ITEMS DAMAGED DURING THE PERFORMANCE OF WORK WHICH ARE NOT PART(S) OF THE PROJECT SCOPE SHALL BE REPAIRED AND/OR REPLACED AT NO ADDITIONAL COST TO THE OWNER.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL EQUIPMENT, LABOR, MATERIALS AND MISCELLANEOUS ACCESSORIES, WHETHER INDICATED IN THE CONTRACT DOCUMENTS OR NOT, AS REQUIRED FOR THE INSTALLATION OF A TOTAL SYSTEM WARRANTY.
4. PRIOR TO SUBMITTING A BID FOR THE WORK, THE CONTRACTOR SHALL WALK THE EXISTING ROOF WITH THE ARCHITECT AND OWNER'S REPRESENTATIVE. FOLLOWING SUBMISSION OF A BID, NO CLAIMS SHALL BE MADE REGARDING THE SCOPE OF WORK.
5. CONTRACTOR SHALL ONLY PERFORM AS MUCH DEMOLITION AND REMOVALS WORK AS CAN BE RECOVERED, REPAIRED, OR REPLACED WITH NEW WITHIN THE SAME WORKING DAY. THE INTEGRITY AND WATERTIGHTNESS OF THE ROOF ASSEMBLY SHALL BE MAINTAINED AT ALL TIMES THROUGHOUT THE DURATION OF WORK.
6. CONTRACTOR SHALL VERIFY THE LOCATIONS AND HEIGHTS OF ALL ROOF PLANES, EXTERIOR BUILDING FEATURES BENEATH THE ROOFS, PENETRATIONS THROUGH ROOF DECKS AND/OR WALLS, AND EQUIPMENT CURBS AND SUPPORTS. THE CONTRACTOR SHALL, AT ALL TIMES DURING THE COURSE OF WORK, PROTECT EXISTING EQUIPMENT, DUCTWORK, SKYLIGHTS, CONDUIT, VENT STACKS, PENETRATIONS, ROOF HATCHES, ADJACENT BUILDING STRUCTURES, DOORS AND FENESTRATIONS, AND FINISHES. ANY DAMAGE ITEMS DAMAGED DURING THE EXECUTION OF THE WORK OF THIS CONTRACT SHALL BE REPLACED AT NO ADDITIONAL COST TO THE OWNER.
7. CONTRACTOR SHALL TEMPORARILY DISCONNECT ELECTRICAL AND MECHANICAL EQUIPMENT AND DEVICES WITHIN THE AREA OF WORK AS REQUIRED. UPON COMPLETION OF THE NEW ROOFING SYSTEM, THE CONTRACTOR SHALL RE-CONNECT ALL EQUIPMENT AND DEVICES AND SHALL ENSURE PROPER WORKING ORDER. ELECTRICAL AND MECHANICAL WORK NOTED SHALL BE PROVIDED BY DULY LICENSED INDIVIDUALS RESPECTIVELY.
8. THE CONTRACTOR IS RESPONSIBLE FOR ALL DAMAGES TO THE INTERIOR AND EXTERIOR OF THE BUILDING THAT RESULT FROM THE WORK, INCLUDING BUT NOT LIMITED TO ADHESIVE DRIPPINGS, WATER LEAKS, EQUIPMENT DAMAGE, DAMAGE TO INTERIOR FEATURES, DAMAGE TO UTILITY SERVICES, AND DAMAGE TO ADJACENT STRUCTURES. ANY ITEMS DAMAGED DURING THE COURSE OF WORK SHALL BE REPLACED AT NO ADDITIONAL COST TO THE OWNER.
9. EXISTING ROOF PITCHES, WHERE INDICATED ON PLANS, ARE APPROXIMATIONS. CONTRACTOR SHALL VERIFY IN-FIELD ACTUAL EXISTING ROOF PITCHES AND SHALL COORDINATE ROOF SYSTEM REPLACEMENT WORK WITH THE ROOFING MANUFACTURER. WHERE NEW TAPERED RIGID INSULATION IS TO BE INSTALLED AS PART OF A NEW ROOFING SYSTEM, CONTRACTOR SHALL PROVIDE SHOP DRAWING SUBMITTALS TO THE ARCHITECT FOR REVIEW. SUBMITTALS SHALL INDICATE THE THICKNESS, ORIENTATION AND PITCH OF TAPERED INSULATION SHEETS. ROOF PITCHES SHALL PROVIDE POSITIVE ROOF DRAINAGE AT A MINIMUM OF 1/4" PER FOOT, UNLESS OTHERWISE NOTED.
10. AS PER 2025 ECCCNYS, WHERE ROOFS ARE TO BE MODIFIED BY REMOVING AND REPLACING THE ENTIRE ROOFING SYSTEM, A MINIMUM OF R-33 CONTINUOUS INSULATION SHALL BE PROVIDED ABOVE THE ROOF DECK. CONTINUOUS INSULATION BOARDS SHALL BE INSTALLED IN AT LEAST TWO LAYERS WITH EDGE JOINTS STAGGERED.
11. ALL WOOD BLOCKING AND NAILERS SHALL BE REPLACED WITH NEW PRESSURE TREATED WOOD. PROVIDE BLOCKING SECUREMENT AS PER FM 1-49 REQUIREMENTS.
12. SQUARE FOOTAGES AND HEIGHTS ABOVE GRADE AS INDICATED IN THESE DOCUMENTS ARE FOR GENERAL INFORMATIONAL PURPOSES ONLY. CONTRACTOR AND/OR BIDDER SHALL BE RESPONSIBLE FOR ALL FINAL TAKE-OFF QUANTITIES ASSOCIATED WITH THE WORK.
13. ALL QUANTITIES, AREAS, AND HEIGHTS ABOVE GRADE AS INDICATED IN THESE DOCUMENTS ARE FOR GENERAL INFORMATIONAL PURPOSES ONLY. CONTRACTOR AND/OR BIDDER SHALL BE RESPONSIBLE FOR ALL FINAL TAKE-OFF QUANTITIES ASSOCIATED WITH THE WORK

GENERAL DEMOLITION NOTES

1. ALL DEMOLITION AND CONSTRUCTION WORK SHALL BE PERFORMED IN COMPLIANCE WITH ALL STATE EDUCATION DEPARTMENT STANDARDS, APPLICABLE FEDERAL, STATE, AND LOCAL GUIDELINES, BUILDING CODES, AND LIFE SAFETY REGULATIONS.
2. ALL CONTRACTORS SHALL OBEY ALL CODES, STATUES, AND LAWS AS APPLICABLE TO DEMOLITION WORK IN AN OCCUPIED BUILDING AND FOR REMOVAL OF MATERIALS SAFELY FROM THE SITE, INCLUDING ALL OSHA REGULATIONS.
3. THE GENERAL CONTRACTOR SHALL PROTECT ALL PORTIONS OF THE EXISTING BUILDING FROM DUST, WEATHER INCLEMENCY AND FREEZING TO PREVENT DAMAGE TO THE EXISTING STRUCTURE AND BUILDING CONTENTS.
4. ALL CONTRACTORS SHALL DISPOSE OF ALL UNWANTED MATERIALS AND OTHER DEMOLITION DEBRIS OFF SITE, IN ACCORDANCE WITH CONTRACT REQUIREMENTS AND ALL LAWS AND REGULATIONS.
5. ALL HOLES IN SLABS AND WALLS, INCLUDING FINAL PATCHING, ARE THE RESPONSIBILITY OF EACH CONTRACTOR FOR WHOM THE PENETRATIONS ARE REQUIRED, UON. HOLES THROUGH SLABS SHALL BE CORE DRILLED. WHERE CORE DRILLING IS NOT POSSIBLE, SLABS SHALL BE SAWCUT. PROVIDE REQUIRED FIRE-STOPPING PRIOR TO CONCEALING WORK.
6. ALL DEMOTION WORK SHALL BE PERFORMED BY CONTRACT 'G', UON. CONTRACT 'G' SHALL DEMOLISH ALL EXISTING CONSTRUCTION, INCLUDING, BUT LIMITED TO, FLOOR, WALL AND CEILING FINISHES, AS INDICATED, TO PROVIDED FINISHED CONSTRUCTION AS DESCRIBED IN THE CONTRACT DOCUMENTS, WHETHER OF NOT THE DEMOLITION IS SPECIFICALLY CALLED OUT.
7. CONTRACT "E" SHALL MAINTAIN AND REROUTE ALL CIRCUITS SCHEDULED TO REMAIN.
8. CONTRACT "M" SHALL MAINTAIN AND REROUTE ALL HYDRONIC LINES AND CONTROL CIRCUITS SCHEDULED TO REMAIN.
9. BUILDING DIMENSIONS ARE APPROXIMATE. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS FOR QUANTITY TAKE-OFFS AND FABRICATION OF MATERIALS.
10. OVER-DEMOLITION SHALL BE ALLOWED, PROVIDED THAT ALL SURFACES SHALL BE REBUILT TO MATCH MATERIALS, STRUCTURAL INTEGRITY AND APPEARANCE OF THOSE WHICH WERE REMOVED, IN CONFORMANCE WITH CONTRACT DOCUMENTS AND AT NO ADDITIONAL COST TO THE DISTRICT.
11. CONTRACT "G" SHALL COORDINATE DEMOLITION WORK WITH ALL ARCHITECTURAL, HVAC, ELECTRICAL TRADES, AND ROOM FINISH DRAWINGS.
12. REMOVE ALL EXISTING FINISHES SCHEDULED TO BE REMOVED PRIOR TO THE PROPER APPLICATION OF FINISHES TO A POINT WHERE WORKABLE SUBSTRATES OR UNDAMAGED ADJACENT FINISHES ARE REACHED, IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDED GUIDELINES AND INSTRUCTIONS.
13. STORE ALL MATERIALS TO BE REUSED SAFELY ON-SITE. TURN OVER ALL MATERIALS TO BE SAVED, BUT NOT REUSED, IN LOCATION PREDETERMINED AND/OR AS DIRECTED BY THE DISTRICT.
14. CONTRACTOR'S ACCESS SHALL BE AS INDICATED IN THE CONTRACT DOCUMENTS, SUBJECT TO THE ACCEPTANCE OF THE OWNER AND CONSTRUCTION MANAGER. THE CONTRACTOR SHALL ADEQUATELY PROTECT ALL EXISTING FINISHES SCHEDULED TO REMAIN ALONG THE ACCESS ROUTE AND ADJOINING SURFACES OUTSIDE THE CONTRACTOR OR SCOPE-OF-WORK, FROM DAMAGE DURING THE PROJECT DURATION. THE CONTRACTOR SHALL BE RESPONSIBLE TO RESTORE EXISTING CONDITIONS AND/OR FINISHES AS DAMAGED DURING CONSTRUCTION, INCLUDING, BUT NOT LIMITED TO, PATCHING AND PAINTING AS REQUIRED AND DEEMED NECESSARY BY THE ARCHITECT, AT NO ADDITIONAL COST TO OWNER.
15. REFER TO "M" DRAWINGS FOR DEMOLITION AND REMOVAL WORK UNDER CONTRACT "M".
16. REFER TO "E" DRAWINGS FOR DEMOLITION AND REMOVAL WORK UNDER CONTRACT "E".
17. THE "G" CONTRACTOR SHALL COORDINATE WITH THE "E" CONTRACTOR REGARDING THE REMOVAL AND DISPOSAL OF EXISTING ELECTRICAL RECEPTACLES.

ASBESTOS ABATEMENT NOTES

ASBESTOS ABATEMENT NOTES:

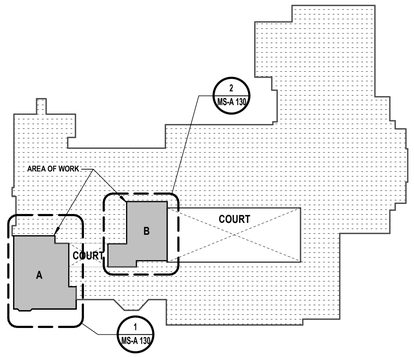
1. ALL ASBESTOS ABATEMENT WORK SHALL CONFORM TO ALL APPLICABLE CODE REQUIREMENTS ALONG WITH SPECIFICATION SECTION 028200 AND INDUSTRIAL CODE RULE 56.
2. MATERIALS TO BE REMOVED ARE ASSUMED TO CONTAIN THE PRESENCE OF ASBESTOS AND ARE SUBJECT TO VERIFICATION PRIOR TO CONSTRUCTION:
   - MULTI-LAYERED BUILT-UP ROOFING
   - FLASHING MATERIALS
   - WATERPROOFING MATERIALS, SUCH AS; TAR, SEALANT & MASTIC
3. THE CONTRACTOR SHALL BE RESPONSIBLE TO PERFORM PERSONAL AIR MONITORING ON ITS EMPLOYEES IN ACCORDANCE WITH OSHA REGULATIONS.
4. THIRD PARTY PROJECT MONITORING AND AIR SAMPLING SHALL BE CONDUCTED BY A CONSULTANT FIRM HIRED DIRECTLY BY THE OWNER.
5. 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.
6. 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.
7. 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.
8. REFER TO SPECIFICATION SECTION 028000 FOR SPECIFIC ABATEMENT PROCEDURES.

LEAD ABATEMENT NOTES:

1. ALL LEAD ABATEMENT WORK SHALL CONFORM TO ALL APPLICABLE CODE REQUIREMENTS ALONG WITH SPECIFICATION SECTION 028200 AND INDUSTRIAL CODE RULE 56.
2. 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, AND KEEP REQUIRED POSTINGS AT SITE.
3. 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.
4. ALL MATERIALS ASSOCIATED WITH PROJECT HAVE BEEN TESTED FOR THE PRESENCE OF LEAD. THE FOLLOWING HAS BEEN FOUND TO BE ASSUMED CONTAINING LEAD AND SHALL BE ABATED IF AFFECTED BY THE PROPOSED WORK:

PCB ABATEMENT NOTES:

1. ALL AREAS SCHEDULED TO BE DISTURBED OR DEMOLISHED DURING CONSTRUCTION UNDER THE SCOPE OF WORK OF THIS PROJECT HAVE BEEN TESTED FOR PCB CONTENT. THE FOLLOWING HAS BEEN FOUND TO BE ASSUMED ASBESTOS AND SHALL BE ABATED IF AFFECTED BY THE PROPOSED WORK:



KEY PLAN - ROOF LEVEL

N.T.S.

PROJECT NORTH

ROOF LEGEND

	EXISTING EXHAUST FAN	RD	EXISTING ROOF DRAIN AND SUMP
	EXISTING ROOFING NOT IN CONTRACT (N.I.C.)		
	EXISTING DOOR TO REMAIN		DIRECTION OF ROOF PITCH OR SLOPE
	HVAC DUCT THROUGH ROOF PENETRATION		EXISTING RTU
	EXISTING WALL ABOVE ROOF	6 1/4"±	ROOF ELEVATION

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CONSULTANTS:

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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. MAGAZU	M. SIMKULET	M. MAGAZU	K. PACHECO

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202, SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT G GENERAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

ROOF PLAN - PROPOSED CONDITION

DRAWING No.

MS-A 130.00

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1 MAIN ENTRANCE - SOUTH ELEVATION
N.T.S.



2 SOUTH ELEVATION - LEFT SIDE
N.T.S.







3 WEST ELEVATION - OLD MAIN ENTRANCE
N.T.S.

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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.
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PATTERNS & SYMBOLS LEGEND

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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

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M. LUCK	C. HENRY	-	K. PACHECO

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202, SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT G
GENERAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

BUILDING ELEVATIONS

DRAWING No.

MS-A 200.00

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1 NORTH ELEVATION - LEFT SIDE CORNER
N.T.S.



2 NORTH ELEVATION - CORRIDOR EXIT
N.T.S.



3 NORTH ELEVATION - BOILER ROOM ENTRANCE
N.T.S.



4 NORTH ELEVATION - CAFETERIA EXIT
N.T.S.



5 NORTH ELEVATION - CAFETERIA
N.T.S.

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CONTRACT G
GENERAL CONSTRUCTION

STATUS
SED SUBMISSION

SHEET TITLE
BUILDING ELEVATIONS

DRAWING No.
MS-A 201.00

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1 NORTH ELEVATION - LOBBY ENTRANCE
N.T.S.



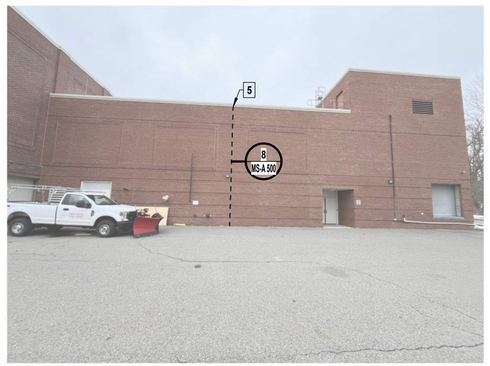
2 NORTH ELEVATION - BAND ROOM EXIT
N.T.S.







3 NORTH ELEVATION - STAGE BACK WALL
N.T.S.



4 EAST ELEVATION - STAGE WALL
N.T.S.



5 NORTHELEVATION - BASEMENT WALL
N.T.S.



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NY PROFESSIONAL ARCHITECT Lic. No. 041183
Exp. Date

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DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
M. LUCK	C. HENRY	-	K. PACHECO

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202, SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT G GENERAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

BUILDING ELEVATIONS

DRAWING No.

MS-A 202.00

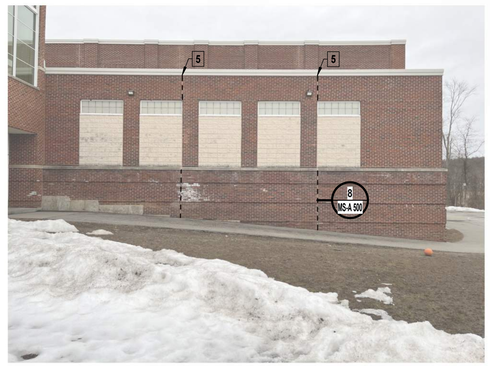
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1 **EAST ELEVATION - BASEMENT WALL**
N.T.S.



2 **SOUTH ELEVATION - BASEMENT WALL**
N.T.S.

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.

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.
7		STEEL LINTEL PAINTING: SCRAPE, PAINT AND SEAL EXISTING STEEL LINTELS AND WINDOWS, CONTRACTOR TO CLEAN OPENING AND PROTECT WINDOW.

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CONSULTANTS:

MARK	DATE	DESCRIPTION

REGISTERED ARCHITECT KATRINA PACHECO 041183 STATE OF NEW YORK

09/30/2029
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NY PROFESSIONAL ARCHITECT Lic. No. 041183
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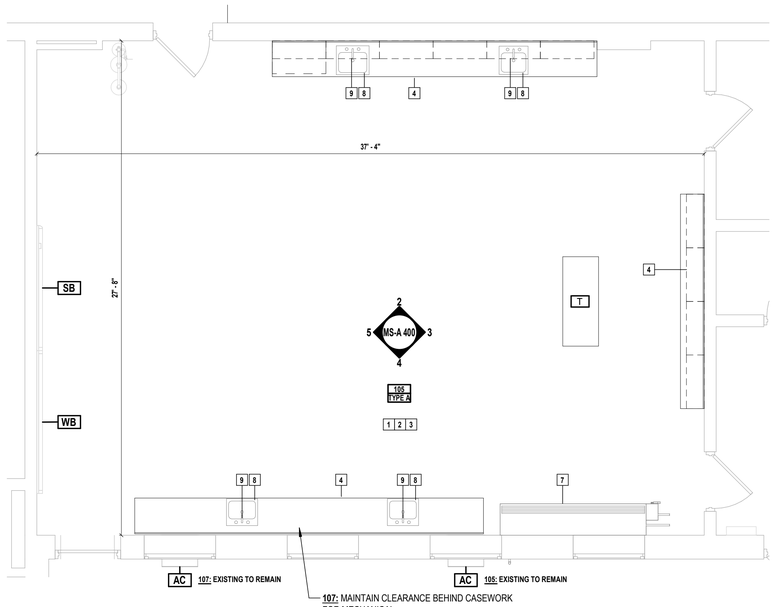
CONTRACT
CONTRACT G GENERAL CONSTRUCTION

STATUS
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SHEET TITLE
BUILDING ELEVATIONS

DRAWING No.
MS-A 203.00

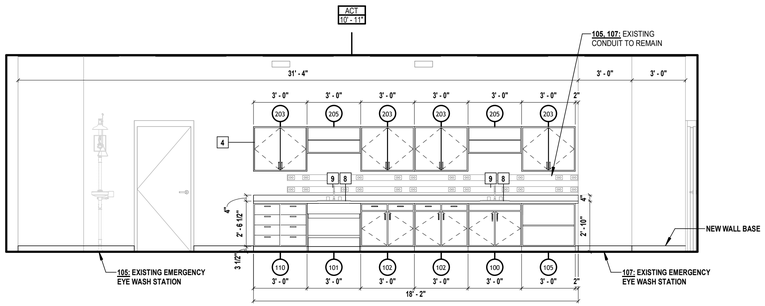
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1 TYPICAL CLASSROOM TYPE 'A' PLAN- SCIENCE ROOM

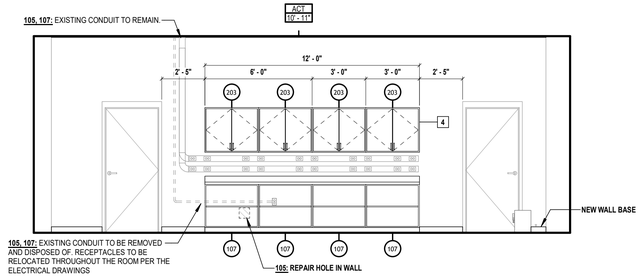
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PROJECT NORTH



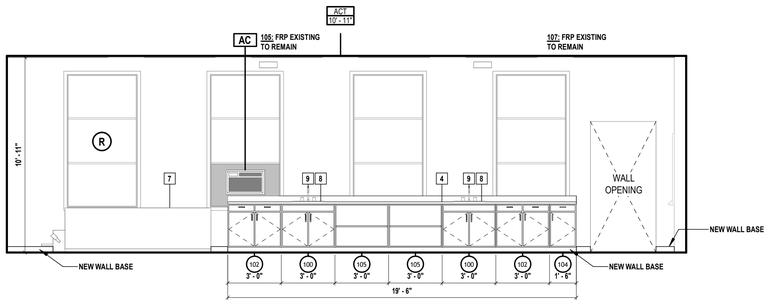
2 CLASSROOM TYPE 'A' ELEVATION

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



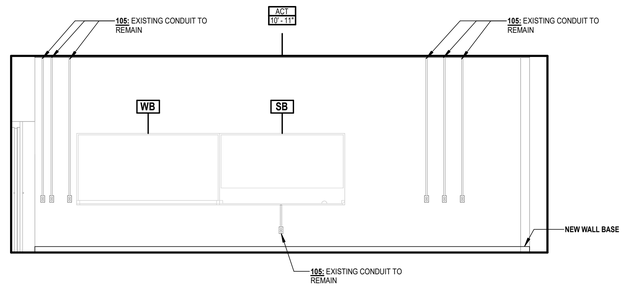
3 CLASSROOM TYPE 'A' ELEVATION

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



4 CLASSROOM TYPE 'A' ELEVATION

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



5 CLASSROOM TYPE 'A' ELEVATION

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

FLOOR PLAN LEGEND

A101 / TYPE A — ROOM NUMBER / ROOM TYPE	EXISTING WINDOW TO REMAIN
11 — KEYED SCOPE NOTE INDICATOR	EXISTING WALL TO REMAIN
EXISTING DOOR AND DOOR FRAME TO REMAIN. PAINT DOOR FRAME AS SELECTED BY DISTRICT	FURNISH NEW DOOR AND FRAME. PAINT DOOR FRAME AS SELECTED BY DISTRICT

ABBREVIATIONS

S	EXISTING STORAGE/ BUILT-IN CASEWORK TO REMAIN	WB	EXISTING WHITEBOARD- RETAIN AND REINSTALL
CB	EXISTING CORK BOARD- PROTECT IN PLACE	TS	TEACHER STATION- TURN OVER TO OWNER
AC	AIR CONDITIONING UNIT- RETAIN AND REINSTALL	R	RESCUE WINDOW STICKER FURNISHED BY CONTRACTOR IF NONE EXISTS. APPLY TO GLAZING & WINDOW SHADES, WHERE APPLICABLE
SB	EXISTING SMART BOARD- RETAIN AND REINSTALL		
BB	EXISTING BLACK BOARD- PROTECT IN PLACE		
FF	EXISTING FLATFILE PROVIDED BY OWNER		

CONTRACT G SCOPE

1	FLOOR FINISHES	FURNISH AND INSTALL NEW FLOOR FINISH AND NEW WALL BASE AS SCHEDULED. REFER TO ABATEMENT FOR FURTHER DETAILS.
2	NEW CEILING	INSTALL NEW SUSPENDED CEILING SYSTEM WITH 2'X2' LAY-IN ACOUSTIC PANELS. SAND, PRIME, AND PAINT ALL EXISTING SOFFITS. STORE AND REINSTALL ALL LIGHTING. STORE AND REINSTALL EXISTING EQUIPMENT INCLUDING,BUT NOT LIMITED TO ALL SPEAKERS, SMOKE DETECTORS, STROB
3	PAINT WALLS	CAREFULLY REMOVE AND STORE ALL EXISTING WALL MOUNTED ITEMS, INCLUDING BUT NOT LIMITED TO: CORK BOARDS, WHITE BOARDS, BLACKBOARDS, SIGNAGE, ARTWORK, HOOKS, PROJECTORS, PROJECTOR BRACKETS, SCREENS, AND ALL DEVICES USED TO SECURE THESE ITEMS IN PLACE. PREPARE ALL WALLS TO RECEIVE NEW FINISHES INCLUDING FILING HOLES, REPAIRING CRACKS IN EXISTING WALLS, SANDING, AND PREPARING ALL SURFACES FOR A NEW PAINT FINISH. UPON COMPLETION OF WALL PREPARATION, REINSTALL EXISTING AND NEW OWNER PROVIDED WALL MOUNTED ITEMS INCLUDING BUT NOT LIMITED TO CORK BOARDS, WHITE BOARDS, SMARTBOARDS, SIGNAGE, ARTWORK, HOOKS, PROJECTORS, PROJECTOR BRACKETS, SCREENS, AND ALL DEVICES USED TO SECURE THESE ITEMS IN PLACE IN ACCORDANCE WITH ENLARGED CLASSROOM ELEVATIONS.
4	CASEWORK	FURNISH AND INSTALL NEW CASEWORK AND COUNTERS.
7	UNIT VENTILATORS	M CONTRACTOR TO FURNISH AND INSTALL NEW UNIT VENTILATOR, COORDINATE WITH MC.
8	SINKS	P CONTRACTOR TO FURNISH AND INSTALL NEW DROP-IN SINK, COORDINATE WITH PC.
9	FAUCETS	P CONTRACTOR TO FURNISH AND INSTALL NEW FAUCET, COORDINATE WITH PC.

CLASSROOM CASEWORK

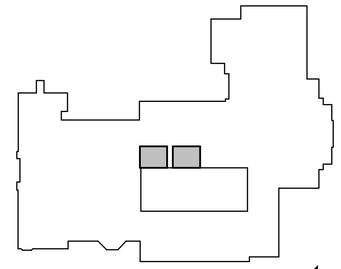
Type Mark	Width	Depth	Height	Description
100	3' - 0"	1' - 10"	2' - 8 1/2"	DOUBLE DOOR SINK BASE CABINET
101	3' - 0"	2' - 0"	2' - 9"	ADA SINK APRON
102	3' - 0"	1' - 10"	2' - 8 1/2"	BASE CABINET-DOUBLE DOOR AND DRAWER
104	1' - 6"	1' - 10"	2' - 8 1/2"	BASE CABINET- SINGLE DOOR AND DRAWER
105	3' - 0"	1' - 10"	2' - 8 1/2"	BASE CABINET- 2 SHELVES, OPEN (NO DOORS)
107	3' - 0"	1' - 3"	2' - 8 1/2"	BASE CABINET -2 SHELVES, OPEN (NO DOORS)
110	3' - 0"	1' - 10"	2' - 8 1/2"	BASE CABINET- 4 DRAWER DOUBLE
203	3' - 0"	1' - 0"	2' - 6"	UPPER CABINET WITH DOUBLE DOOR
205	3' - 0"	1' - 0"	1' - 6"	UPPER CABINET WITH 2 SHELVES

CLASSROOM TYPE "A"

Number	Scopes	Classroom Type	Mirrored	Comments
105	1,2,3,4,7,8,9	A		
107	1,2,3,4,7,8,9	A	SHOWN MIRRORED	

CLASSROOM UPGRADES GENERAL NOTES

1. REFER TO CLASSROOM CASEWORK DETAILS ON SHEET MS-A 501



6 KEY PLAN - TYPE A

SCALE: 1" = 100'-0"

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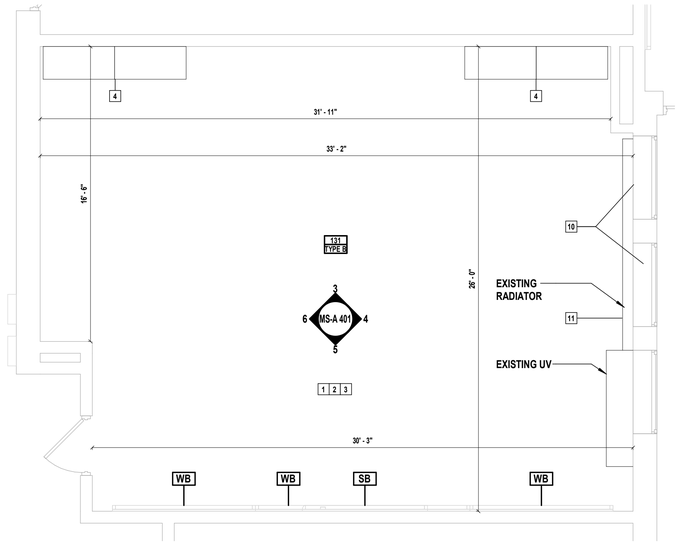
ENLARGED PLANS & ELEVATIONS CLASSROOM UPGRADES TYPE A

DRAWING No.

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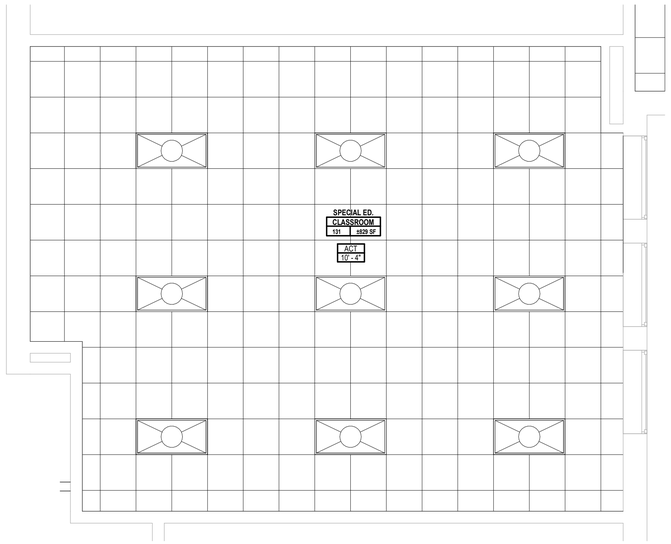
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1 CLASSROOM TYPE 'B' PLAN

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

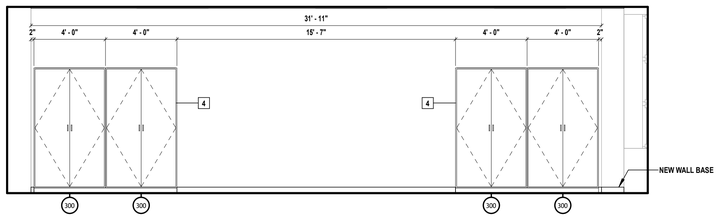
PROJECT NORTH



2 CLASSROOM TYPE 'B' REFLECTED CEILING PLAN

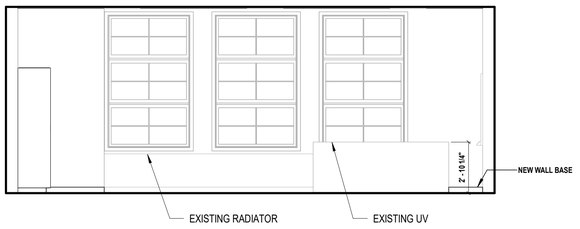
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PROJECT NORTH



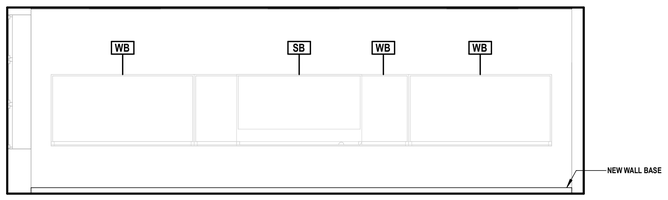
3 CLASSROOM TYPE 'B' ELEVATION

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



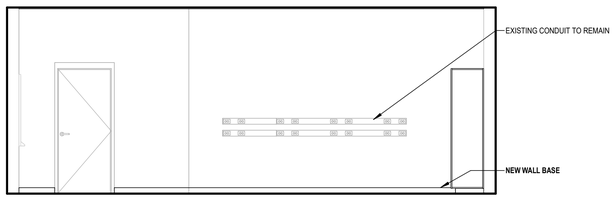
4 CLASSROOM TYPE 'B' ELEVATION

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



5 CLASSROOM TYPE 'B' ELEVATION

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



6 CLASSROOM TYPE 'B' ELEVATION

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

FLOOR PLAN LEGEND

A101 / TYPE A — ROOM NUMBER / ROOM TYPE	EXISTING WINDOW TO REMAIN
11 — KEYED SCOPE NOTE INDICATOR	EXISTING WALL TO REMAIN
EXISTING DOOR AND DOOR FRAME TO REMAIN. PAINT DOOR FRAME AS SELECTED BY DISTRICT	FURNISH NEW DOOR AND FRAME. PAINT DOOR FRAME AS SELECTED BY DISTRICT

ABBREVIATIONS

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AC	AIR CONDITIONING UNIT- RETAIN AND REINSTALL	R	RESCUE WINDOW STICKER FURNISHED BY CONTRACTOR IF NONE EXISTS. APPLY TO GLAZING & WINDOW SHADES, WHERE APPLICABLE
SB	EXISTING SMART BOARD- RETAIN AND REINSTALL		
BB	EXISTING BLACK BOARD- PROTECT IN PLACE		
FF	EXISTING FLATFILE PROVIDED BY OWNER		

CONTRACT G SCOPE

1	FLOOR FINISHES	FURNISH AND INSTALL NEW FLOOR FINISH AND NEW WALL BASE AS SCHEDULED. REFER TO ABATEMENT FOR FURTHER DETAILS.
2	NEW CEILING	INSTALL NEW SUSPENDED CEILING SYSTEM WITH 2'X2' LAY-IN ACOUSTIC PANELS. SAND, PRIME, AND PAINT ALL EXISTING SOFFITS. STORE AND REINSTALL ALL LIGHTING. STORE AND REINSTALL EXISTING EQUIPMENT INCLUDING,BUT NOT LIMITED TO ALL SPEAKERS, SMOKE DETECTORS, STROBES, SUPPLY AND RETURN GRILLES BACK TO THEIR ORIGINAL LOCATIONS.
3	PAINT WALLS	CAREFULLY REMOVE AND STORE ALL EXISTING WALL MOUNTED ITEMS, INCLUDING BUT NOT LIMITED TO: CORK BOARDS, WHITE BOARDS, BLACKBOARDS, SIGNAGE, ARTWORK, HOOKS, PROJECTORS, PROJECTOR BRACKETS, SCREENS, AND ALL DEVICES USED TO SECURE THESE ITEMS IN PLACE. PREPARE ALL WALLS TO RECEIVE NEW FINISHES INCLUDING FILING HOLES, REPAIRING CRACKS IN EXISTING WALLS, SANDING, AND PREPARING ALL SURFACES FOR A NEW PAINT FINISH. UPON COMPLETION OF WALL PREPARATION, REINSTALL EXISTING AND NEW OWNER PROVIDED WALL MOUNTED ITEMS INCLUDING BUT NOT LIMITED TO CORK BOARDS, WHITE BOARDS, SMARTBOARDS, SIGNAGE, ARTWORK, HOOKS, PROJECTORS, PROJECTOR BRACKETS, SCREENS, AND ALL DEVICES USED TO SECURE THESE ITEMS IN PLACE IN ACCORDANCE WITH ENLARGED CLASSROOM ELEVATIONS.
4	CASEWORK	FURNISH AND INSTALL NEW CASEWORK AND COUNTERS.
10	FIRE SHUTTERS	EXISTING FIRE SHUTTERS, PROTECT IN PLACE.
11	RADIATOR COVERS	REPLACE EXISTING RADIATOR COVERS. FINTUBE TO REMAIN.

CLASSROOM CASEWORK

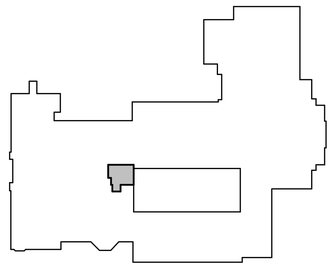
Type Mark	Width	Depth	Height	Description
100	3' - 0"	1' - 10"	2' - 8 1/2"	DOUBLE DOOR SINK BASE CABINET
102	3' - 0"	1' - 10"	2' - 8 1/2"	BASE CABINET-DOUBLE DOOR AND DRAWER
104	1' - 6"	1' - 10"	2' - 8 1/2"	BASE CABINET- SINGLE DOOR AND DRAWER
300	4' - 0"	1' - 10"	7' - 0"	TALL CABINET WITH DOUBLE DOORS

REFLECTED CEILING PLAN LEGEND

A101 / TYPE A / 9'-0" — ROOM NUMBER, ROOM TYPE, ROOM HEIGHT	2'x2' CEILING AND GRID SYSTEM
1X4 LINEAR DROP LIGHTING- EXISTING RETAIN AND REINSTALL. COORDINATE WITH ELECTRICAL CONTRACTOR FOR MORE INFO.	2X4 TROFFER- EXISTING RETAIN AND REINSTALL. COORDINATE WITH ELECTRICAL CONTRACTOR FOR MORE INFO.
DIFUSSER - SEE 'M' DRAWINGS FOR MORE INFO.	RETURN DIFFUSER - SEE 'M' DRAWINGS FOR MORE INFO.

CLASSROOM UPGRADES GENERAL NOTES

1. REFER TO CLASSROOM CASEWORK DETAILS ON SHEET MS-A 501



7 KEY PLAN - TYPE B

SCALE: 1" = 100'-0"

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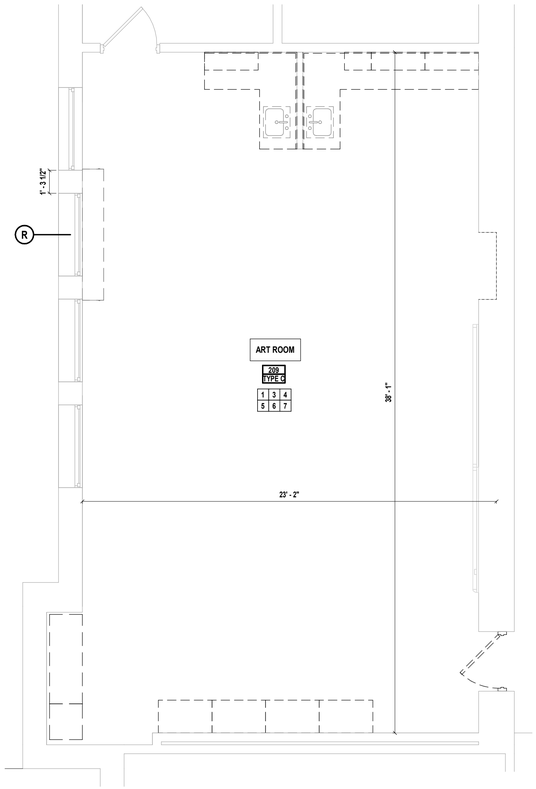
ENLARGED PLANS & ELEVATIONS
CLASSROOM UPGRADES
TYPE B - RM 131

DRAWING No.

MS-A 401.00

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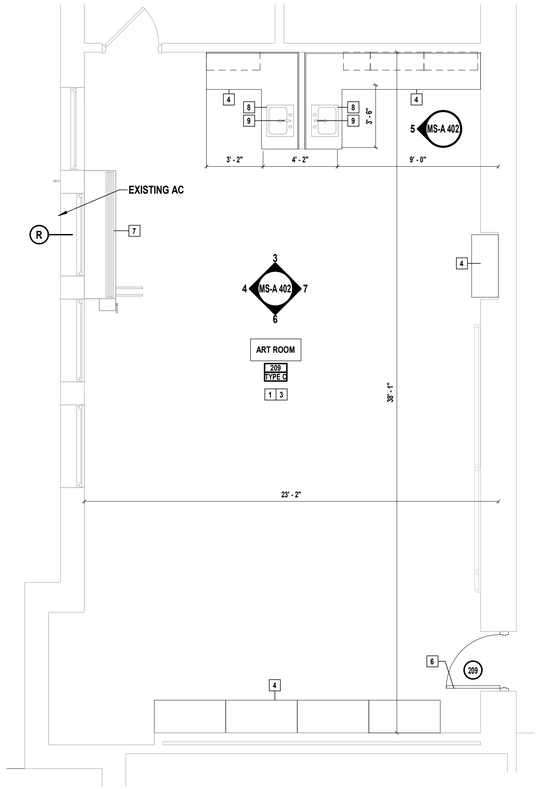
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1 CLASSROOM TYPE 'C' PLAN- ART ROOM DEMO

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

PROJECT NORTH



2 CLASSROOM TYPE 'C' PLAN- ART ROOM

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

PROJECT NORTH

CLASSROOM CASEWORK				
Type Mark	Width	Depth	Height	Description
	3' - 0"	2' - 0"	2' - 8 1/2"	
100	3' - 0"	1' - 10"	2' - 8 1/2"	DOUBLE DOOR SINK BASE CABINET
101	3' - 0"	2' - 0"	2' - 9"	ADA SINK APRON
102	3' - 0"	1' - 10"	2' - 8 1/2"	BASE CABINET-DOUBLE DOOR AND DRAWER
104	1' - 6"	1' - 10"	2' - 8 1/2"	BASE CABINET- SINGLE DOOR AND DRAWER
106	1' - 6"	1' - 10"	2' - 8 1/2"	BASE CABINET -2 SHELVES
200	1' - 6"	1' - 0"	2' - 6"	UPPER CABINET WITH SINGLE DOOR
201	1' - 6"	1' - 0"	4' - 6"	UPPER CABINET WITH SINGLE DOOR
202	3' - 0"	1' - 0"	4' - 6"	UPPER CABINET WITH DOUBLE DOOR
203	3' - 0"	1' - 0"	2' - 6"	UPPER CABINET WITH DOUBLE DOOR
300	4' - 0"	1' - 10"	7' - 0"	TALL CABINET WITH DOUBLE DOORS
306	3' - 6"	1' - 6"	6' - 3"	TALL CABINET WITH 6 SHELVES, OPEN (NO DOORS)

CLASSROOM UPGRADES GENERAL NOTES

1. REFER TO CLASSROOM CASEWORK DETAILS ON SHEET MS-A 501

FLOOR PLAN LEGEND

A101 / TYPE A — ROOM NUMBER / ROOM TYPE	EXISTING WINDOW TO REMAIN
11 — KEYED SCOPE NOTE INDICATOR	EXISTING WALL TO REMAIN
EXISTING DOOR AND DOOR FRAME TO REMAIN. PAINT DOOR FRAME AS SELECTED BY DISTRICT	FURNISH NEW DOOR AND FRAME. PAINT DOOR FRAME AS SELECTED BY DISTRICT

ABBREVIATIONS

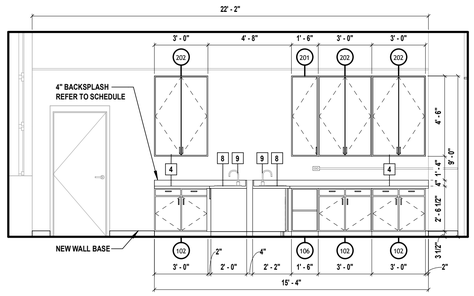
S	EXISTING STORAGE/ BUILT-IN CASEWORK TO REMAIN	WB	EXISTING WHITEBOARD- RETAIN AND REINSTALL
CB	EXISTING CORK BOARD- PROTECT IN PLACE	TS	TEACHER STATION- TURN OVER TO OWNER
AC	AIR CONDITIONING UNIT- RETAIN AND REINSTALL	R	RESCUE WINDOW STICKER FURNISHED BY CONTRACTOR IF NONE EXISTS. APPLY TO GLAZING & WINDOW SHADES, WHERE APPLICABLE
SB	EXISTING SMART BOARD- RETAIN AND REINSTALL		
BB	EXISTING BLACK BOARD- PROTECT IN PLACE		
FF	EXISTING FLATFILE PROVIDED BY OWNER		

CONTRACT G SCOPE

1	FLOOR FINISHES	FURNISH AND INSTALL NEW FLOOR FINISH AND NEW WALL BASE AS SCHEDULED. REFER TO ABATEMENT FOR FURTHER DETAILS.
3	PAINT WALLS	CAREFULLY REMOVE AND STORE ALL EXISTING WALL MOUNTED ITEMS, INCLUDING BUT NOT LIMITED TO: CORK BOARDS, WHITE BOARDS, BLACKBOARDS, SIGNAGE, ARTWORK, HOOKS, PROJECTORS, PROJECTOR BRACKETS, SCREENS, AND ALL DEVICES USED TO SECURE THESE ITEMS IN PLACE. PREPARE ALL WALLS TO RECEIVE NEW FINISHES INCLUDING FILING HOLES, REPAIRING CRACKS IN EXISTING WALLS, SANDING, AND PREPARING ALL SURFACES FOR A NEW PAINT FINISH. UPON COMPLETION OF WALL PREPARATION, REINSTALL EXISTING AND NEW OWNER PROVIDED WALL MOUNTED ITEMS INCLUDING BUT NOT LIMITED TO CORK BOARDS, WHITE BOARDS, SMARTBOARDS, SIGNAGE, ARTWORK, HOOKS, PROJECTORS, PROJECTOR BRACKETS, SCREENS, AND ALL DEVICES USED TO SECURE THESE ITEMS IN PLACE IN ACCORDANCE WITH ENLARGED CLASSROOM ELEVATIONS.
4	CASEWORK	FURNISH AND INSTALL NEW CASEWORK AND COUNTERS.
6	INFILL	INFILL EXISTING FIREPLACE USING SHAFT WALL. REFER TO ARCHITECTURAL DETAILS.
7	UNIT VENTILATORS	M CONTRACTOR TO FURNISH AND INSTALL NEW UNIT VENTILATOR, COORDINATE WITH MC.
8	SINKS	P CONTRACT TO FURNISH AND INSTALL NEW DROP-IN SINK, COORDINATE WITH PC.
9	FAUCETS	P CONTRACTOR TO FURNISH AND INSTALL NEW FAUCET, COORDINATE WITH PC.

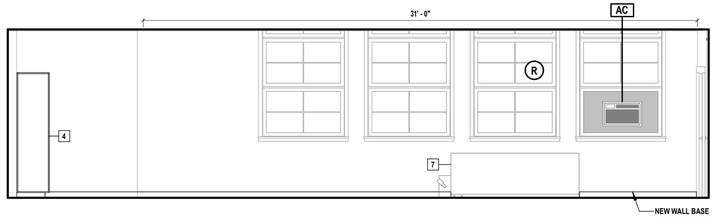
CONTRACT G DEMOLITION SCOPE

1	FLOOR FINISHES	REMOVE AND DISPOSE OF EXISTING WALL BASE, AND FLOOR FINISHES DOWN TO SUB-FLOOR. CONTRACTOR SHALL BE RESPONSIBLE TO INSPECT THE EXISTING CONCRETE SLAB-FLOOR CONDITION AND PATCH ALL EXPOSED SURFACES AS NEEDED TO ENSURE A TRUE SMOOTH AND LEVEL FLOOR FINISH FREE OF DIPS, WAVES, DEPRESSIONS, AND TELEGRAPHING OF THE LEVELING COMPOUND OR IMPERFECTIONS OF THE SLAB BELOW. ASSUME FLOOR PREP THAT MAY INCLUDE FLASH PATCH EXISTING MATERIALS IN EACH ROOM.
3	WALL FINISHES	PREPARE ALL WALLS TO RECEIVE NEW FINISHES INCLUDING FILLING HOLES, REPAIRING CRACKS IN EXISTING WALLS, SANDING, AND PREPARING ALL SURFACES FOR A NEW PAINT FINISH.
4	CASEWORK	CONTRACTOR TO REMOVE AND DISPOSE OF EXISTING CASEWORK IN ITS ENTIRETY, INCLUDING BUT NOT LIMITED TO ALL WALLS, SOFFITS, FASCIA PIECES, ENCLOSURES, ETC. USED TO CONCEAL CASEWORK. PREPARE ALL WALLS TO RECEIVE NEW FINISHES INCLUDING FILLING HOLES, REPAIRING
5	FURNITURE	REMOVE AND PROTECT ALL EXISTING FURNITURE, TURN OVER TO OWNER.
6	UNIT VENTILATOR	EXISTING VENTILATOR TO BE REMOVED. COORDINATE WITH MECHANICAL CONTRACT.
7	RADIATOR	EXISTING RADIATORS TO BE REMOVED. COORDINATE WITH MECHANICAL CONTRACT.



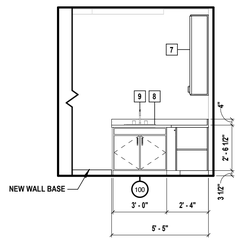
3 CLASSROOM TYPE 'C' ELEVATION

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



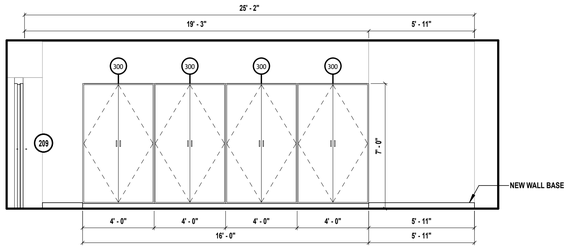
4 CLASSROOM TYPE 'C' ELEVATION

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



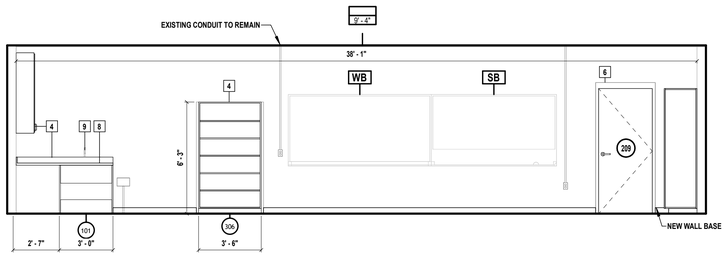
5 CLASSROOM TYPE 'C' ELEVATION

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



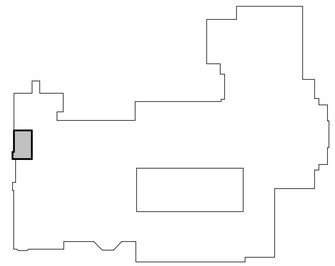
6 CLASSROOM TYPE 'C' ELEVATION

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



7 CLASSROOM TYPE 'C' ELEVATION

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



8 KEY PLAN - TYPE C

SCALE: 1" = 100'-0"

PROJECT NORTH

H 2 M 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
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:
A. PAPPAS	A. PAPPAS A. DUNN	S.MANDIC	K. PACHECO

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202, SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT G & CONTRACT P GENERAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

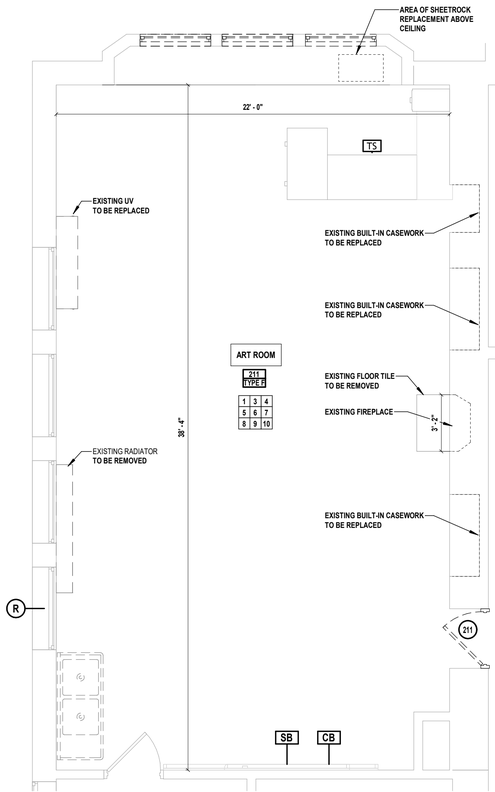
ENLARGED PLANS & ELEVATIONS CLASSROOM UPGRADES TYPE C - RM 209

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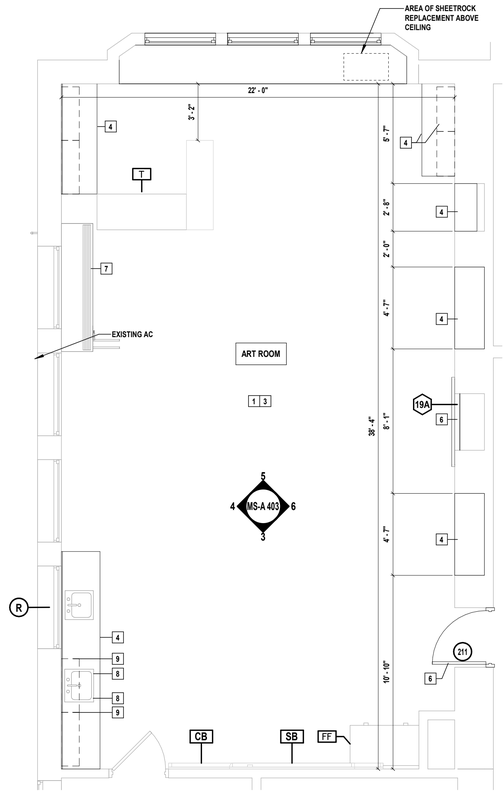
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1 ART CLASSROOM ROOM 211 PLAN DEMO

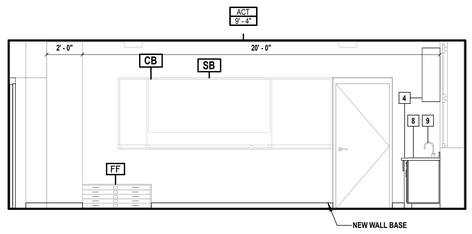
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2 ART CLASSROOM ROOM 211 PLAN

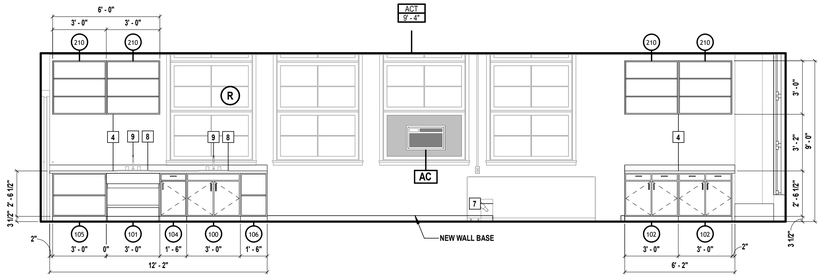
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PROJECT NORTH



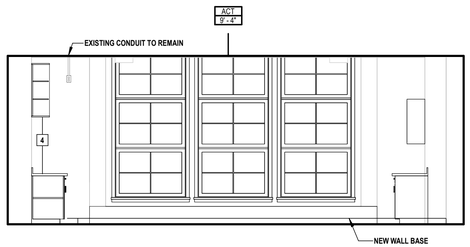
3 ART CLASSROOM ROOM 211 ELEVATION

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



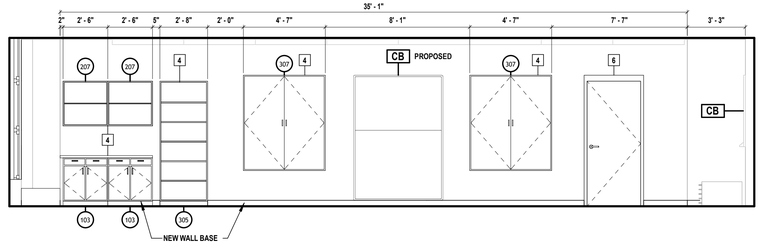
4 ART CLASSROOM ROOM 211 ELEVATION

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



5 ART CLASSROOM ROOM 211 ELEVATION

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



6 ART CLASSROOM ROOM 211 ELEVATION

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

FLOOR PLAN LEGEND

A101 / TYPE A — ROOM NUMBER / ROOM TYPE	EXISTING WINDOW TO REMAIN
11 — KEYED SCOPE NOTE INDICATOR	EXISTING WALL TO REMAIN
EXISTING DOOR AND DOOR FRAME TO REMAIN. PAINT DOOR FRAME AS SELECTED BY DISTRICT	FURNISH NEW DOOR AND FRAME. PAINT DOOR FRAME AS SELECTED BY DISTRICT

ABBREVIATIONS

S — EXISTING STORAGE/ BUILT-IN CASEWORK TO REMAIN	WB — EXISTING WHITEBOARD- RETAIN AND REINSTALL
CB — EXISTING CORK BOARD- PROTECT IN PLACE	TS — TEACHER STATION- TURN OVER TO OWNER
AC — AIR CONDITIONING UNIT- RETAIN AND REINSTALL	R — RESCUE WINDOW STICKER FURNISHED BY CONTRACTOR IF NONE EXISTS. APPLY TO GLAZING & WINDOW SHADES, WHERE APPLICABLE
SB — EXISTING SMART BOARD- RETAIN AND REINSTALL	
BB — EXISTING BLACK BOARD- PROTECT IN PLACE	
FF — EXISTING FLATFILE PROVIDED BY OWNER	

CONTRACT G DEMOLITION SCOPE

1	FLOOR FINISHES	REMOVE AND DISPOSE OF EXISTING WALL BASE, AND FLOOR FINISHES DOWN TO SUB-FLOOR. CONTRACTOR SHALL BE RESPONSIBLE TO INSPECT THE EXISTING CONCRETE SLAB-FLOOR CONDITION AND PATCH ALL EXPOSED SURFACES AS NEEDED TO ENSURE A TRUE SMOOTH AND LEVEL FLOOR FINISH FREE OF DIPS, WAVES, DEPRESSIONS, AND TELEGRAPHING OF THE LEVELING COMPOUND OR IMPERFECTIONS OF THE SLAB BELOW. ASSUME FLOOR PREP THAT MAY INCLUDE FLASH PATCH EXISTING MATERIALS IN EACH ROOM.
3	WALL FINISHES	PREPARE ALL WALLS TO RECEIVE NEW FINISHES INCLUDING FILLING HOLES, REPAIRING CRACKS IN EXISTING WALLS, SANDING, AND PREPARING ALL SURFACES FOR A NEW PAINT FINISH.
4	CASEWORK	CONTRACTOR TO REMOVE AND DISPOSE OF EXISTING CASEWORK IN ITS ENTIRETY, INCLUDING BUT NOT LIMITED TO ALL WALLS, SOFFITS, FASCIA PIECES, ENCLOSURES, ETC. USED TO CONCEAL CASEWORK. PREPARE ALL WALLS TO RECEIVE NEW FINISHES INCLUDING FILLING HOLES, REPAIRING
5	FURNITURE	REMOVE AND PROTECT ALL EXISTING FURNITURE, TURN OVER TO OWNER.
6	UNIT VENTILATOR	EXISTING VENTILATOR TO BE REMOVED. COORDINATE WITH MECHANICAL CONTRACT.
7	RADIATOR	EXISTING RADIATORS TO BE REMOVED. COORDINATE WITH MECHANICAL CONTRACT.
8	SINK	EXISTING SINK TO BE REMOVED.
9	FAUCETS	EXISTING FAUCETS TO BE REMOVED.
10	DOOR & CLOSERS	REMOVE EXISTING DOOR AND CLOSERS. PREP FRAME FOR NEW INSTALL.

CONTRACT G SCOPE

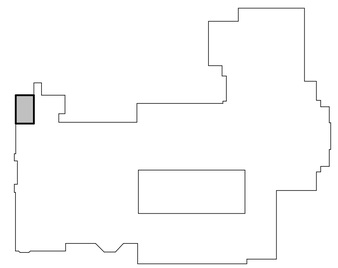
1	FLOOR FINISHES	FURNISH AND INSTALL NEW FLOOR FINISH AND NEW WALL BASE AS SCHEDULED. REFER TO ABATEMENT FOR FURTHER DETAILS.
3	PAINT WALLS	CAREFULLY REMOVE AND STORE ALL EXISTING WALL MOUNTED ITEMS, INCLUDING BUT NOT LIMITED TO: CORK BOARDS, WHITE BOARDS, BLACKBOARDS, SIGNAGE, ARTWORK, HOOKS, PROJECTORS, PROJECTOR BRACKETS, SCREENS, AND ALL DEVICES USED TO SECURE THESE ITEMS IN PLACE. PREPARE ALL WALLS TO RECEIVE NEW FINISHES INCLUDING FILING HOLES, REPAIRING CRACKS IN EXISTING WALLS, SANDING, AND PREPARING ALL SURFACES FOR A NEW PAINT FINISH. UPON COMPLETION OF WALL PREPARATION, REINSTALL EXISTING AND NEW OWNER PROVIDED WALL MOUNTED ITEMS INCLUDING BUT NOT LIMITED TO CORK BOARDS, WHITE BOARDS, SMARTBOARDS, SIGNAGE, ARTWORK, HOOKS, PROJECTORS, PROJECTOR BRACKETS, SCREENS, AND ALL DEVICES USED TO SECURE THESE ITEMS IN PLACE IN ACCORDANCE WITH ENLARGED CLASSROOM ELEVATIONS.
4	CASEWORK	FURNISH AND INSTALL NEW CASEWORK AND COUNTERS.
6	INFILL	INFILL EXISTING FIREPLACE USING SHAFT WALL. REFER TO ARCHITECTURAL DETAILS.
7	UNIT VENTILATORS	M CONTRACTOR TO FURNISH AND INSTALL NEW UNIT VENTILATOR, COORDINATE WITH MC.
8	SINKS	P CONTRACT TO FURNISH AND INSTALL NEW DROP-IN SINK, COORDINATE WITH PC.
9	FAUCETS	P CONTRACTOR TO FURNISH AND INSTALL NEW FAUCET, COORDINATE WITH PC.

CLASSROOM CASEWORK

Type Mark	Width	Depth	Height	Description
100	3' - 0"	1' - 10"	2' - 8 1/2"	DOUBLE DOOR SINK BASE CABINET
101	3' - 0"	2' - 0"	2' - 9"	ADA SINK APRON
102	3' - 0"	1' - 10"	2' - 8 1/2"	BASE CABINET-DOUBLE DOOR AND DRAWER
103	2' - 6"	1' - 10"	2' - 8 1/2"	BASE CABINET-DOUBLE DOOR AND DRAWER
104	1' - 6"	1' - 10"	2' - 8 1/2"	BASE CABINET- SINGLE DOOR AND DRAWER
105	3' - 0"	1' - 10"	2' - 8 1/2"	BASE CABINET- 2 SHELVES, OPEN (NO DOORS)
106	1' - 6"	1' - 10"	2' - 8 1/2"	BASE CABINET -2 SHELVES
207	2' - 6"	1' - 0"	2' - 6"	UPPER CABINET WITH 2 SHELVES
210	3' - 0"	1' - 0"	3' - 0"	UPPER CABINET WITH 3 SHELVES
305	2' - 8"	1' - 3"	7' - 0"	TALL CABINET WITH 6 SHELVES
307	4' - 7"	1' - 8"	5' - 7 1/2"	TALL CABINET WITH DOUBLE DOORS

CLASSROOM UPGRADES GENERAL NOTES

1. REFER TO CLASSROOM CASEWORK DETAILS ON SHEET MS-A 501



7 KEY PLAN - RM 211

SCALE: 1" = 100'-0"

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 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:
A. PAPPAS	A. PAPPAS A. DUNN	S.MANDIC	K. PACHECO

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202, SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT G & CONTRACT P GENERAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

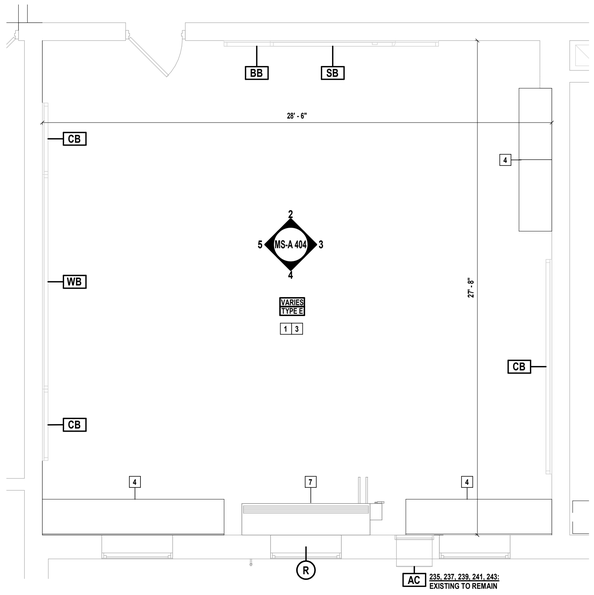
ENLARGED PLANS & ELEVATIONS CLASSROOM UPGRADES TYPE D - RM 211

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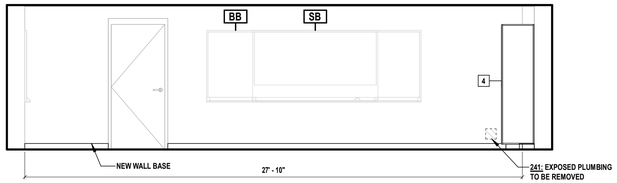
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1 CLASSROOM TYPE 'E' PLAN

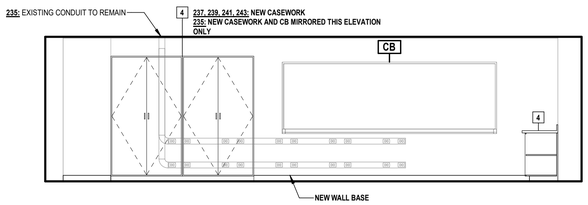
SCALE: 1/4" = 1'-0"

PROJECT NORTH



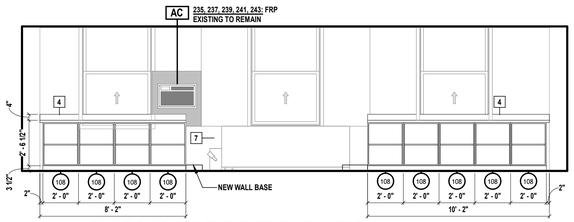
2 CLASSROOM TYPE 'E' ELEVATION

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



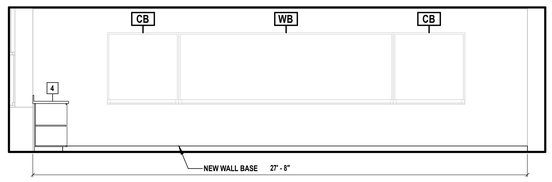
3 CLASSROOM TYPE 'E' ELEVATION

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



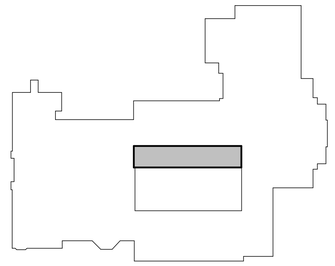
4 CLASSROOM TYPE 'E' ELEVATION

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



5 CLASSROOM TYPE 'E' ELEVATION

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



6 KEY PLAN - TYPE E

SCALE: 1" = 100'-0"

FLOOR PLAN LEGEND

A101 TYPE A — ROOM NUMBER ROOM TYPE	EXISTING WINDOW TO REMAIN
11 — KEYED SCOPE NOTE INDICATOR	EXISTING WALL TO REMAIN
EXISTING DOOR AND DOOR FRAME TO REMAIN. PAINT DOOR FRAME AS SELECTED BY DISTRICT	FURNISH NEW DOOR AND FRAME. PAINT DOOR FRAME AS SELECTED BY DISTRICT

ABBREVIATIONS

S	EXISTING STORAGE/ BUILT-IN CASEWORK TO REMAIN	WB	EXISTING WHITEBOARD- RETAIN AND REINSTALL
CB	EXISTING CORK BOARD- PROTECT IN PLACE	TS	TEACHER STATION- TURN OVER TO OWNER
AC	AIR CONDITIONING UNIT- RETAIN AND REINSTALL	R	RESCUE WINDOW STICKER FURNISHED BY CONTRACTOR IF NONE EXISTS. APPLY TO GLAZING & WINDOW SHADES, WHERE APPLICABLE
SB	EXISTING SMART BOARD- RETAIN AND REINSTALL		
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FF	EXISTING FLATFILE PROVIDED BY OWNER		

CONTRACT G SCOPE

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4	CASEWORK	FURNISH AND INSTALL NEW CASEWORK AND COUNTERS.
7	UNIT VENTILATORS	M CONTRACTOR TO FURNISH AND INSTALL NEW UNIT VENTILATOR, COORDINATE WITH MC.

CLASSROOM CASEWORK

Type Mark	Width	Depth	Height	Description
108	2' - 0"	1' - 10"	2' - 8 1/2"	BASE CABINET -2 SHELVES, OPEN (NO DOORS)
300	4' - 0"	1' - 10"	7' - 0"	TALL CABINET WITH DOUBLE DOORS

CLASSROOM TYPE "E"

Number	Scopes	Mirrored	Comments
235	1, 3, 4, 7	NOT MIRRORED	
237	1, 3, 4, 7	NOT MIRRORED	
239	1, 3, 4, 7	NOT MIRRORED	
241	1, 3, 4, 7	NOT MIRRORED	
243	1, 3, 4, 7	NOT MIRRORED	

CLASSROOM UPGRADES GENERAL NOTES

1. REFER TO CLASSROOM CASEWORK DETAILS ON SHEET MS-A 501

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White Plains, NY 10605
914.358.5623 • www.h2m.com
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NY Engineering Certificate of Authorization No.: 0018178

CONSULTANTS:

MARK	DATE	DESCRIPTION

REGISTERED ARCHITECT MARINA 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

"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:
A. PAPPAS	A. PAPPAS A. DUNN	S.MANDIC	K. PACHECO

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202, SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT G GENERAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

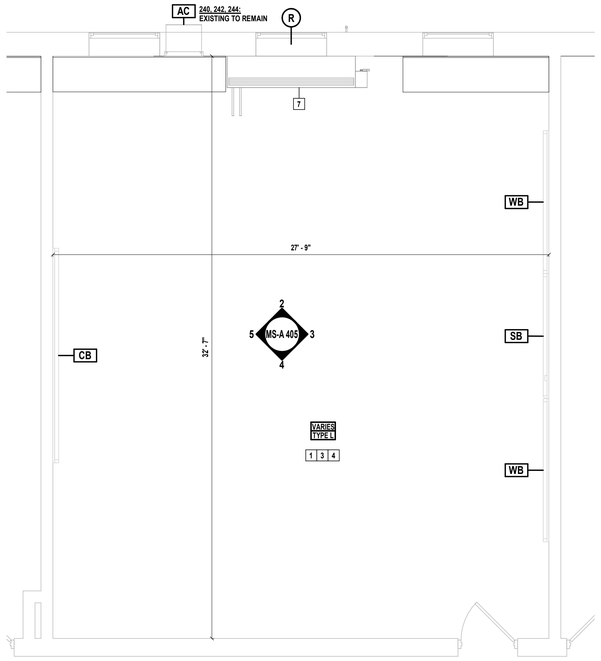
ENLARGED PLANS & ELEVATIONS CLASSROOM UPGRADES TYPE E

DRAWING No.

MS-A 404.00

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1 CLASSROOM TYPE 'F' PLAN

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

PROJECT NORTH

FLOOR PLAN LEGEND

A101 TYPE A — ROOM NUMBER ROOM TYPE	EXISTING WINDOW TO REMAIN
11 — KEYED SCOPE NOTE INDICATOR	EXISTING WALL TO REMAIN
EXISTING DOOR AND DOOR FRAME TO REMAIN. PAINT DOOR FRAME AS SELECTED BY DISTRICT	FURNISH NEW DOOR AND FRAME. PAINT DOOR FRAME AS SELECTED BY DISTRICT

ABBREVIATIONS

S	EXISTING STORAGE/ BUILT-IN CASEWORK TO REMAIN	WB	EXISTING WHITEBOARD- RETAIN AND REINSTALL
CB	EXISTING CORK BOARD- PROTECT IN PLACE	TS	TEACHER STATION- TURN OVER TO OWNER
AC	AIR CONDITIONING UNIT- RETAIN AND REINSTALL	R	RESCUE WINDOW STICKER FURNISHED BY CONTRACTOR IF NONE EXISTS. APPLY TO GLAZING & WINDOW SHADES, WHERE APPLICABLE
SB	EXISTING SMART BOARD- RETAIN AND REINSTALL		
BB	EXISTING BLACK BOARD- PROTECT IN PLACE		
FF	EXISTING FLATFILE PROVIDED BY OWNER		

CONTRACT G SCOPE

1	FLOOR FINISHES	FURNISH AND INSTALL NEW FLOOR FINISH AND NEW WALL BASE AS SCHEDULED. REFER TO ABATEMENT FOR FURTHER DETAILS.
3	PAINT WALLS	CAREFULLY REMOVE AND STORE ALL EXISTING WALL MOUNTED ITEMS, INCLUDING BUT NOT LIMITED TO: CORK BOARDS, WHITE BOARDS, BLACKBOARDS, SIGNAGE, ARTWORK, HOOKS, PROJECTORS, PROJECTOR BRACKETS, SCREENS, AND ALL DEVICES USED TO SECURE THESE ITEMS IN PLACE. PREPARE ALL WALLS TO RECEIVE NEW FINISHES INCLUDING FILING HOLES, REPAIRING CRACKS IN EXISTING WALLS, SANDING, AND PREPARING ALL SURFACES FOR A NEW PAINT FINISH. UPON COMPLETION OF WALL PREPARATION, REINSTALL EXISTING AND NEW OWNER PROVIDED WALL MOUNTED ITEMS INCLUDING BUT NOT LIMITED TO CORK BOARDS, WHITE BOARDS, SMARTBOARDS, SIGNAGE, ARTWORK, HOOKS, PROJECTORS, PROJECTOR BRACKETS, SCREENS, AND ALL DEVICES USED TO SECURE THESE ITEMS IN PLACE IN ACCORDANCE WITH ENLARGED CLASSROOM ELEVATIONS.
4	CASEWORK	FURNISH AND INSTALL NEW CASEWORK AND COUNTERS.
7	UNIT VENTILATORS	M CONTRACTOR TO FURNISH AND INSTALL NEW UNIT VENTILATOR, COORDINATE WITH MC.

CLASSROOM CASEWORK

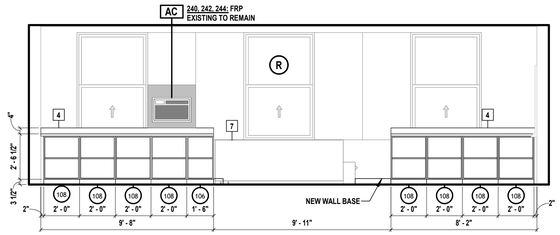
Type Mark	Width	Depth	Height	Description
106	1' - 6"	1' - 10"	2' - 8 1/2"	BASE CABINET -2 SHELVES
108	2' - 0"	1' - 10"	2' - 8 1/2"	BASE CABINET -2 SHELVES, OPEN (NO DOORS)

CLASSROOM TYPE "F"

Number	Scopes	Mirrored	Comments
240	1, 3, 4, 7		
242	1, 3, 4, 7		
244	1, 3, 4, 7		

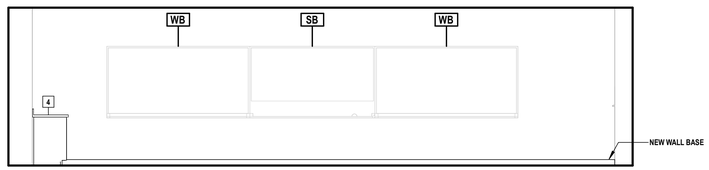
CLASSROOM UPGRADES GENERAL NOTES

1. REFER TO CLASSROOM CASEWORK DETAILS ON SHEET MS-A 501



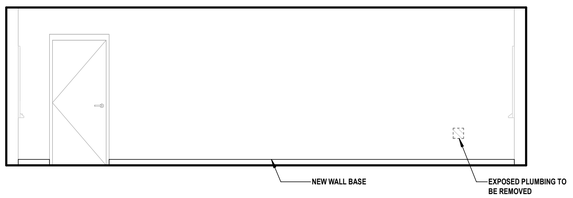
2 CLASSROOM TYPE 'F' ELEVATION

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



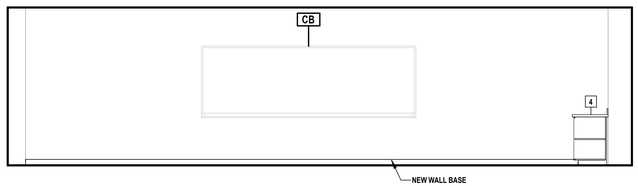
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SCALE: 1/4" = 1'-0"



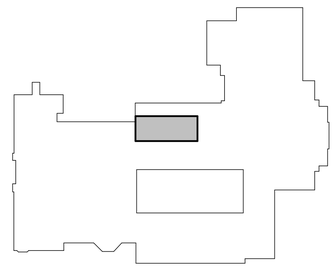
4 CLASSROOM TYPE 'F' ELEVATION

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



5 CLASSROOM TYPE 'F' ELEVATION

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



6 KEY PLAN - TYPE F

SCALE: 1" = 100'-0"

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CONSULTANTS:

MARK	DATE	DESCRIPTION

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Katrina N. Pacheco 09/30/2029
Exp. Date

KATRINA N. PACHECO, R.A.
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A. PAPPAS	A. PAPPAS A. DUNN	S.MANDIC	K. PACHECO

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202, SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT G
GENERAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

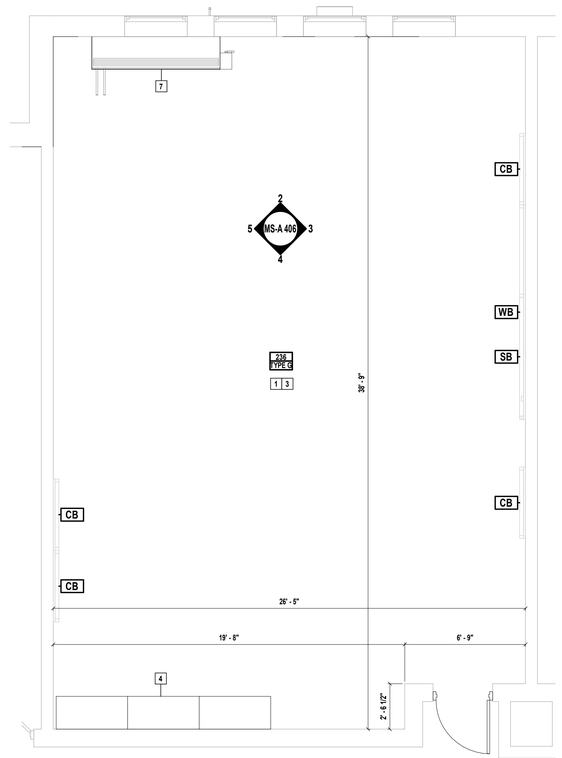
ENLARGED PLANS & ELEVATIONS CLASSROOM UPGRADES TYPE F

DRAWING No.

MS-A 405.00

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1 CLASSROOM TYPE 'G' PLAN
SCALE: 1/4" = 1'-0"

PROJECT NORTH

FLOOR PLAN LEGEND

A101 TYPE A — ROOM NUMBER ROOM TYPE	EXISTING WINDOW TO REMAIN
11 — KEYED SCOPE NOTE INDICATOR	EXISTING WALL TO REMAIN
EXISTING DOOR AND DOOR FRAME TO REMAIN. PAINT DOOR FRAME AS SELECTED BY DISTRICT	FURNISH NEW DOOR AND FRAME. PAINT DOOR FRAME AS SELECTED BY DISTRICT

ABBREVIATIONS

S	EXISTING STORAGE/ BUILT-IN CASEWORK TO REMAIN
CB	EXISTING CORK BOARD- PROTECT IN PLACE
AC	AIR CONDITIONING UNIT- RETAIN AND REINSTALL
SB	EXISTING SMART BOARD- RETAIN AND REINSTALL
BB	EXISTING BLACK BOARD- PROTECT IN PLACE
FF	EXISTING FLATFILE PROVIDED BY OWNER
WB	EXISTING WHITEBOARD- RETAIN AND REINSTALL
TS	TEACHER STATION- TURN OVER TO OWNER
R	RESCUE WINDOW STICKER FURNISHED BY CONTRACTOR IF NONE EXISTS. APPLY TO GLAZING & WINDOW SHADES, WHERE APPLICABLE

CONTRACT G SCOPE

1	FLOOR FINISHES	FURNISH AND INSTALL NEW FLOOR FINISH AND NEW WALL BASE AS SCHEDULED. REFER TO ABATEMENT FOR FURTHER DETAILS.
3	PAINT WALLS	CAREFULLY REMOVE AND STORE ALL EXISTING WALL MOUNTED ITEMS, INCLUDING BUT NOT LIMITED TO: CORK BOARDS, WHITE BOARDS, BLACKBOARDS, SIGNAGE, ARTWORK, HOOKS, PROJECTORS, PROJECTOR BRACKETS, SCREENS, AND ALL DEVICES USED TO SECURE THESE ITEMS IN PLACE. PREPARE ALL WALLS TO RECEIVE NEW FINISHES INCLUDING FILING HOLES, REPAIRING CRACKS IN EXISTING WALLS, SANDING, AND PREPARING ALL SURFACES FOR A NEW PAINT FINISH. UPON COMPLETION OF WALL PREPARATION, REINSTALL EXISTING AND NEW OWNER PROVIDED WALL MOUNTED ITEMS INCLUDING BUT NOT LIMITED TO CORK BOARDS, WHITE BOARDS, SMARTBOARDS, SIGNAGE, ARTWORK, HOOKS, PROJECTORS, PROJECTOR BRACKETS, SCREENS, AND ALL DEVICES USED TO SECURE THESE ITEMS IN PLACE IN ACCORDANCE WITH ENLARGED CLASSROOM ELEVATIONS.
4	CASEWORK	FURNISH AND INSTALL NEW CASEWORK AND COUNTERS.
7	UNIT VENTILATORS	M CONTRACTOR TO FURNISH AND INSTALL NEW UNIT VENTILATOR, COORDINATE WITH MC.

CLASSROOM CASEWORK

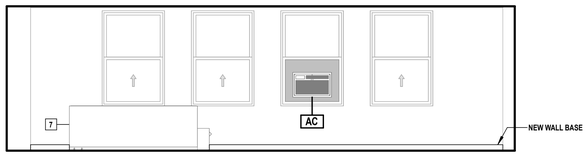
Type Mark	Width	Depth	Height	Description
300	4' - 0"	1' - 10"	7' - 0"	TALL CABINET WITH DOUBLE DOORS

CLASSROOM TYPE "G"

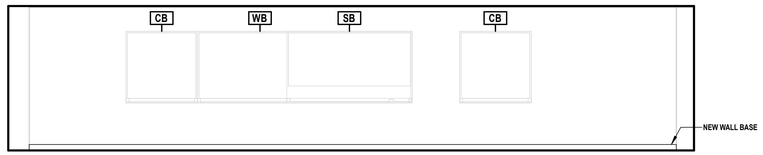
Number	Scopes	Mirrored	Comments
234	1, 3, 4, 7	SHOWN MIRRORED	
236	1, 3, 4, 7		

CLASSROOM UPGRADES GENERAL NOTES

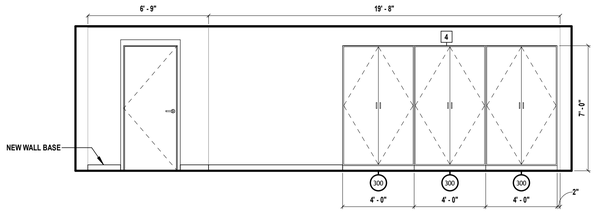
1. REFER TO CLASSROOM CASEWORK DETAILS ON SHEET MS-A 501



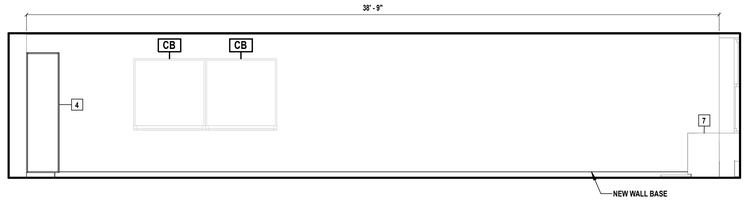
2 CLASSROOM TYPE 'G' ELEVATION
SCALE: 1/4" = 1'-0"



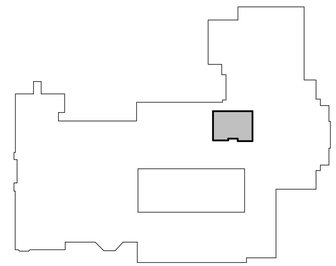
3 CLASSROOM TYPE 'G' ELEVATION
SCALE: 1/4" = 1'-0"



4 CLASSROOM TYPE 'G' ELEVATION
SCALE: 1/4" = 1'-0"



5 CLASSROOM TYPE 'G' ELEVATION
SCALE: 1/4" = 1'-0"



6 KEY PLAN - TYPE G
SCALE: 1" = 100'-0"

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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:	REVIEWENED BY:
A. PAPPAS	A. PAPPAS A. DUNN	S.MANDIC	K. PACHECO

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202, SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

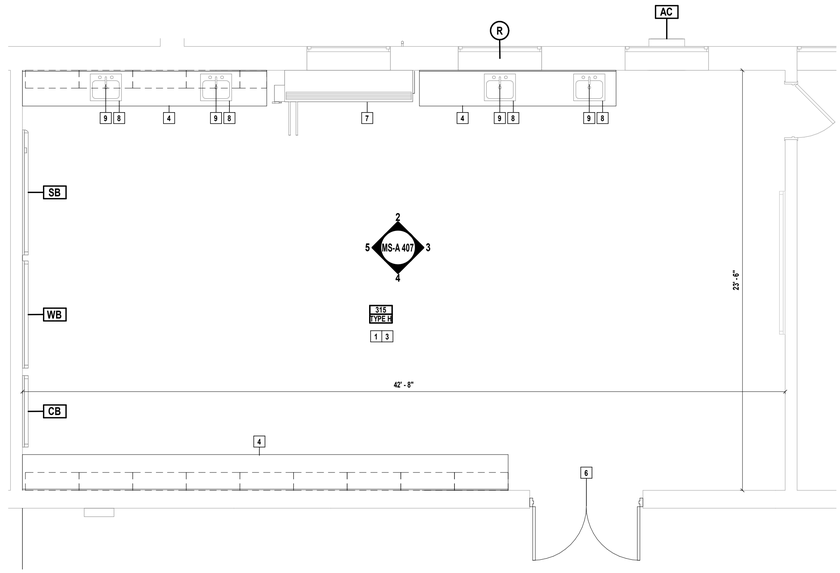
CONTRACT
CONTRACT G
GENERAL CONSTRUCTION

STATUS
SED SUBMISSION

SHEET TITLE
ENLARGED PLANS & ELEVATIONS CLASSROOM UPGRADES TYPE G

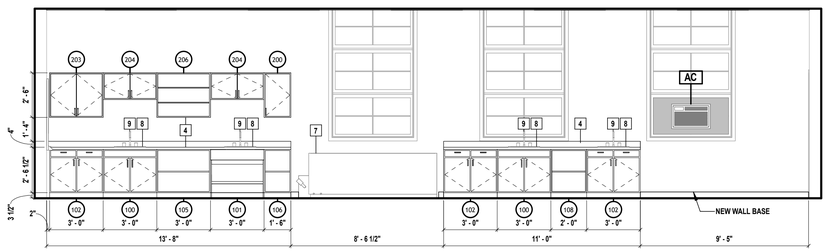
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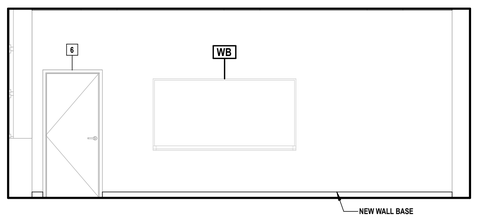


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SCALE: 1/4" = 1'-0"

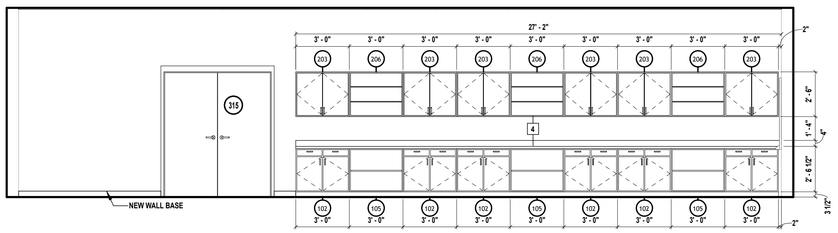
PROJECT NORTH



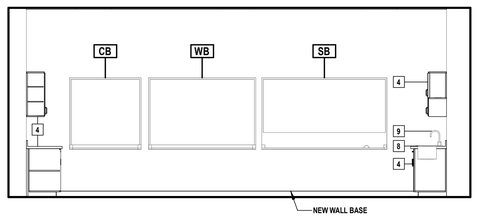
2 CLASSROOM TYPE 'H' ELEVATION
SCALE: 1/4" = 1'-0"



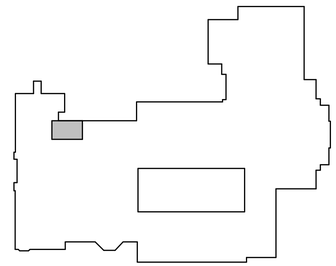
3 CLASSROOM TYPE 'H' ELEVATION
SCALE: 1/4" = 1'-0"



4 CLASSROOM TYPE 'H' ELEVATION
SCALE: 1/4" = 1'-0"



5 CLASSROOM TYPE 'H' ELEVATION
SCALE: 1/4" = 1'-0"



6 KEY PLAN - TYPE H
SCALE: 1" = 100'-0"

FLOOR PLAN LEGEND

A101 / TYPE A	ROOM NUMBER / ROOM TYPE		EXISTING WINDOW TO REMAIN
11	KEYED SCOPE NOTE INDICATOR		EXISTING WALL TO REMAIN
	EXISTING DOOR AND DOOR FRAME TO REMAIN. PAINT DOOR FRAME AS SELECTED BY DISTRICT		FURNISH NEW DOOR AND FRAME. PAINT DOOR FRAME AS SELECTED BY DISTRICT

ABBREVIATIONS

S	EXISTING STORAGE/ BUILT-IN CASEWORK TO REMAIN	WB	EXISTING WHITEBOARD- RETAIN AND REINSTALL
CB	EXISTING CORK BOARD- PROTECT IN PLACE	TS	TEACHER STATION- TURN OVER TO OWNER
AC	AIR CONDITIONING UNIT- RETAIN AND REINSTALL	R	RESCUE WINDOW STICKER FURNISHED BY CONTRACTOR IF NONE EXISTS. APPLY TO GLAZING & WINDOW SHADES, WHERE APPLICABLE
SB	EXISTING SMART BOARD- RETAIN AND REINSTALL		
BB	EXISTING BLACK BOARD- PROTECT IN PLACE		
FF	EXISTING FLATFILE PROVIDED BY OWNER		

CONTRACT G SCOPE

1	FLOOR FINISHES	FURNISH AND INSTALL NEW FLOOR FINISH AND NEW WALL BASE AS SCHEDULED. REFER TO ABATEMENT FOR FURTHER DETAILS.
3	PAINT WALLS	CAREFULLY REMOVE AND STORE ALL EXISTING WALL MOUNTED ITEMS, INCLUDING BUT NOT LIMITED TO: CORK BOARDS, WHITE BOARDS, BLACKBOARDS, SIGNAGE, ARTWORK, HOOKS, PROJECTORS, PROJECTOR BRACKETS, SCREENS, AND ALL DEVICES USED TO SECURE THESE ITEMS IN PLACE. PREPARE ALL WALLS TO RECEIVE NEW FINISHES INCLUDING FILING HOLES, REPAIRING CRACKS IN EXISTING WALLS, SANDING, AND PREPARING ALL SURFACES FOR A NEW PAINT FINISH. UPON COMPLETION OF WALL PREPARATION, REINSTALL EXISTING AND NEW OWNER PROVIDED WALL MOUNTED ITEMS INCLUDING BUT NOT LIMITED TO CORK BOARDS, WHITE BOARDS, SMARTBOARDS, SIGNAGE, ARTWORK, HOOKS, PROJECTORS, PROJECTOR BRACKETS, SCREENS, AND ALL DEVICES USED TO SECURE THESE ITEMS IN PLACE IN ACCORDANCE WITH ENLARGED CLASSROOM ELEVATIONS.
4	CASEWORK	FURNISH AND INSTALL NEW CASEWORK AND COUNTERS.
6	INFILL	INFILL EXISTING FIREPLACE USING SHAFT WALL. REFER TO ARCHITECTURAL DETAILS.
7	UNIT VENTILATORS	M CONTRACTOR TO FURNISH AND INSTALL NEW UNIT VENTILATOR, COORDINATE WITH MC.
8	SINKS	P CONTRACT TO FURNISH AND INSTALL NEW DROP-IN SINK, COORDINATE WITH PC.
9	FAUCETS	P CONTRACTOR TO FURNISH AND INSTALL NEW FAUCET, COORDINATE WITH PC.

CLASSROOM CASEWORK

Type Mark	Width	Depth	Height	Description
100	3' - 0"	1' - 10"	2' - 8 1/2"	DOUBLE DOOR SINK BASE CABINET
101	3' - 0"	2' - 0"	2' - 9"	ADA SINK APRON
102	3' - 0"	1' - 10"	2' - 8 1/2"	BASE CABINET-DOUBLE DOOR AND DRAWER
105	3' - 0"	1' - 10"	2' - 8 1/2"	BASE CABINET- 2 SHELVES, OPEN (NO DOORS)
106	1' - 6"	1' - 10"	2' - 8 1/2"	BASE CABINET -2 SHELVES
108	2' - 0"	1' - 10"	2' - 8 1/2"	BASE CABINET -2 SHELVES, OPEN (NO DOORS)
200	1' - 6"	1' - 0"	2' - 6"	UPPER CABINET WITH SINGLE DOOR
203	3' - 0"	1' - 0"	2' - 6"	UPPER CABINET WITH DOUBLE DOOR
204	3' - 0"	1' - 0"	1' - 6"	UPPER CABINET WITH DOUBLE DOOR
206	3' - 0"	1' - 0"	2' - 6"	UPPER CABINET WITH 2 SHELVES

CLASSROOM UPGRADES GENERAL NOTES

1. REFER TO CLASSROOM CASEWORK DETAILS ON SHEET MS-A 501

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CONSULTANTS:

MARK	DATE	DESCRIPTION

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

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Exp. Date

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SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202, SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT G & CONTRACT P GENERAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

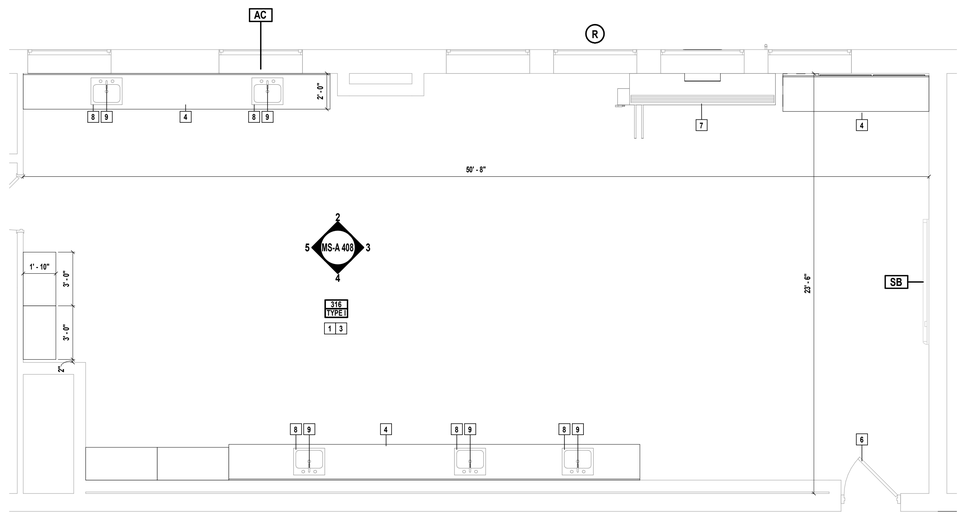
ENLARGED PLANS & ELEVATIONS CLASSROOM UPGRADES TYPE H - RM 315

DRAWING No.

MS-A 407.00

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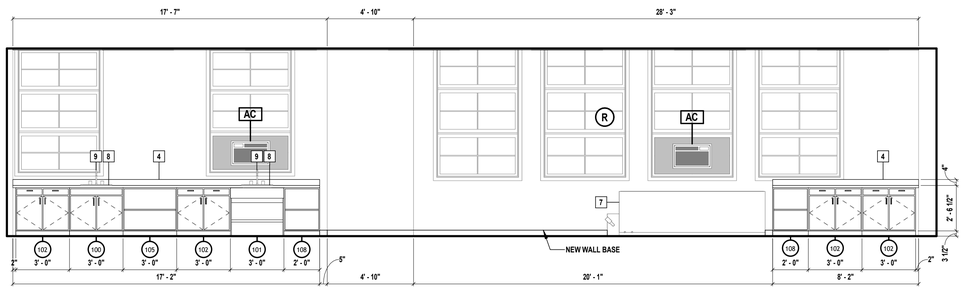
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1 CLASSROOM TYPE 'I' PLAN

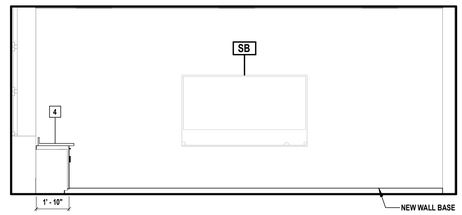
SCALE: 1/4" = 1'-0"

PROJECT NORTH



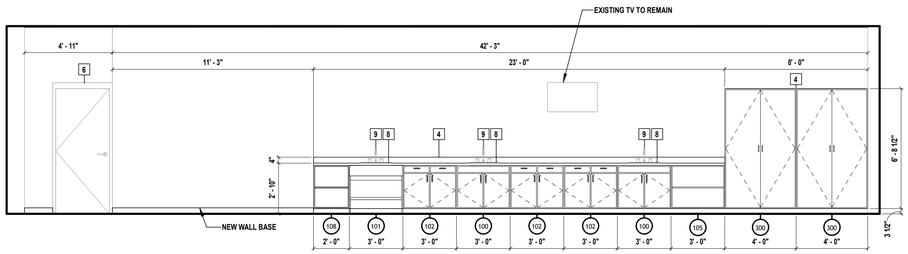
2 CLASSROOM TYPE 'I' EAST ELEVATION

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



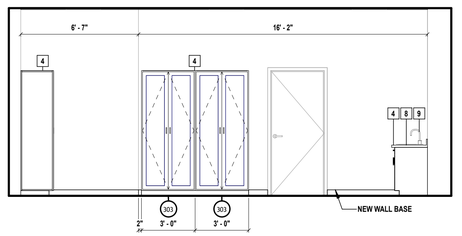
3 CLASSROOM TYPE 'I' SOUTH ELEVATION

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



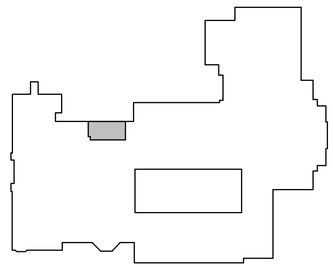
4 CLASSROOM TYPE 'I' WEST ELEVATION

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



5 CLASSROOM TYPE 'I' NORTH ELEVATION

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



6 KEY PLAN - TYPE I

SCALE: 1" = 100'-0"

FLOOR PLAN LEGEND

A101 TYPE A	ROOM NUMBER ROOM TYPE		EXISTING WINDOW TO REMAIN
11	KEYED SCOPE NOTE INDICATOR		EXISTING WALL TO REMAIN
	EXISTING DOOR AND DOOR FRAME TO REMAIN. PAINT DOOR FRAME AS SELECTED BY DISTRICT		FURNISH NEW DOOR AND FRAME. PAINT DOOR FRAME AS SELECTED BY DISTRICT

ABBREVIATIONS

S	EXISTING STORAGE/ BUILT-IN CASEWORK TO REMAIN	WB	EXISTING WHITEBOARD- RETAIN AND REINSTALL
CB	EXISTING CORK BOARD- PROTECT IN PLACE	TS	TEACHER STATION- TURN OVER TO OWNER
AC	AIR CONDITIONING UNIT- RETAIN AND REINSTALL	R	RESCUE WINDOW STICKER FURNISHED BY CONTRACTOR IF NONE EXISTS. APPLY TO GLAZING & WINDOW SHADES, WHERE APPLICABLE
SB	EXISTING SMART BOARD- RETAIN AND REINSTALL		
BB	EXISTING BLACK BOARD- PROTECT IN PLACE		
FF	EXISTING FLATFILE PROVIDED BY OWNER		

CONTRACT G SCOPE

1	FLOOR FINISHES	FURNISH AND INSTALL NEW FLOOR FINISH AND NEW WALL BASE AS SCHEDULED. REFER TO ABATEMENT FOR FURTHER DETAILS.
3	PAINT WALLS	CAREFULLY REMOVE AND STORE ALL EXISTING WALL MOUNTED ITEMS, INCLUDING BUT NOT LIMITED TO: CORK BOARDS, WHITE BOARDS, BLACKBOARDS, SIGNAGE, ARTWORK, HOOKS, PROJECTORS, PROJECTOR BRACKETS, SCREENS, AND ALL DEVICES USED TO SECURE THESE ITEMS IN PLACE. PREPARE ALL WALLS TO RECEIVE NEW FINISHES INCLUDING FILING HOLES, REPAIRING CRACKS IN EXISTING WALLS, SANDING, AND PREPARING ALL SURFACES FOR A NEW PAINT FINISH. UPON COMPLETION OF WALL PREPARATION, REINSTALL EXISTING AND NEW OWNER PROVIDED WALL MOUNTED ITEMS INCLUDING BUT NOT LIMITED TO CORK BOARDS, WHITE BOARDS, SMARTBOARDS, SIGNAGE, ARTWORK, HOOKS, PROJECTORS, PROJECTOR BRACKETS, SCREENS, AND ALL DEVICES USED TO SECURE THESE ITEMS IN PLACE IN ACCORDANCE WITH ENLARGED CLASSROOM ELEVATIONS.
4	CASEWORK	FURNISH AND INSTALL NEW CASEWORK AND COUNTERS.
6	INFILL	INFILL EXISTING FIREPLACE USING SHAFT WALL. REFER TO ARCHITECTURAL DETAILS.
7	UNIT VENTILATORS	M CONTRACTOR TO FURNISH AND INSTALL NEW UNIT VENTILATOR, COORDINATE WITH MC.
8	SINKS	P CONTRACT TO FURNISH AND INSTALL NEW DROP-IN SINK, COORDINATE WITH PC.
9	FAUCETS	P CONTRACTOR TO FURNISH AND INSTALL NEW FAUCET, COORDINATE WITH PC.

CLASSROOM CASEWORK

Type Mark	Width	Depth	Height	Description
100	3' - 0"	1' - 10"	2' - 8 1/2"	DOUBLE DOOR SINK BASE CABINET
101	3' - 0"	2' - 0"	2' - 9"	ADA SINK APRON
102	3' - 0"	1' - 10"	2' - 8 1/2"	BASE CABINET-DOUBLE DOOR AND DRAWER
105	3' - 0"	1' - 10"	2' - 8 1/2"	BASE CABINET- 2 SHELVES, OPEN (NO DOORS)
108	2' - 0"	1' - 10"	2' - 8 1/2"	BASE CABINET -2 SHELVES, OPEN (NO DOORS)
300	4' - 0"	1' - 10"	7' - 0"	TALL CABINET WITH DOUBLE DOORS
303	3' - 0"	1' - 10"	7' - 0"	TALL CABINET WITH DOUBLE GLASS DOORS

CLASSROOM UPGRADES GENERAL NOTES

1. REFER TO CLASSROOM CASEWORK DETAILS ON SHEET MS-A 501

H2M architects + engineers

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914.358.5623 • www.h2m.com
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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

"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:
A. PAPPAS	A. PAPPAS A. DUNN	S.MANDIC	K. PACHECO

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202, SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT G & CONTRACT P
GENERAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

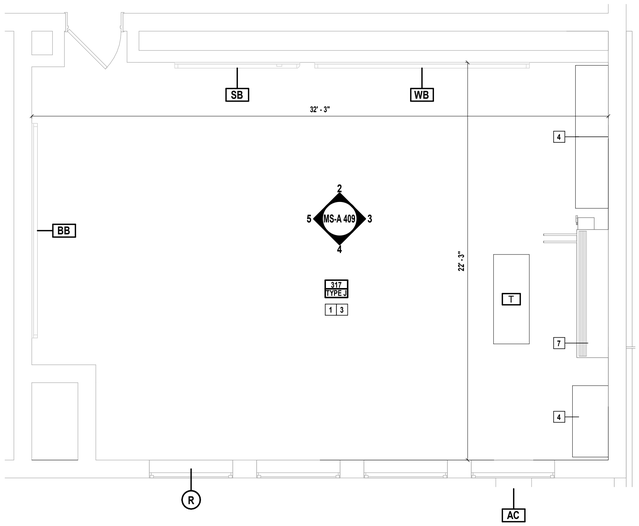
ENLARGED PLANS & ELEVATIONS
CLASSROOM UPGRADES
TYPE I - RM 316

DRAWING No.

MS-A 408.00

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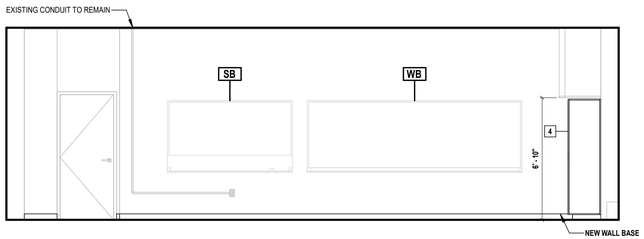
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1 CLASSROOM TYPE 'J' PLAN

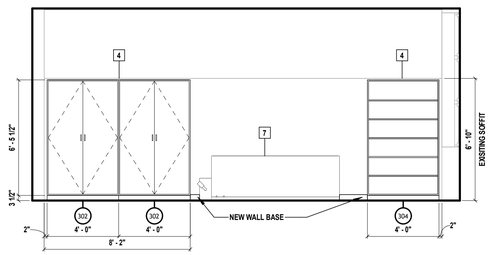
SCALE: 1/4" = 1'-0"

PROJECT NORTH



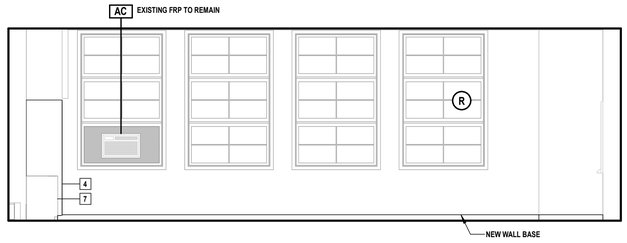
2 CLASSROOM TYPE 'J' EAST ELEVATION

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



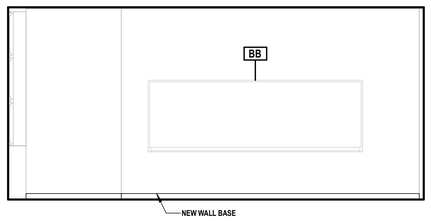
3 CLASSROOM TYPE 'J' SOUTH ELEVATION

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



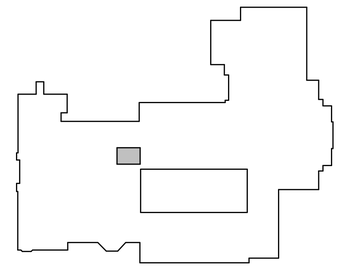
4 CLASSROOM TYPE 'J' WEST ELEVATION

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



5 CLASSROOM TYPE 'J' NORTH ELEVATION

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



6 KEY PLAN - TYPE J

SCALE: 1" = 100'-0"

FLOOR PLAN LEGEND

A101 / TYPE A — ROOM NUMBER / ROOM TYPE	EXISTING WINDOW TO REMAIN
11 — KEYED SCOPE NOTE INDICATOR	EXISTING WALL TO REMAIN
EXISTING DOOR AND DOOR FRAME TO REMAIN. PAINT DOOR FRAME AS SELECTED BY DISTRICT	FURNISH NEW DOOR AND FRAME. PAINT DOOR FRAME AS SELECTED BY DISTRICT

ABBREVIATIONS

S	EXISTING STORAGE/ BUILT-IN CASEWORK TO REMAIN	WB	EXISTING WHITEBOARD- RETAIN AND REINSTALL
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CONTRACT G SCOPE

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4	CASEWORK	FURNISH AND INSTALL NEW CASEWORK AND COUNTERS.
7	UNIT VENTILATORS	M CONTRACTOR TO FURNISH AND INSTALL NEW UNIT VENTILATOR, COORDINATE WITH MC.

CLASSROOM CASEWORK

Type Mark	Width	Depth	Height	Description
302	4' - 0"	1' - 10"	6' - 9"	TALL CABINET WITH DOUBLE DOORS
304	4' - 0"	2' - 0"	6' - 9"	TALL CABINET WITH 6 SHELVES

CLASSROOM UPGRADES GENERAL NOTES

1. REFER TO CLASSROOM CASEWORK DETAILS ON SHEET MS-A 501

H2M architects + engineers

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White Plains, NY 10605
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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
Exp. Date

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

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A. PAPPAS	A. PAPPAS A. DUNN	S.MANDIC	-

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202, SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT G
GENERAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

ENLARGED PLANS & ELEVATIONS
CLASSROOM UPGRADES
TYPE J - RM 317

DRAWING No.

MS-A 409.00

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DOOR TYPE NOTES

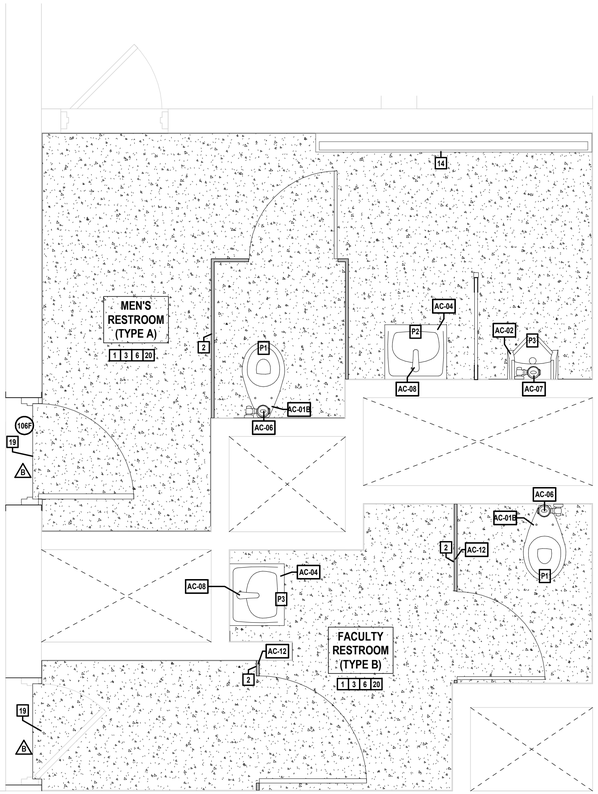
1. FRAMES AND DOORS SCHEDULED FOR EXISTING OPENING - VERIFY IN FIELD EXISTING OPENING SIZES AND RECORD ON SHOP DRAWINGS.
2. ALL DOORS ARE TO BE ADJUSTED TO ELIMINATE RATTLE AND OR PLAY WHEN DOOR IS LATCHED
3. SLOPED ALUMINUM THRESHOLDS AT ALL EXTERIOR DOORS
4. ALL DOORS ARE TO HAVE STOPS
5. UNDERCUT 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

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.P.	EPOXY WALL PAINT	HM	HOLLOW METAL
EXP.	EXPOSED	U.S.	UNDERSIDE
G.W.B./GWB	GYPSUM WALL BOARD		
L.V.T./LVT	LUXURY VINYL TILE		
R.B./RB	RUBBER BASE		
RUBBER	RUBBER FLOORING		

DOOR FRAME DEPTH NOTES

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



1 BATHROOM TYPES A & B - PROPOSED

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

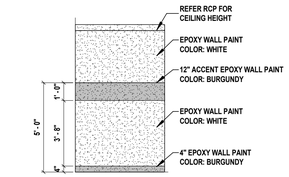
PROJECT NORTH

FINISH SCHEDULE

NAME	FLOORING		NORTH WALL		EAST WALL		SOUTH WALL		WEST WALL		COMMENTS
	FINISH	BASE	MAT.	FIN.	MAT.	FIN.	MAT.	FIN.	MAT.	FIN.	
FACULTY TOILET	E.P.	E.P.	E.P.	EXIST	E.P.	EXIST	E.P.	EXIST	E.P.	EXIST	
MEN'S TOILET	E.P.	E.P.	E.P.	EXIST	E.P.	EXIST	E.P.	EXIST	E.P.	EXIST	

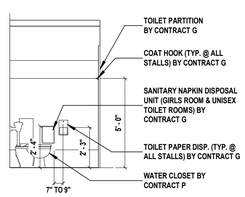
PLUMBING FIXTURE SCHEDULE

FIXTURE TAG	DESCRIPTION	MAX...	MINIMUM CONNECTION SIZES							SPECIFICATION	REMARKS
		MAX FLOW	COLD... SIZE	W...	HOT... SIZE	WFU	DRAIN SI...	D...	VENT		
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....	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....
AC-01	WATER CLOSET - FLOOR MOUNTED - ADA COMPLIANT - TOP SPUD	1.28 GPF	1"	10	---	---	3"	4	1-1/2"	TOILET: VITREOUS CHINA, ELONGATED, ADA HEIGHT, ASME A112.19.2. PROVIDE TOILET SEAT CHURCH 295CT OR... FLUSH VALVE: EXPOSED SENSOR FLUSHOMETER, POLISHED CHROME, ADA COMPLIANT, VANDAL RESISTANT. COMPLIES WITH ASSE 1037. PROVIDE...	COORDINATE GRAB BAR HEIGHT WITH FLUSH VALVE.
AC-15	URINAL - ADA COMPLIANT - TOP SPUD	0.125 GPF	3/4"	5	---	---	3"	4	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...	PROVIDE CARRIER SUPPORT WATTS CA-311 OR APPROVED EQUAL.



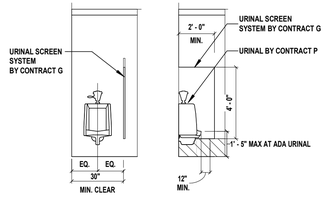
2 TILE ACCENT WALL

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



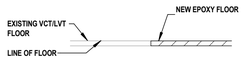
3 TOILET - TYPICAL

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



4 URINAL - ACCESSIBLE

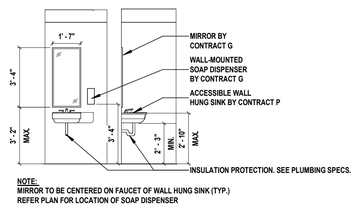
SCALE: 1/4" = 1'-0"



B THRESHOLD - EXISTING VCT/LVT TO EPOXY

7 THRESHOLDS - INTERIOR

SCALE: 3" = 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"

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 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.
14	RADIATOR COVER	PROVIDE NEW RADIATOR COVER IN KIND.
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

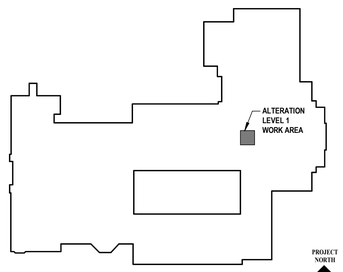
P1	FLOOR MOUNTED TOILET	PROVIDE NEW FLOOR MOUNTED TOILET WITH FLUSH SENSOR. INSTALL 1-INCH COLD WATER, 3-INCH SANITARY, AND 2-INCH VENT TO TOILET WITH WAX SEAL AND SEALANT.
P2	WALL HUNG SINK	PROVIDE NEW SINGLE LAVATORY WITH FAUCET AND SOAP DISPENSER. INSTALL 1/2-INCH COLD AND HOT WATER TO FAUCET WITH 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 APPLICAITONS 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	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.
P4	FLOOR DRAIN	PROVIDE AND INSTALL NEW FLOOR DRAIN COVER PLATE.

FIXTURE SCHEDULE

FIXTURE NO.	NAME	BRAND	MODEL #	QUANTITY	ADA
AC-01B	TOILET FLOOR MOUNTED (ADA)	Sloan Valve	ST-2029	2	Yes
AC-02	URINAL WALL HUNG	SLOAN VALVE	SU-1009	1	Yes
AC-04	LAVAOTRY SINGLE WALL HUNG	Sloan Valve	SS-3103	2	Yes
AC-06	FLUSHOMETER - TOILET	Sloan Valve	G2-8111	2	
AC-07	FLUSHOMETER - URINAL	Sloan Valve	G2-8186	1	
AC-08	FAUCET	Sloan Valve	EAF-150	2	
AC-12	PARTITION SYSTEM	SCRANTON PRODUCTS	HINY HIDERS	3	

KEY PLAN LEGEND

ALTERATION LEVEL 1 AREAS OF WORK



PROJECT NORTH

6 KEY PLAN - FIRST FLOOR

SCALE: 1" = 100'-0"

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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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M. LUCK	M. LUCK	S. MANDIC	K. PACHECO

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202, SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT G GENERAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

RESTROOM UPGRADES PROPOSED PLAN

DRAWING No.

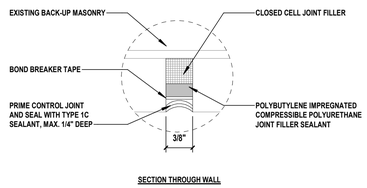
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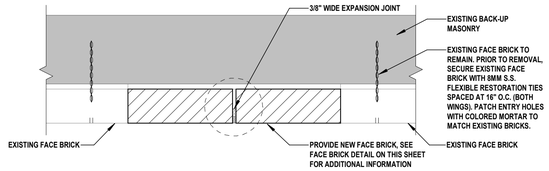
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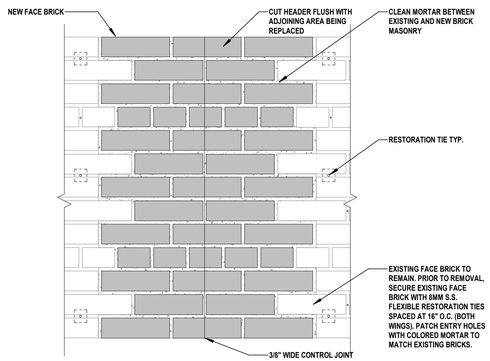
1 MASONRY POINTING
SCALE: 1 1/2" = 1'-0"



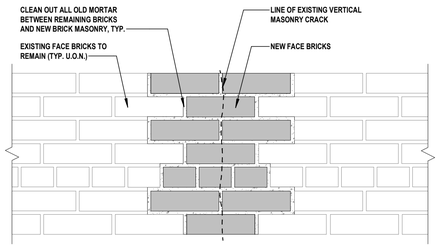
2 EXTERIOR MASONRY WALL - CONTROL JOINT-SECTION
SCALE: 12" = 1'-0"



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

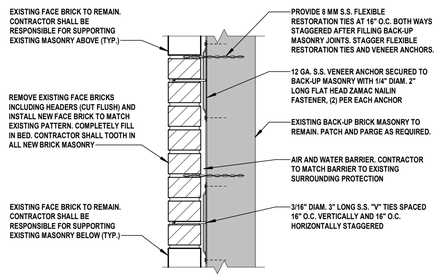


4 EXTERIOR MASONRY WALL - EXPANSION JOINT-ELEVATION
SCALE: 1 1/2" = 1'-0"



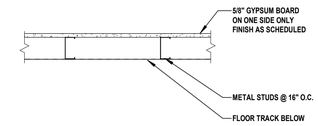
NOTES:
1. REPLACE HATCHED BRICKS/BLOCKS WITH NEW BRICKS/BLOCKS.
2. DO NOT REPLACE HEADER BRICKS IF NOT CRACKED.
3. ALL JOINTS BETWEEN BRICK HEAD AND BED JOINTS ARE TO BE FILLED SOLID.

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

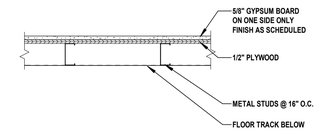


NOTE: REPLACE EXISTING MASONRY THROUGH-WALL AND COUNTER FLASHING WITH NEW WHERE INDICATED ON ELEVATIONS.

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

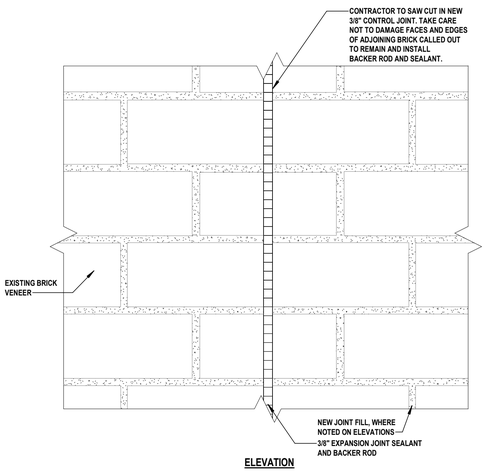


WALL TYPE	OVERALL DIMENSIONS	STUD SIZE	FIRE RATING	UL No.	STC RATING	COMMENTS
18A	3 1/8"	2 1/2"	-	-	-	-



WALL TYPE	OVERALL DIMENSIONS	STUD SIZE	FIRE RATING	UL No.	STC RATING	COMMENTS
19A	3 3/4"	2 1/2"	-	-	-	-

7 METAL STUD PARTITION
SCALE: 1" = 1'-0"



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

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S. MANDIC	C. HENRY	S. MANDIC	

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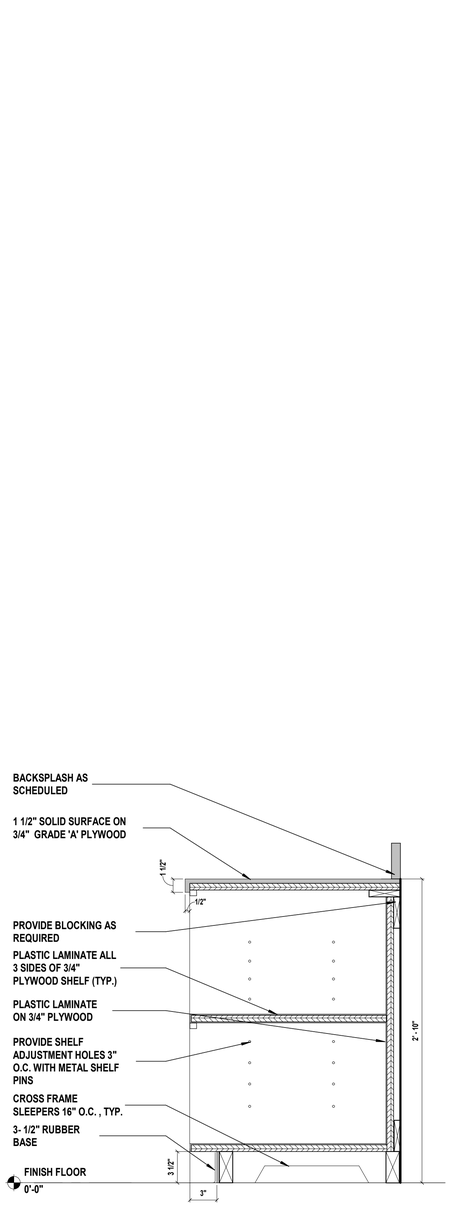
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CONTRACT G GENERAL CONSTRUCTION

STATUS
SED SUBMISSION

SHEET TITLE
ARCHITECTURAL DETAILS

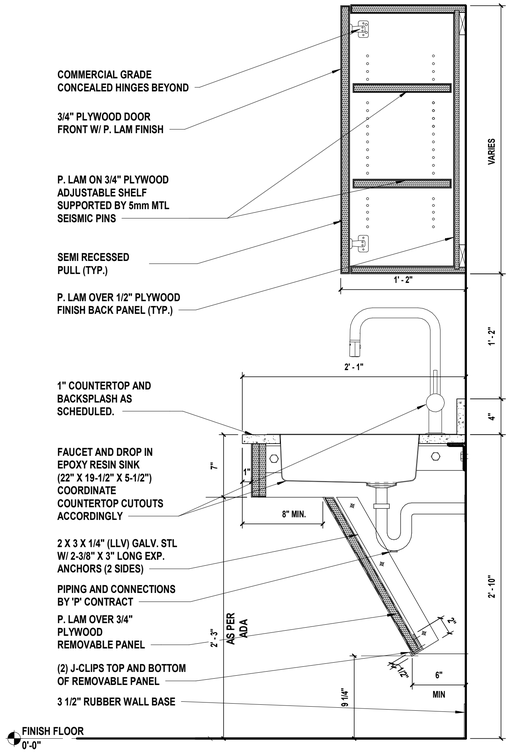
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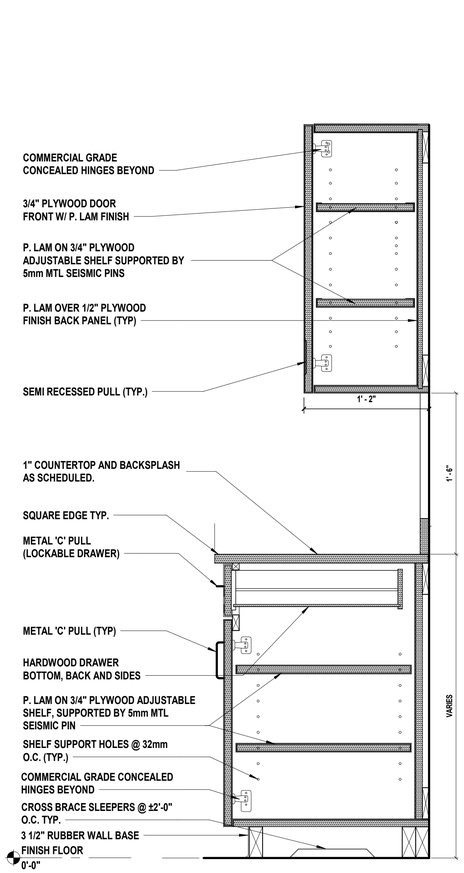
1 MILLWORK SECTION- OPEN CASEWORK

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



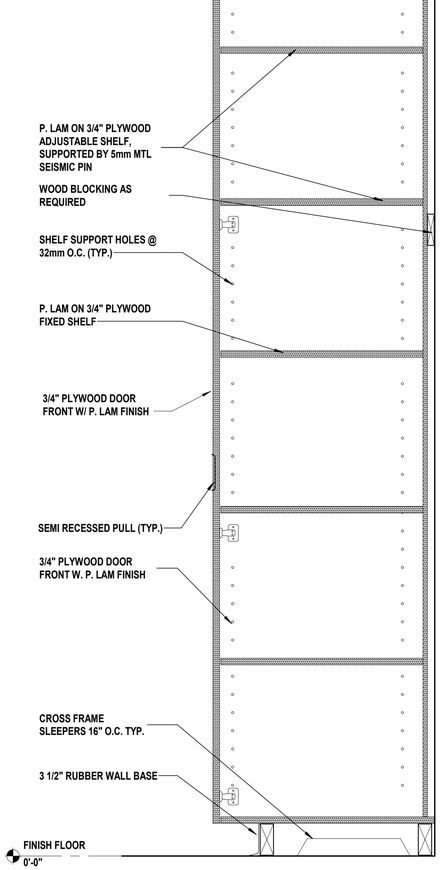
2 MILLWORK SECTION AT ADA SINK.

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



3 MILLWORK SECTION AT CABINETS

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



4 MILLWORK SECTION- FULL HEIGHT CABINET

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

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SHEET TITLE

ARCHITECTURAL CASEWORK DETAILS

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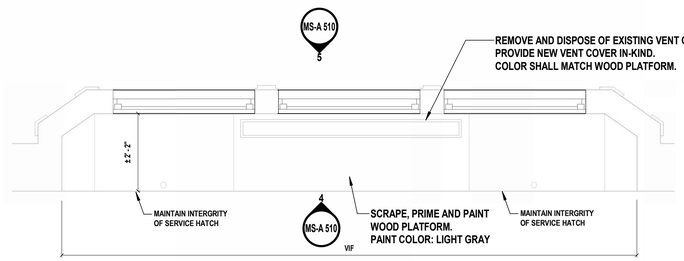
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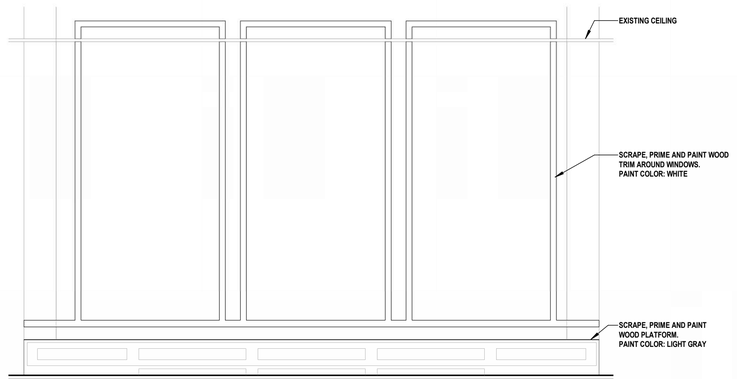
1 BAY WINDOW 2 - EXTERIOR ELEVATION
N.T.S.



5 BAY WINDOW 1 - EXTERIOR ELEVATION
N.T.S.



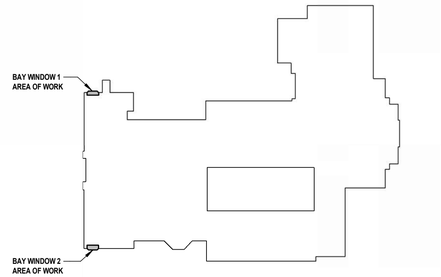
3 BAY WINDOW 1 - PLAN VIEW
SCALE: 1/2" = 1'-0"



4 BAY WINDOW 1 - INTERIOR ELEVATION
SCALE: 1/2" = 1'-0"

BAY WINDOW DEMOLITION NOTES

1. DEMOLITION WORK SHALL BE IN COMPLIANCE WITH ALL STATE EDUCATION DEPARTMENT STANDARDS, ALL N.Y.S. AND TOWN APPLICABLE BUILDING CODES, AND LIFE AND SAFETY REGULATIONS.
2. ALL CONTRACTORS SHALL OBEY ALL CODES, STATUES, AND LAWS AS APPLICABLE TO DEMOLITION WORK IN AN OCCUPIED BUILDING AND FOR REMOVAL OF MATERIALS SAFELY FROM THE SITE, INCLUDING ALL OSHA REGULATIONS.
3. IN EVENT OF DISCREPANCIES BETWEEN THESE DRAWINGS AND EXISTING CONDITIONS, ANY CONTRACTOR SHALL NOTIFY THE ARCHITECT IN WRITING PRIOR TO PROCEEDING AND SHALL NOT PROCEED WITHOUT WRITTEN DIRECTION FROM THE ARCHITECT.
4. THE GENERAL CONTRACTOR SHALL PROTECT ALL PORTIONS OF THE EXISTING BUILDING FROM DUST, WEATHER INCLEMENCY AND FREEZING TO PREVENT DAMAGE TO THE EXISTING STRUCTURE AND BUILDING CONTENTS.
5. ALL CONTRACTORS SHALL DISPOSE OF ALL UNWANTED MATERIALS AND OTHER DEMOLITION DEBRIS OFF SITE, IN ACCORDANCE WITH CONTRACT REQUIREMENTS AND ALL LAWS AND REGULATIONS.
6. THE ELEMENTS AND PORTIONS OF THIS BUILDING WHICH ARE INDICATED ARE TO BE SELECTIVELY DEMOLISHED ARE TO BE DEMOLISHED IN THEIR ENTIRETY, UNLESS OTHERWISE NOTED. REMOVALS SHALL INCLUDE, BUT ARE NOT LIMITED TO SELECT PORTIONS OF CONCRETE AND WOOD FLOORING, DOORS, WINDOWS, INDICATED PARTITIONS, EQUIPMENT, MISCELLANEOUS AND UNUSED HARDWARE, CEILING FINISHES, AND FLOOR FINISHES. MECHANICAL, PLUMBING, AND ELECTRICAL FIXTURES, CONDUIT, AND WIRING DEMOLITION RELATED TO THESE PLANS ARE SHOWN ON RESPECTIVE DRAWINGS.
7. REMOVE MEANS: TO DISCONNECT IF REQUIRED, REMOVE AND LEGALLY DISPOSE OF UNLESS NOTED OTHERWISE.
8. ALL HOLES IN SLABS AND WALLS, INCLUDING FINAL PATCHING, ARE THE RESPONSIBILITY OF EACH CONTRACTOR FOR WHOM THE PENETRATIONS ARE REQUIRED, UON. HOLES THROUGH SLABS SHALL BE CORE DRILLED. WHERE CORE DRILLING IS NOT POSSIBLE, SLABS SHALL BE SAWCUT. PROVIDE REQUIRED FIRE-STOPPING PRIOR TO CONCEALING WORK.
9. ALL DEMOTION WORK SHALL BE PERFORMED BY CONTRACT 'G', UON. CONTRACT 'G' SHALL DEMOLISH ALL EXISTING CONSTRUCTION, INCLUDING, BUT LIMITED TO, FLOOR, WALL AND CEILING FINISHES, AS INDICATED, TO PROVIDED FINISHED CONSTRUCTION AS DESCRIBED IN THE CONTRACT DOCUMENTS, WHETHER OF NOT THE DEMOLITION IS SPECIFICALLY CALLED OUT.
10. ALL EXTERIOR BUILDING ENVELOPE REMOVALS TO BE COORDINATED WITH PERMANENT INFILL CONSTRUCTION OR TEMPORARY OPENING PROTECTION TO MAINTAIN A WEATHER TIGHT ENVELOPE.
11. BUILDING DIMENSIONS ARE APPROXIMATE. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS FOR QUANTITY TAKE-OFFS AND FABRICATION OF MATERIALS.
12. OVER-DEMOLITION SHALL BE ALLOWED, PROVIDED THAT ALL SURFACES SHALL BE REBUILT TO MATCH MATERIALS, STRUCTURAL INTEGRITY AND APPEARANCE OF THOSE WHICH WERE REMOVED, IN CONFORMANCE WITH CONTRACT DOCUMENTS AND AT NO ADDITIONAL COST TO THE DISTRICT, UPON ROOM PERIMETER WALLS TO REMAIN INTACT, U.O.N.
13. REMOVE ALL EXISTING FINISHES SCHEDULED TO BE REMOVED PRIOR TO THE PROPER APPLICATION OF FINISHES TO A POINT WHERE WORKABLE SUBSTRATES OR UNDAMAGED ADJACENT FINISHES ARE REACHED, IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDED GUIDELINES AND INSTRUCTIONS.
14. STORE ALL MATERIALS TO BE REUSED SAFELY ON-SITE. TURN OVER ALL MATERIALS TO BE SAVED, BUT NOT REUSED, IN LOCATION PREDETERMINED AND/OR AS DIRECTED BY THE DISTRICT.
15. CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL UNWANTED MATERIALS AND OTHER DEMOLITION DEBRIS OFF-SITE, IN ACCORDANCE WITH CONTRACT REQUIREMENTS AND ALL APPLICABLE CODES, STATUTES AND LAWS.
16. PROVIDE TEMPORARY SUPPORT DURING DEMOLITION AT ALL LOCATIONS WHERE EXISTING PARTITIONS AND STRUCTURE ARE TO BE REMOVED.
17. ALL FURNITURE, FURNISHINGS, AND EQUIPMENT NOT AFFIXED TO THE BUILDING ARE THE PROPERTY OF THE OWNER AND SHALL BE REMOVED BY THE OWNER PRIOR TO SELECTIVE DEMOLITION, U.O.N.
18. CONTRACTOR'S ACCESS SHALL BE AS INDICATED IN THE CONTRACT DOCUMENTS, SUBJECT TO THE ACCEPTANCE OF THE OWNER AND CONSTRUCTION MANAGER. THE CONTRACTOR SHALL ADEQUATELY PROTECT ALL EXISTING FINISHES SCHEDULED TO REMAIN ALONG THE ACCESS ROUTE AND ADJOINING SURFACES OUTSIDE THE CONTRACTOR OR SCOPE-OF-WORK, FROM DAMAGE DURING THE PROJECT DURATION. THE CONTRACTOR SHALL BE RESPONSIBLE TO RESTORE EXISTING CONDITIONS AND/OR FINISHES AS DAMAGED DURING CONSTRUCTION, INCLUDING, BUT NOT LIMITED TO, PATCHING AND PAINTING AS REQUIRED AND DEEMED NECESSARY BY THE ARCHITECT, AT NO ADDITIONAL COST TO OWNER.



6 KEY PLAN - BAY WINDOW LOCATIONS
SCALE: 1" = 100'-0"

PROJECT NORTH

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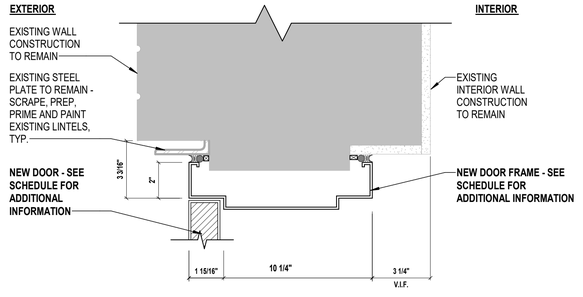
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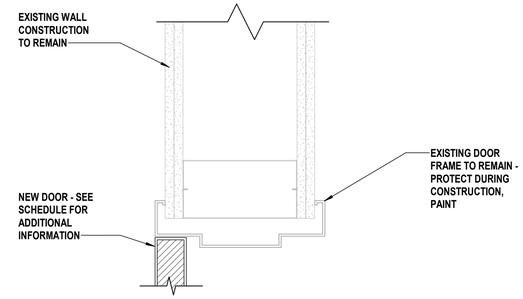
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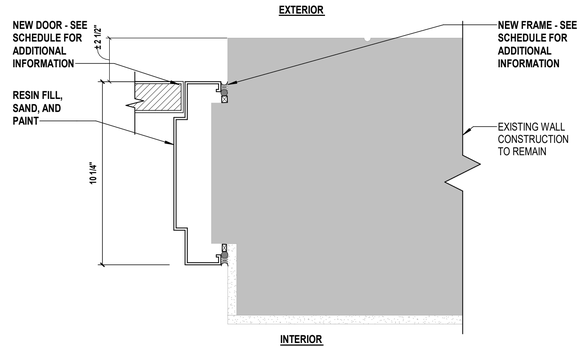
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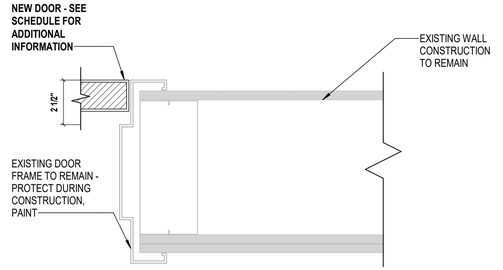
1 Door Head - Exterior Doors
SCALE: 3" = 1'-0"



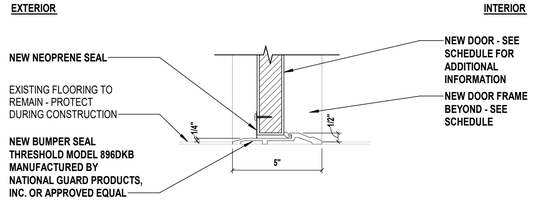
2 Door Head - Interior Doors
SCALE: 3" = 1'-0"



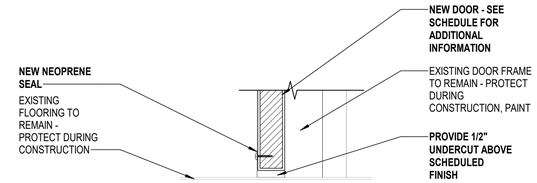
3 Door Jamb - Exterior Doors
SCALE: 3" = 1'-0"



4 Door Jamb - Interior Doors
SCALE: 3" = 1'-0"



5 Door Saddle - Exterior Doors
SCALE: 3" = 1'-0"



6 Door Saddle - Interior Doors
SCALE: 3" = 1'-0"

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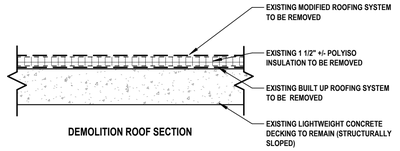
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DOOR DETAILS

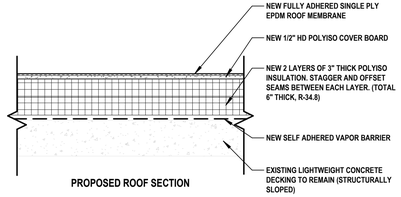
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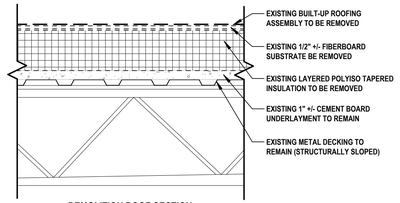
DEMOLITION ROOF SECTION



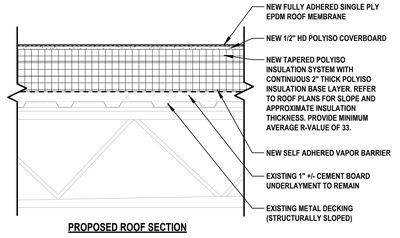
PROPOSED ROOF SECTION

1 ROOF ASSEMBLY - ROOF 'A' (TYP.)

SCALE: 1" = 1'-0"



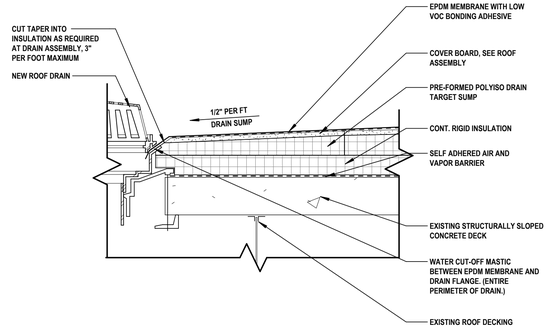
DEMOLITION ROOF SECTION



PROPOSED ROOF SECTION

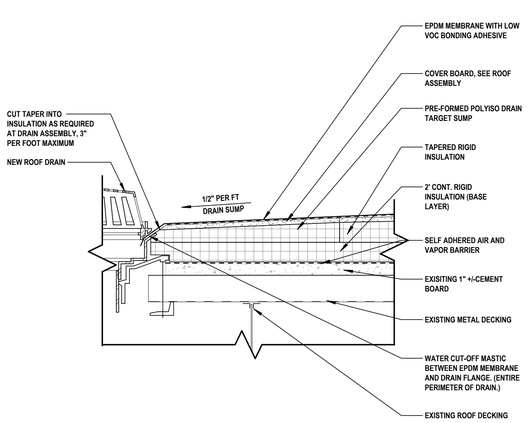
2 ROOF ASSEMBLY - ROOF 'B' (TYP.)

SCALE: 1" = 1'-0"



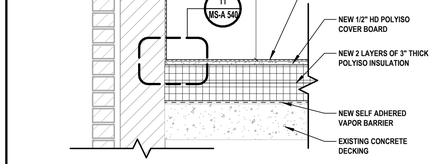
3 ROOF DRAIN DETAIL - ROOF 'A'

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



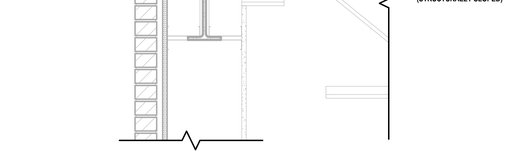
4 ROOF DRAIN DETAIL - ROOF 'B'

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



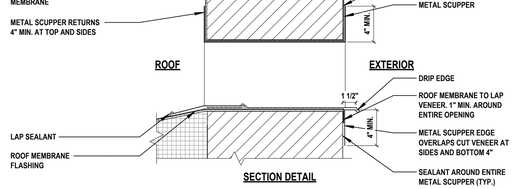
5 PARAPET SECTION - ROOF 'A'

SCALE: 1" = 1'-0"



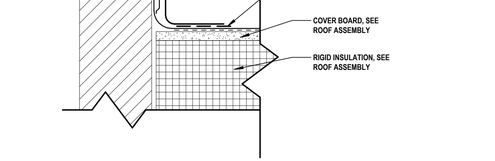
6 PARAPET SECTION - ROOF 'B'

SCALE: 1" = 1'-0"



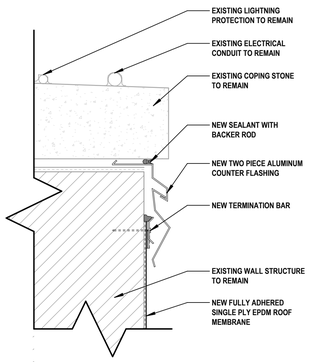
7 THROUGH WALL SCUPPER DETAIL

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



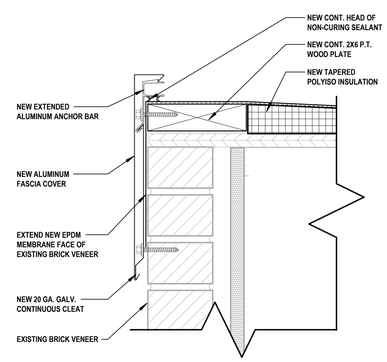
11 PARAPET BASE FLASHING DETAIL

SCALE: 3" = 1'-0"



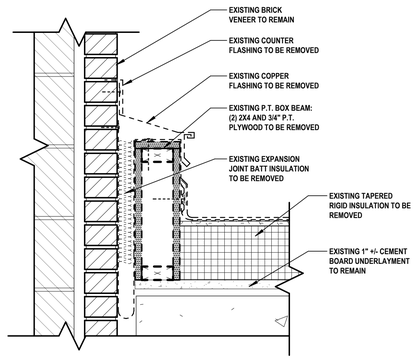
9 PARAPET COPING STONE DETAIL

SCALE: 3" = 1'-0"

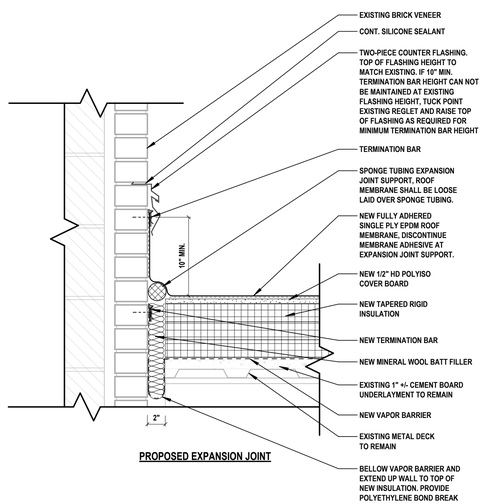


10 PARAPET FASCIA DETAIL

SCALE: 3" = 1'-0"



DEMOLITION EXPANSION JOINT



PROPOSED EXPANSION JOINT

8 EXPANSION JOINT - ROOF 'B'

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

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NY Engineering Certificate of Authorization No.: E018178

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

"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. MAGAZU	M. SIMKULET	M. MAGAZU	K. PACHECO

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202, SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT G GENERAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

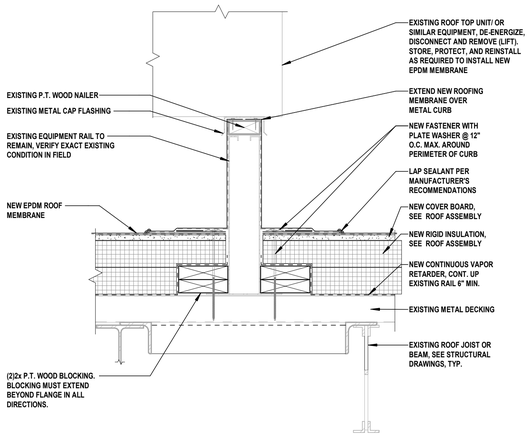
ROOF DETAILS

DRAWING No.

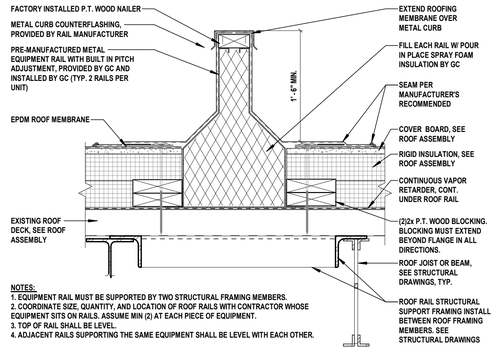
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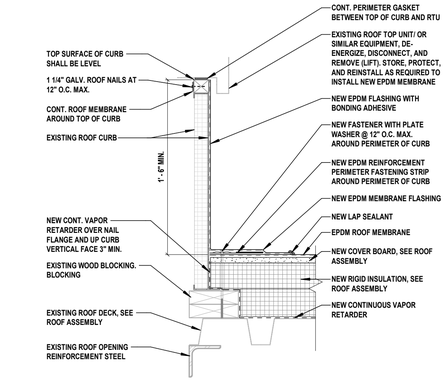


1 EQUIPMENT RAIL DETAIL (EXISTING)
SCALE: 1 1/2" = 1'-0"

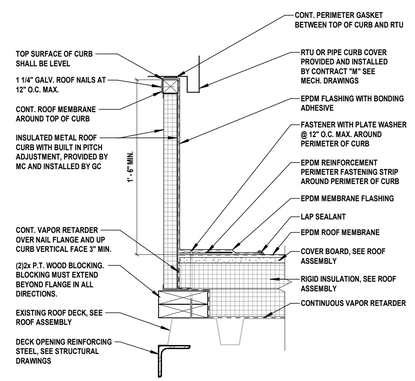


NOTES:
1. EQUIPMENT RAIL MUST BE SUPPORTED BY TWO STRUCTURAL FRAMING MEMBERS.
2. COORDINATE SIZE, QUANTITY, AND LOCATION OF ROOF RAILS WITH CONTRACTOR WHOSE EQUIPMENT SITS ON RAILS. ASSUME MIN (2) AT EACH PIECE OF EQUIPMENT.
3. TOP OF RAIL SHALL BE LEVEL.
4. ADJACENT RAILS SUPPORTING THE SAME EQUIPMENT SHALL BE LEVEL WITH EACH OTHER.

2 EQUIPMENT RAIL DETAIL (NEW)
SCALE: 1 1/2" = 1'-0"



3 EQUIPMENT CURB DETAIL (EXISTING)
SCALE: 1 1/2" = 1'-0"



4 EQUIPMENT CURB DETAIL (NEW)
SCALE: 1 1/2" = 1'-0"

5 ROOF VENT FLASHING DETAIL
SCALE: 1 1/2" = 1'-0"

6 THROUGH ROOF DUCT DETAIL
SCALE: 1 1/2" = 1'-0"

7 ROOF TO WALL DETAIL
SCALE: 1 1/2" = 1'-0"

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NY Engineering Certificate of Authorization No.: 0018178

CONSULTANTS:

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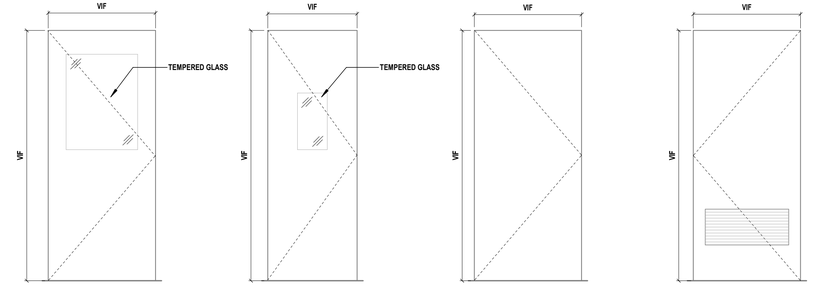
CONTRACT
CONTRACT G GENERAL CONSTRUCTION

STATUS
SED SUBMISSION

SHEET TITLE
ROOF DETAILS

DRAWING No.
MS-A 541.00

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TYPE - 1A

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

TYPE - 1B

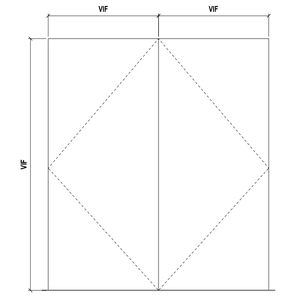
SCALE: 1/2" = 1'-0"

TYPE - 2A

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

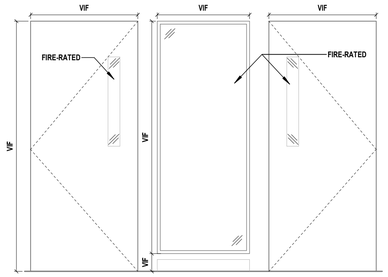
TYPE - 2B

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



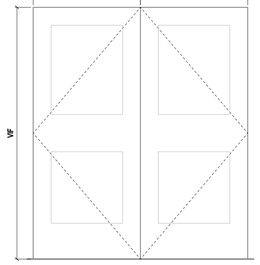
TYPE - 3A

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



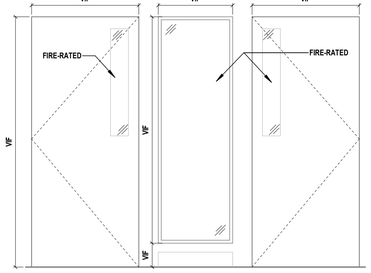
TYPE - 4A

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



TYPE - 5A

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



TYPE - 6A

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

DOOR SCHEDULE

DOOR NO.	FROM ROOM NAME	#	TO ROOM NAME	#	DOOR SIZE THICKNESS	DOOR TYPE	DOOR MATERIAL	DOOR FINISH	FRAME TYPE	FRAME MATERIAL	FRAME FINISH	DETAILS HEAD	DETAILS JAMB	DETAILS SADDLE	FIRE RATING	HARDWARE SET	COMMENTS
BASEMENT																	
13	STAIR 7	7	EXTERIOR	EXT	1 3/4"	5A/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
14	STAIR 6	6	EXTERIOR	EXT	1 3/4"	5A/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
LEVEL 1																	
106F	KITCHEN	106	MEN'S TOILET	106F	1 3/4"	2A/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
216	COURTYARD	CY-1	SCIENCE RM	105	1 3/4"												
LEVEL 2																	
204	STORAGE	213H	GUIDANCE OFF.	213	1 3/4"	2A/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
209	CORRIDOR	HW-2E	ART RM	209	1 3/4"	1B/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
210	CORRIDOR	HW-2E	COUNSELING CENTER	210	1 3/4"	2A/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
211	CORRIDOR	HW-2E			1 3/4"										45 MIN.		
211	CORRIDOR	HW-2E			1 3/4"										45 MIN.		
213	GUIDANCE SUITE	HW-3C	CORRIDOR	HW-2D	1 3/4"	3A/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	REMOVE, MAINTAIN, AND RESTALL ALL EXISTING HARDWARE
214	CORRIDOR	HW-2D	OFFICE	214	1 3/4"	1B/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
215	CORRIDOR	HW-2D	WELLNESS CEN.	215	1 3/4"	1A/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
219	OFFICE LOBBY	201F	CONFERENCE	201F	1 3/4"										45 MIN.		
220	ELEC CLOSET	201G	CONFERENCE	201F	1 3/4"										45 MIN.		
220H	CORRIDOR	HW-2C	JANITOR	220H	1 3/4"	2A/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
222	MAIN ENTRY	V1	MAIN OFFICE	201	1 3/4"										45 MIN.		
234	CLASSROOM	234	CORRIDOR	HW-2C	1 3/4"	1A/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
236	CLASSROOM	236	CORRIDOR	HW-2C	1 3/4"	1A/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
246	CORRIDOR	HW-2D	CONFERENCE ROOM	246	1 3/4"	1B/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
S1-L2	CORRIDOR	HW-2H	STAIR	S1-L2	1 3/4"	/MS-A-6204A	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
S2-L2	CORRIDOR	HW-2E	STAIR	S2-L2	1 3/4"	/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
S3-L2	CORRIDOR	HW-2E	STAIR	S3-L2	1 3/4"	4A/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
S4-L2	CORRIDOR	HW-2D	STAIR	S4-L2	1 3/4"	6A/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
LEVEL 3																	
300A	CORRIDOR	HW-3A	ELEVATOR RM.	300A	1 3/4"	1A/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
300C	CORRIDOR	HW-3A	BOYS TOILET	300C	1 3/4"	2B/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
300D	CORRIDOR	HW-3A	CORRIDOR	300F	1 3/4"	2A/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
300E	CORRIDOR	300F	TOILET	300E	1 3/4"	2A/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
300F	CORRIDOR	300F	SPEECH	300D	1 3/4"	2A/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
301	STAIR	S1-L3	CLASSROOM	301	1 3/4"	1B/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
302	CORRIDOR	HW-3A	STORAGE	302	1 3/4"	2A/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
303	CORRIDOR	HW-3A	SCIENCE CLASS	303	1 3/4"	1B/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
304	CORRIDOR	HW-3A	CLASSROOM	304	1 3/4"	1B/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
305	CORRIDOR	HW-3A	CLASSROOM	305	1 3/4"	1B/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
306	CORRIDOR	HW-3A	RESOURCE RM.	306	1 3/4"	1B/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
307	CORRIDOR	HW-3A	FACUL. LOUNGE	307	1 3/4"	1A/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
307A	FACUL. LOUNGE	307	TOILET	307A	1 3/4"	2A/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
308	CORRIDOR	HW-3A	SENSORY ROOM	308	1 3/4"	2A/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
309	CORRIDOR	HW-3A	STORAGE	309	1 3/4"	2A/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
309A	STORAGE	309A	CORRIDOR	HW-3A	1 3/4"	2A/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
309B	STORAGE	309	STORAGE	309A	1 3/4"	2A/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
311	HOME E.C.	311	CORRIDOR	HW-3A	1 3/4"	1B/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
313	CORRIDOR	HW-3A	CLASSROOM	313	1 3/4"	1B/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
314	STAIR 2	S2-L3	CLASSROOM	314	1 3/4"	1B/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
321A	FACUL. LOUNGE	307	TOILET	321A	1 3/4"	2A/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
S1-L3	STAIR	S1-L3	CORRIDOR	HW-3A	1 3/4"	4A/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
S2-L3	CORRIDOR	HW-3A	STAIR 2	S2-L3	1 3/4"	4A/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE
S4-L3	CORRIDOR	HW-3B	STAIR	S4-L3	1 3/4"	6A/MS-A-620	WOOD	FF	EXIST.	EXIST.	PT				45 MIN.	TBD	EXISTING HARDWARE TO BE REPLACED BY NEW HARDWARE

NOTES:

1. REFER TO DOOR SCHEDULE, HARDWARE SETS, AND PROJECT MANUAL FOR HARDWARE INFORMATION.
2. ALL REQUIRED PREP AND MODIFICATIONS TO EXISTING WALL ASSEMBLIES TO ACCOMMODATE NEW DOORS 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. DOOR FRAMES TO BE SCRAPED AND RECEIVE PAINTED FINISH, COLOR TO MATCH EXISTING COLOR.

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 2025 BCNYS.

FINISH ABBREVIATIONS

ALUM	ALUMINUM	R.B./RB	RUBBER BASE
CG	CORNER GUARD	RUBBER	RUBBER FLOORING
C.M.U.	CONCRETE MASONRY UNIT	P.T./PT	PAINT
CONC.	CONCRETE	S.A.C./SAC	SUSPENDED ACOUSTICAL CEILING
C.F.T./CFT	CERAMIC FLOOR TILE	S.C. WD	SOLID CORE WOOD
C.W.T./CWT	CERAMIC WALL TILE	STRUCT.	STRUCTURE
F.F.	FACTORY FINISH	V.C.T./VCT	VINYL COMPOSITE TILE
FRP	FIBERGLASS REINFORCED POLYESTER	EXIST.	EXISTING
E.P.	EXPOSED	EXT	EXTERIOR
EXP.	EPOXY WALL PAINT	HM	HOLLOW METAL
G.W.B./GWB	GYPSUM WALL BOARD	U.S.	UNDERSIDE
L.V.T./LVT	LUXURY VINYL TILE	WD	WOOD

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M.LUCK	M. LUCK	S.MANDIC	-

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202, SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT G
GGENERAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

DOOR SCHEDULE

DRAWING No.

MS-A 620.00

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LEGEND

SYMBOL	DESCRIPTION
	PIPING UP
	PIPING DOWN
	PIPING RISE OR DROP
	BRANCH-TOP CONNECTION
	BRANCH-BOTTOM CONNECTION
	REDUCER
CO CO	CLEANOUT
	FLOOR CLEANOUT
	CAPPED PIPE
M	METER
	FLOOR DRAIN
	AQUASTAT
	PUMP
	STRAINER
	UNION
	THERMOSTATIC MIXING VALVE
	BALANCING VALVE (BLV)
	GLOBE VALVE (GLV)
	CHECK VALVE (CV)
	GAS COCK, GAS STOP
	BALL VALVE (BV)
	BUTTERFLY VALVE (BFV)
S	SOLENOID VALVE
	PRESSURE-REDUCING VALVE (PRV)
	GATE VALVE (GV)
	PRESSURE-RELIEF VALVE (RV)
	BACKFLOW PREVENTER
	FROST FREE HOSE BIBB
	HOSE BIBB
	RECESSED-BOX HOSE BIBB OR WALL HYDRANT
	EXPANSION JOINT
	WATER HAMMER ARRESTER
	VALVE IN RISER
CO	WALL CLEANOUT (WCO)
	PITCH DOWN OR UP IN DIRECTION OF ARROW
	FLOW IN DIRECTION OF ARROW
	COLD WATER (CW)
	TEMPERED WATER (TW)
	HOT WATER (HW)
	TEMPERED WATER RETURN (TWR)
	HOT WATER RETURN (HWR)
	WASTE PIPING (W,S,OW)
	BELOW SLAB WASTE PIPING
	VENT PIPING (V)
	GAS PIPING (G)
	TO BE REMOVED
	POINT OF CONNECTION
	POINT OF DISCONNECTION

ABBREVIATIONS

AFF	ABOVE FINISHED FLOOR
BTU	BRITISH THERMAL UNIT
BTUH	BTU PER HOUR
CLG	CEILING
CO	CLEAN OUT
CODP	CLEAN OUT DECK PLATE
COWP	CLEAN OUT WALL PLATE
CW	COLD WATER
(D)	DEMOLISH
DCV	DOUBLE CHECK VALVE DEVICE
DEG. F	° FAHRENHEIT
DIA	DIAMETER
DN	DOWN
(E)	EXISTING
EA	EACH
FAI	FRESH AIR INTAKE
FD	FLOOR DRAIN
G	GAS
'GC'	GENERAL CONSTRUCTION CONTRACTOR
GPM	GALLONS PER MINUTE
GPH	GALLONS PER HOUR
'H'	HVAC CONTRACTOR
HP	HORSEPOWER
HW	HOT WATER
HWR	HOT WATER RETURN
IN.	INCHES
IN. W.C. (W.G.)	INCHES WATER COLUMN (WATER GAUGE)
KW	KILOWATTS
LBS	POUNDS
M	METER
MAX	MAXIMUM
MIN	MINIMUM
NTS	NOT TO SCALE
OD	OUTER DIAMETER
(P)	PROPOSED
'P'	PLUMBING CONTRACTOR
PD	PRESSURE DROP
RD	ROOF DRAIN
RPM	REVOLUTIONS PER MINUTE
RPZ	REDUCED PRESSURE ZONE
SAN / S	SANITARY
ST	STORM DRAIN
TEMP	TEMPERATURE
TYP	TYPICAL
TW	TEMPERED WATER (110°F)
TWR	TEMPERED WATER RETURN
V	VENT
VTR	VENT THROUGH ROOF
W	WASTE

GENERAL PLUMBING NOTES

1. PROVIDE ALL MATERIALS AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL COMPLETE AND OPERABLE PLUMBING 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/ENGINEER PRIOR TO THE SUBMISSION OF BIDS.
3. PERFORM ALL WORK IN ACCORDANCE WITH THE 2025 PLUMBING CODE OF NEW YORK STATE (PCNYS), MECHANICAL (MCNYS), ENERGY CONSERVATION CONSTRUCTION CODE OF NEW YORK STATE (ECCCNYS) CODE AND THE REQUIREMENTS OF THE LOCAL AUTHORITIES HAVING JURISDICTION.
4. APPLY FOR AND SECURE ALL REQUIRED PERMITS AND INSPECTIONS AND PAY ALL COSTS FOR THE SAME.
5. DO NOT SCALE DRAWINGS. DRAWINGS FOR PLUMBING 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.
6. COORDINATE CONTRACT DOCUMENTS PROJECT REQUIREMENTS, WORK OF OTHERS, AND EQUIPMENT AND MATERIALS PURCHASED WITH FIELD DIMENSIONS, MANUFACTURERS REQUIREMENTS FOR INSTALLATION, OPERATION, AND MAINTENANCE, CONTRACTORS INTENDED MEANS AND METHODS OF INSTALLATION AND CONTRACTORS FABRICATED ITEMS TO 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. FIELD VERIFY AND COORDINATE ALL 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.
8. PROVIDE PRODUCTS OF ONE MANUFACTURER WHERE TWO OR MORE ITEMS OF THE SAME TYPE OF MATERIAL OR EQUIPMENT IS REQUIRED.
9. 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.
10. LOCATE ALL TEMPERATURE, PRESSURE, AND FLOW MEASURING DEVICES IN ACCESSIBLE LOCATIONS WITH STRAIGHT SECTION OF PIPE UP- AND DOWNSTREAM AS RECOMMENDED BY THE MANUFACTURER TO ENSURE MANUFACTURER CERTIFIED ACCURACY.
11. COORDINATE ALL EQUIPMENT CONNECTIONS WITH MANUFACTURER'S CERTIFIED DRAWINGS. COORDINATE AND PROVIDE ALL PIPING TRANSITIONS REQUIRED FOR FINAL CONNECTIONS TO EQUIPMENT.
12. 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.
13. COMPLETE ALL PRESSURE TESTS BEFORE ANY PLUMBING EQUIPMENT, OR PIPING INSULATION IS APPLIED.
14. MAKE ALL ATTACHMENTS TO JOISTS, TRUSSES, OR JOIST GIRDERS AT PANEL POINTS. PROVIDE BEAM CLAMPS MEETING MSS STANDARDS. THE USE OF C-CLAMPS IS NOT PERMITTED.
15. INSTALL PIPING, AND CONDUIT CONCEALED IN AREAS HAVING HUNG CEILINGS AND/OR FURRED SPACES UNLESS OTHERWISE INDICATED ON THE DRAWINGS.
16. REFER TO ARCHITECTURAL DRAWINGS FOR EXACT LOCATION OF ALL ACCESSIBLE FIXTURES. MOUNT ALL SUCH FIXTURES IN ACCORDANCE WITH THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
17. PROVIDE ACCESS DOORS IN WALLS, PARTITIONS, AND CEILINGS AS REQUIRED TO MAKE VALVES, WATER HAMMER ARRESTERS, ETC. READILY ACCESSIBLE.
18. ARRANGE FOR, COORDINATE, AND MAKE CONNECTION TO ALL SERVICES PROVIDED BY OTHERS. CONFORM TO ALL REQUIREMENTS APPLICABLE TO CONNECTIONS IMPOSED BY UTILITY COMPANIES AND AUTHORITIES HAVING JURISDICTION.
19. INSTALL FIXTURES AND EQUIPMENT WITH VALVES, UNIONS, ETC. TO ALLOW FOR EASE OF SERVICE AND/OR REMOVAL.
20. FURNISH AND INSTALL WATER PRESSURE REDUCING VALVE AND PRESSURE RELIEF VALVE IN ACCORDANCE WITH THE PLUMBING CODE OF NEW YORK STATE ON ALL INCOMING DOMESTIC WATER SYSTEMS IN EXCESS OF 80 P.S.I.G.
21. SLOPE ALL VENT PIPING TO DRAIN BACK TO THE DRAINAGE SYSTEM.
22. FLUSH AND DISINFECT ALL DOMESTIC POTABLE WATER PIPING AND TEST THE WATER IN ACCORDANCE WITH THE PLUMBING CODE OF NEW YORK STATE. PROVIDE CERTIFICATE OF PERFORMANCE AND LABORATORY TEST REPORT TO LOCAL AUTHORITIES HAVING JURISDICTION AND OBTAIN THEIR APPROVAL.
23. PROVIDE WATER HAMMER ARRESTORS AT ALL QUICK CLOSING FIXTURE VALVE LOCATIONS.
24. ALL PIPING, VALVES AND FITTINGS USED FOR POTABLE WATER SHALL BE NSF 61/372 COMPLIANT AND BE TESTED FOR LOW LEAD.
25. ANY PENETRATIONS THROUGH AIR BARRIER SHALL BE SEALED AS PER 2025 BCNYS AND COMMERCIAL PROVISIONS .
26. ALL PIPING IN PLENUM SPACES SHALL BE CAST IRON FOR SANITARY, STORM, VENT SYSTEMS, AND COPPER PIPING FOR DOMESTIC SYSTEMS, AND STEEL PIPING FOR GAS SYSTEMS. NO PLASTIC PIPING ALLOWED.
27. HOT WATER TEMPERATURE FOR ALL PUBLIC HAND WASHING FIXTURES SHALL BE TEMPERED TO A MAXIMUM TEMPERATURE OF 105 DEGREES F.
28. ALL FIXTURES SHALL MEET THE WATER CONSERVATION REQUIREMENTS LISTED IN THE TABLE 604.4 OF THE 2025 PLUMBING CODE OF NEW YORK STATE.
29. ALL FIXTURES THAT HAS THE ABILITY TO HAVE A HOSE CONNECTED TO IT, OR DIRECT CONNECTED FIXTURES, SHALL HAVE A BACKFLOW PREVENTION DEVICE ON THE FAUCET, VACUUM BREAKER (ASSE 1052 AND ASME A112.21.3).
30. ALL SANITARY FITTINGS SHALL BE 'WYE' TYPE AND SHALL FOLLOW THE DIRECTION OF FLOW.
31. IN THE EVENT THAT THERE IS A DISCREPANCY BETWEEN DESIGN PLANS, RISER DIAGRAMS, AND/OR SPECIFICATIONS CONCERNING PIPE SIZES, FIXTURES, AND/OR EQUIPMENT, THE MOST STRINGENT REQUIREMENTS SHALL BE APPLIED TO THE PROJECT.
32. FIRE STOP ALL OPENINGS IN FIRE RATED CONSTRUCTION FOR PIPING, CONDUIT, ETC.
33. MAINTAIN MAXIMUM HEADROOM AND SPACE CONDITIONS AT ALL POINTS. WHERE HEADROOM AND SPACE CONDITIONS APPEAR INADEQUATE, NOTIFY ARCHITECT PRIOR TO PROCEEDING WITH INSTALLATION. MAINTAIN A MINIMUM OF 6'-8" CLEARANCE FROM FINISHED FLOOR TO UNDERSIDE OF PIPES, CONDUITS, SUSPENDED EQUIPMENT, ETC., THROUGHOUT ACCESS ROUTES IN MECHANICAL ROOMS.
34. CORE DRILL ALL PENETRATIONS THROUGH CONCRETE FLOORS, WALLS, AND FOOTINGS.
35. INSTALL LINK SEAL TYPE PROTECTION FOR WATER RESISTANT SEALS AT ALL SLAB AND BELOW GROUND WALL FOOTING PENETRATIONS.
36. COVER ALL COPPER PIPING BELOW SLAB WITH "ARMAFLEX" TYPE INSULATION.

APPLICABLE CODES

- 2025 BUILDING CODE NEW YORK STATE (BCNYS) 1ST PRINTING
- 2025 PLUMBING CODE NEW YORK STATE (PCNYS) 1ST PRINTING
- 2025 FUEL GAS CODE NEW YORK STATE (FGCNYS) 1ST PRINTING
- 2025 MECHANICAL CODE NEW YORK STATE (MCNYS) 1ST PRINTING
- 2025 ENERGY CONSERVATION CONSTRUCTION CODE OF NEW YORK STATE (ECCCNYS) 1ST PRINTING
- 2026 MANUAL OF PLANNING STANDARDS (SED)

ENERGY NOTES

2025 ENERGY CONSERVATION CONSTRUCTION CODE OF NEW YORK STATE NOTES: STATEMENT OF COMPLIANCE:

TO THE BEST OF MY KNOWLEDGE, AND PERSONAL JUDGEMENT, THESE PLANS AND SPECIFICATIONS ARE IN COMPLIANCE WITH THE 2025 NEW YORK STATE ENERGY CONSERVATION CODE (ECCCNYS).

1. SERVICE WATER HEATING EQUIPMENT PERFORMANCE EFFICIENCY:
   - 1.1. WATER HEATING EQUIPMENT AND HOT WATER STORAGE TANKS SHALL MEET THE REQUIREMENTS OF TABLE C404.2 IN THE 2025 ECCCNYS. (ECCCNYS C404.2)
   - 1.2. SERVICE WATER HEATING SHALL BE COMMISSIONED AND COMPLETED IN ACCORDANCE WITH SECTION C408.2 OF THE 2025 ECCCNYS.
2. TEMPERATURE CONTROL:
   - 2.1. SERVICE WATER HEATING EQUIPMENT SHALL BE PROVIDED WITH CONTROLS ALLOWING A SETPOINT OF 110°F AND 90 °F FOR OTHER OCCUPANCIES. PUBLIC REST ROOM LAVATORIES SHALL HAVE A MAXIMUM OUTLET TEMPERATURE OF 110°F.
   - 2.2. WHERE WATER HEATING EQUIPMENT SERVING NONCIRCULATING SYSTEMS IS NOT SUPPLIED WITH INTEGRAL HEAT TRAPS, HEAT TRAPS SHALL BE PROVIDED ON THE SUPPLY AND DISCHARGE PIPING. (ECCCNYS C404.3)
3. PIPE INSULATION:
   - 3.1. AUTOMATIC CIRCULATING HOT WATER SYSTEM PIPING SHALL BE INSULATED WITH 1 INCH OF INSULATION WITH A CONDUCTIVITY NOT EXCEEDING 0.27 BTU PER INCH, OR THE INSULATION REQUIREMENTS, WHICHEVER IS GREATER. THE FIRST 8 FT OF PIPING IN NONCIRCULATING SYSTEMS WITH EQUIPMENT WITHOUT INTEGRAL HEAT TRAPS SHALL BE INSULATED WITH 0.5 INCH OF MATERIAL HAVING A CONDUCTIVITY NOT EXCEEDING 0.27 BTU PER INCH, OR THE INSULATION REQUIREMENTS, WHICHEVER IS GREATER. (ECCCNYS C404.5)
   - 3.2. ALL PIPING TO BE INSULATED WITH 0.21-0.28 CONDUCTIVITY
   - 3.3. COLD WATER PIPING - ALL SIZES - 1-INCH INSULATION, A.S. JACKET.
   - 3.4. STORM DRAINAGE PIPING ALL HORIZONTAL RUNS AND DRAIN BODY - MINIMUM 1-INCH INSULATION, A.S. JACKET.
   - 3.5. HOT WATER PIPING (140°F) AND TEMPERED WATER PIPING (110°F)
     - 3.5.1. PIPE SIZE: < 1" INSULATION: 1"
     - 3.5.2. PIPE SIZE: 1" TO < 1-1/2" INSULATION: 1"
     - 3.5.3. PIPE SIZE: 1-1/2 TO < 4" INSULATION: 1.5"
     - 3.5.4. PIPE SIZE: 4" TO < 8" INSULATION: 1.5"
4. HOT WATER SYSTEM CONTROLS:
   - 4.1. CIRCULATING HOT WATER SYSTEM PUMPS OR HEAT TRACE SHALL BE ARRANGED TO BE TURNED OFF EITHER AUTOMATICALLY OR MANUALLY WHEN THERE IS LIMITED HOT WATER DEMAND. READY ACCESS SHALL BE PROVIDED TO THE OPERATING CONTROLS. (ECCCNYS C404.6)
5. PIPE VOLUME AND MAXIMUM LENGTHS:
   - 5.1. PER SECTION OF C404.5.1 OF THE 2025 ECCCNYS, ALL MAXIMUM PIPE LENGTHS FROM FIXTURES SHALL COMPLY WITH THE MAXIMUM PIPE LENGTHS ON THE CHART BELOW. CONTRACTOR TO ENSURE HOT WATER RETURN PIPING IS INSTALLED AS PER PLANS AND THAT THESE LENGTHS ARE MAINTAINED.

NOMINAL PIPE SIZE (INCHES)	VOLUME (LIQUID OUNCES PER FOOT LENGTH)	MAXIMUM PIPING LENGTH (FEET)	
		PUBLIC LAVATORY FAUCETS	OTHER FIXTURES AND APPLIANCES
1/4"	0.33	6	50
5/16"	0.5	4	50
3/8"	0.75	3	50
1/2"	1.5	2	43
5/8"	2	1	32
3/4"	3	0.5	21
7/8"	4	0.5	16
1"	5	0.5	13
1-1/4"	8	0.5	8
1-1/2"	11	0.5	6
2" OR LARGER	18	0.5	4

DEMOLITION NOTES

GENERAL

1. PRIOR TO PROPOSAL SUBMISSION, THIS CONTRACTOR SHALL VISIT THE SITE TO REVIEW THE EXISTING CONDITIONS ASSOCIATED WITH THE SCOPE OF WORK AND ADJACENT AREAS TO ASCERTAIN THE DIFFICULTIES WHICH WILL AFFECT THE EXECUTION OF THE WORK OF THIS CONTRACT.
2. SUBMISSION OF A PROPOSAL WILL BE CONSTRUED AS EVIDENCE THAT THE ABOVE SITE EXAMINATION HAS BEEN MADE AND LATER CLAIMS WILL NOT BE RECOGNIZED FOR EXTRA LABOR, EQUIPMENT OR MATERIALS REQUIRED BECAUSE OF DIFFICULTIES ENCOUNTERED WHICH COULD HAVE BEEN FORESEEN HAD SUCH AN EXAMINATION BEEN MADE.
3. ALL DEMOLITION WORK SHALL BE IN COMPLIANCE WITH ALL FEDERAL AND NEW YORK STATE APPLICABLE BUILDING AND LIFE AND SAFETY REGULATIONS.

SCOPE OF WORK

1. DEMOLITION WORK SHALL INCLUDE ALL MATERIALS, LABOR, EXTENSIONS, CONNECTIONS, CUTTING, REPAIRING, ADAPTING AND OTHER PLUMBING WORK REQUIRED TO MAINTAIN SERVICE PENDING THE COMPLETION OF THE PERMANENT WORK. COORDINATE THE EXTENT OF DEMOLITION WORK WITH THE ARCHITECT AND BUILDING MANAGEMENT.
2. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL CONSTRUCTION DEBRIS AND UNWANTED MATERIAL OFF SITE IN ACCORDANCE WITH CONTRACT SPECIFICATIONS.
3. THE CONTRACTOR SHALL TAKE CARE NOT TO DAMAGE ADJOINING SURFACES OUTSIDE THE CONTRACT AREA OR SCOPE OF WORK. THE CONTRACTOR SHALL BE RESPONSIBLE TO RESTORE TO EXISTING CONDITIONS SURFACE DAMAGED DURING CONSTRUCTION INCLUDING PATCHING AND PAINTING AS REQUIRED AND DEEMED NECESSARY BY THE ARCHITECT.
4. ALL EXISTING WORK REQUIRED TO REMAIN BUT INTERFERING WITH PROPOSED NEW PLUMBING (AS WELL AS ELECTRICAL, MECHANICAL AND GENERAL CONSTRUCTION WORK) SHALL BE RELOCATED AND RECONNECTED USING MATERIALS CONFORMING TO STANDARDS OF THIS CONTRACT.
5. REMOVE ALL FIXTURES AS NOTED ON THE ARCHITECTURAL PLANS. PROVIDE TEMPORARY CAPS FOR HOT, COLD AND SANITARY CONNECTIONS DURING NEW CONSTRUCTION.
6. REMOVE BASE BUILDING PIPING AS INDICATED BELOW:
   - 6.1. REMOVE ALL ABANDONED BASE BUILDING PIPING BACK TO THE EXISTING WET COLUMNS OR SHAFTS, OR AS NOTED ON DRAWINGS.
   - 6.2. CONTRACTOR TO CONTACT BUILDING MANAGEMENT AND TENANT REGARDING REMOVAL SCOPE OF WORK TO MAINTAIN CONTINUITY OF ALL SERVICES TO ALL TENANTS WHO ARE TO REMAIN OPERATIONAL AND NOT BE AFFECTED BY DEMOLITION WORK.
   - 6.3. ALL EXISTING BUILDING VALVES FOR DOMESTIC WATER MAINS AT SHAFTS ARE TO REMAIN.
7. PROVIDE ADDITIONAL SUPPORT FOR ALL EXISTING PIPING TO REMAIN WHICH ARE AFFECTED BY DEMOLITION OF EXISTING CEILING AND PARTITIONS.
8. COORDINATE WITH OWNER TO DETERMINE WHETHER REMOVED EQUIPMENT IS TO BE TURNED OVER TO THE OWNER.

LEAD FREE NOTE

1. ALL FAUCETS,FITTINGS, AND VALVES MUST COMPLY WITH NSF 61 AND ANSI / NSF 372 FOR LOW LEAD PERCENTAGE.
2. CONTRACTOR SHALL BE RESPONSIBLE TO DEMONSTRATE COMPLIANCE WITH THE NYS DEPARTMENT OF HEALTH LEAD IN WATER REGULATION (10 NYCRR 67-4).
3. AT THE CONCLUSION OF NEW PLUMBING WORK, THE CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE THE SERVICES PF A THIRD PARTY NYS LICENSED ENVIRONMENTAL TESTING LABORATORY TO PROVIDE LEAD TESTING AT ALL NEW LAVATORIES, SINKS, DRINKING FOUNTAINS AND ALL OTHER FIXTURES WHERE WATER MAY BE CONSUMED FOR DRINKING. TWO COPIES OF THE REPORT MUST BE SUBMITTED, ONE COPY TO THE ENGINEER AND THE OTHER ONE TO THE OWNER.

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NY Engineering Certificate of Authorization No.: 0018178

CONSULTANTS:

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STATE OF NEW YORK · JONATHAN RICHARD MURATORE · LICENSED PROFESSIONAL ENGINEER · 096440-1

10/31/2027
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PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202
SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

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PLUMBING CONSTRUCTION

STATUS

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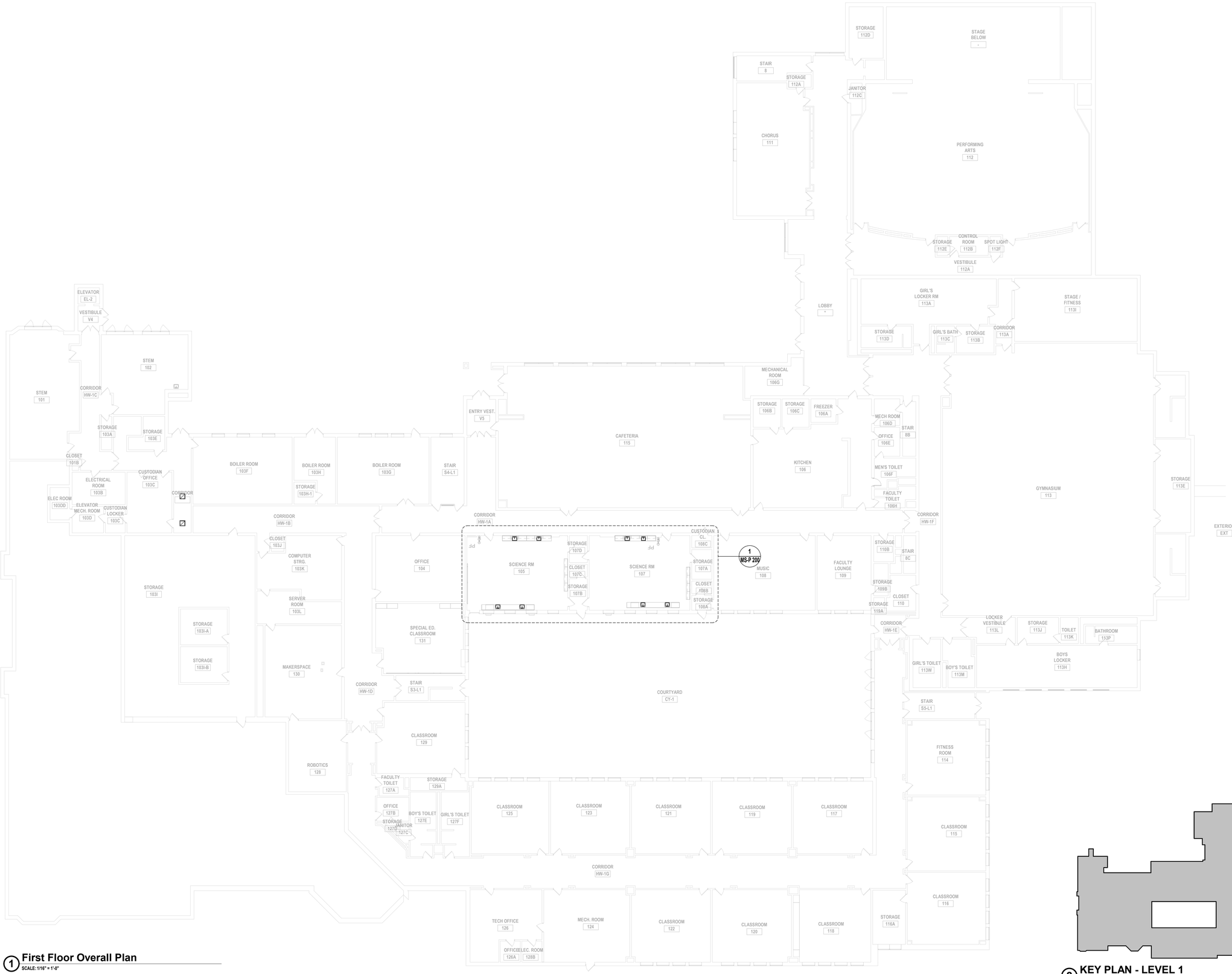
GENERAL NOTES, LEGEND, AND ABBREVIATIONS

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1 First Floor Overall Plan

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

2 KEY PLAN - LEVEL 1

SCALE: 1" = 100'-0"

PROJECT NORTH

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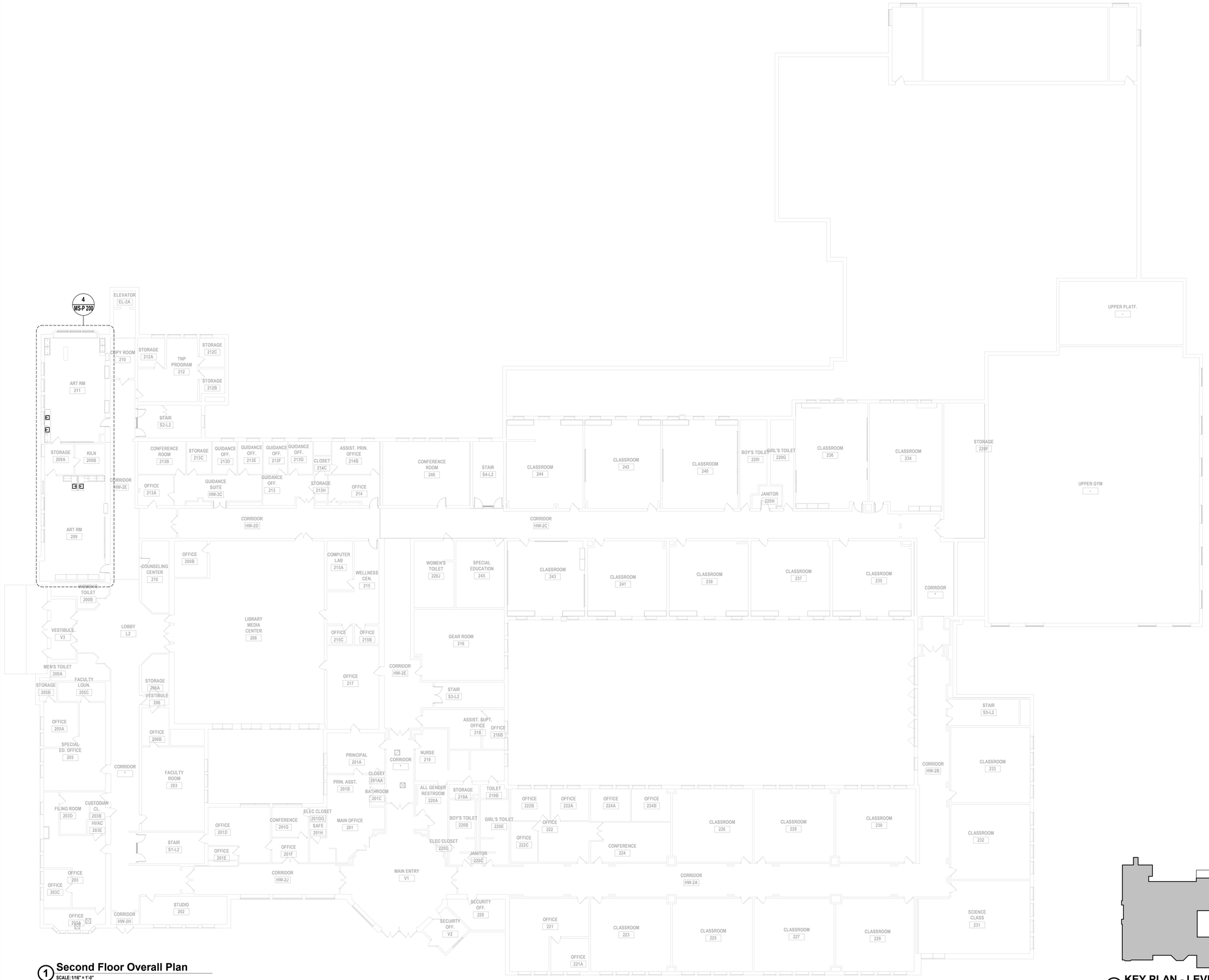
FIRST FLOOR OVERALL PLAN

DRAWING No.

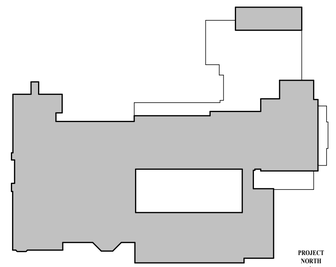
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1 **Second Floor Overall Plan**
SCALE: 1/16" = 1'-0"



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

PROJECT NORTH

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CONSULTANTS:

MARK	DATE	DESCRIPTION

STATE OF NEW YORK · JONATHAN RICHARD MURATORE · LICENSED PROFESSIONAL ENGINEER · 096440-1

10/31/2027
Exp. Date

JONATHAN R. MURATORE, P.E.
NY PROFESSIONAL ENGINEER Lic. No. 096440

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DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
P. ANGELONE	P. ANGELONE	J. MURATORE	J. MURATORE

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202
SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT P
PLUMBING CONSTRUCTION

STATUS

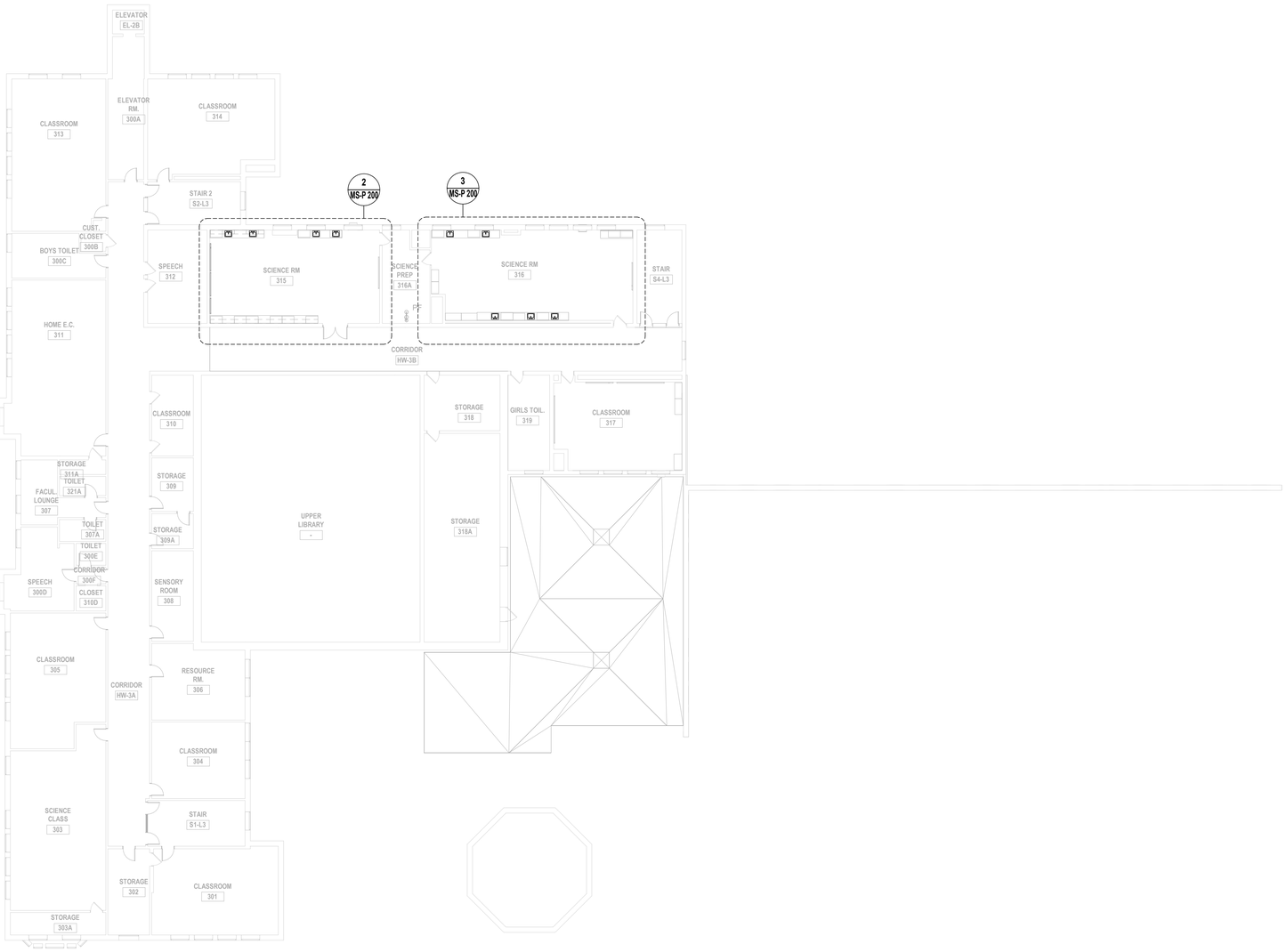
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SHEET TITLE

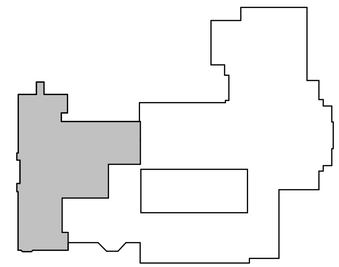
SECOND FLOOR OVERALL PLAN

DRAWING No.

MS-P 101.00



1 **Third Floor Overall Plan**
SCALE: 1/16" = 1'-0"



KEY PLAN - LEVEL 3
SCALE: 1" = 100'-0"

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P. ANGELONE	P. ANGELONE	J. MURATORE	J. MURATORE

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

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SOMERS, NY 10589

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CONTRACT

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PLUMBING CONSTRUCTION

STATUS

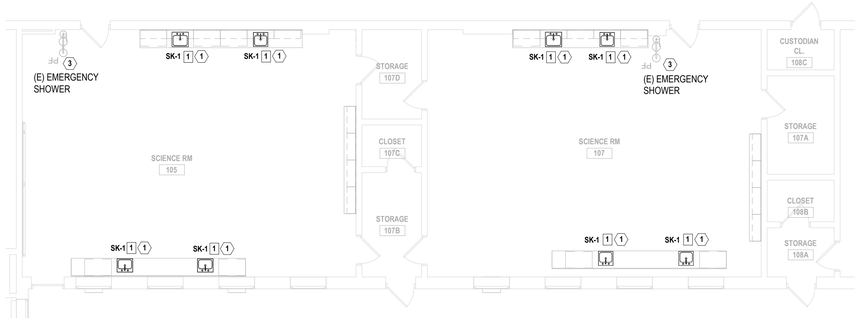
90% SUBMISSION

SHEET TITLE

THIRD FLOOR OVERALL PLAN

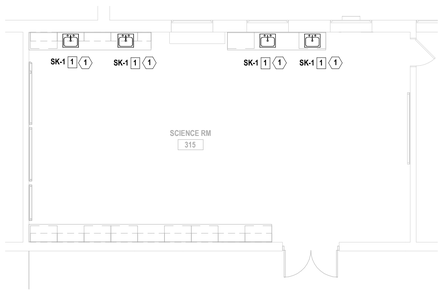
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MS-P 102.00



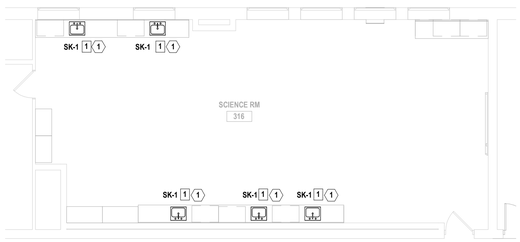
1 Plumbing Science Classroom 105 and 107 Enlargement Plan

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



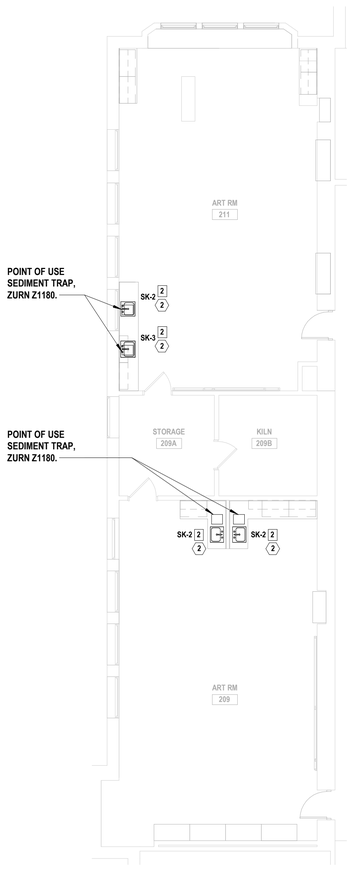
2 Plumbing Classroom 315 Enlargement Plan

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



3 Plumbing Science Classroom 316 Enlargement Plan

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



4 Plumbing Art Classroom 209 and 211 Enlargement Plan

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

DEMOLITION NOTES

GENERAL

1. PRIOR TO PROPOSAL SUBMISSION, THE CONTRACTOR SHALL VISIT THE SITE TO REVIEW THE EXISTING CONDITIONS ASSOCIATED WITH THE SCOPE OF WORK TO ASCERTAIN THE DIFFICULTIES WHICH WILL AFFECT THE EXECUTION OF THE WORK INCLUDING THE PIPING ACCESS.
2. SUBMISSION OF A PROPOSAL WILL BE CONSTRUED AS EVIDENCE THAT THE ABOVE SITE EXAMINATION HAS BEEN MADE AND LATER CLAIMS WILL NOT BE RECOGNIZED FOR EXTRA LABOR, EQUIPMENT OR MATERIALS REQUIRED BECAUSE OF DIFFICULTIES ENCOUNTERED WHICH COULD HAVE BEEN FORESEEN HAD SUCH AN EXAMINATION BEEN MADE.
3. ALL DEMOLITION WORK SHALL BE IN COMPLIANCE WITH ALL FEDERAL AND NEW YORK STATE APPLICABLE BUILDING AND LIFE AND SAFETY REGULATIONS.
4. DEMOLITION WORK SHALL INCLUDE ALL MATERIALS, LABOR, EXTENSIONS, CONNECTIONS, CUTTING, REPAIRING, ADAPTING AND OTHER PLUMBING WORK REQUIRED TO MAINTAIN SERVICE IF REQUIRED. COORDINATE THE EXTENT OF DEMOLITION WORK WITH THE ARCHITECT AD BUILDING OWNER.
5. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL CONSTRUCTION DEBRIS AND UNWANTED MATERIAL OFF SITE IN ACCORDANCE WITH CONTRACT SPECIFICATIONS. COORDINATE WITH OWNER FOR ANY EQUIPMENT OR FIXTURES TO BE KEPT ON SITE.
6. THE CONTRACTOR SHALL TAKE CARE NOT TO DAMAGE ADJOINING SURFACES OUTSIDE THE CONTRACT AREA. THE CONTRACTOR SHALL BE RESPONSIBLE TO RESTORE ALL EXISTING CONDITION SURFACES DAMAGED DURING CONSTRUCTION INCLUDING PATCHING AND PAINTING AS REQUIRED AND DEEMED NECESSARY BY THE ARCHITECT.
7. ALL EXISTING WORK REQUIRED TO REMAIN BUT INTERFERING WITH PROPOSED NEW PLUMBING (AS WELL AS ELECTRICAL, MECHANICAL AND GENERAL CONSTRUCTION WORK) SHALL BE RELOCATED AND RECONNECTED USING MATERIALS CONFORMING TO STANDARDS OF THIS CONTRACT.

PIPING SCOPE OF WORK

1. REMOVE ALL ABANDONED BASE BUILDING PIPING BACK TO THE EXISTING WET COLUMNS OR SHAFTS, OR AS NOTED ON DRAWINGS.
2. IF THE BUILDING IS TO REMAIN OPERATIONAL, CONTRACTOR SHALL COORDINATE WITH THE BUILDING OWNER ON TIMING OF WORK AND TO PROVIDE A MINIMUM OF 48-HOURS IN ADVANCE.
3. PROVIDE ADDITIONAL SUPPORT FOR ALL EXISTING PIPING TO REMAIN WHICH ARE AFFECTED BY DEMOLITION OF EXISTING CEILING AND PARTITIONS.

PLUMBING FIXTURE SCOPE OF WORK

1. ALL FIXTURES INDICATED ON THE PLANS DESIGNATED FOR REMOVAL OR REPLACEMENT SHALL BE COMPLETELY REMOVED AND DISPOSED OF. SCOPE TO INCLUDE ALL PLUMBING TO FIXTURES INCLUDING SINKS, FAUCETS, FLOOR DRAINS, STOP VALVES AND ALL DEVICES USED TO SECURE THESE FIXTURES IN PLACE.
2. PRIOR TO THE REMOVAL OF FIXTURES, THE CONTRACTOR SHALL MAKE ALL NECESSARY DISCONNECTS AND WORK REQUIRES TO ACCESS THE PIPING WITHIN CHASES AND WALLS. THE CONTRACTORS SHALL SHUT WATER OFF TO THE FIXTURES AND REPLACE ANY DAMAGED VALVES WITHIN THE SCOPE OF WORK AREA.
3. FLUSH AND SNAKE ALL SANITARY/WASTE LINES BACK TO THEIR ASSOCIATED RISERS PRIOR TO THE START OF WORK.

⟨X⟩ KEYED PLUMBING DEMOLITION NOTES

1. DISCONNECT AND DEMOLISH ACID WASTE, HOT AND COLD WATER PIPING FROM EXISTING ROUGH-IN PIPING IN WALL. TEMPORARILY CAP PIPE AND PREPARE FOR RECONNECTION. MODIFY PIPING AS NEEDED.

2. DISCONNECT AND REMOVE SANITARY, COLD AND HOT WATER PIPING FROM EXISTING ART SINK. TEMPORARILY CAP PIPE AND PREPARE FOR RECONNECTION. DEMO ASSOCIATED SEDIMENT TRAP AND CUT AND CAP PIPE, PREPARE SANITARY PIPE FOR RECONNECTION. MODIFY PIPING AS NEEDED.

3. EXISTING FIXTURE TO REMAIN. PROTECT DURING CONSTRUCTION AS NOTED IN PLUMBING DEMOLITION NOTES.

[X] KEYED PLUMBING CONSTRUCTION NOTES

1. INSTALL NEW LAB SINK WITH FAUCET. INSTALL NEW COLD WATER AND HOT WATER STOP VALVE. CONNECT NEW 1/2" COLD AND HOT WATER PIPE TO EXISTING COLD AND HOT WATER PIPING IN WALL. CONNECT NEW 2" ACID WASTE PIPING TO EXISTING ACID WASTE PIPE IN WALL. MODIFY PIPING AS REQUIRED. SEE PLUMBING FIXTURE SCHEDULE FOR MAKE AND MODEL.

2. INSTALL NEW ART SINK. CONNECT NEW 1/2" COLD AND HOT WATER PIPING TO EXISTING 1/2" CAPPED COLD WATER PIPE. PIPE NEW 1-1/2" SANITARY PIPE TO NEW UNDER COUNTER SEDIMENT TRAP AND CONNECT TO EXISTING 2" CAPPED SANITARY PIPE AND PIPE. MODIFY PIPING AS REQUIRED. SEE PLUMBING FIXTURE SCHEDULE FOR MAKE AND MODEL.

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CONSULTANTS:

MARK	DATE	DESCRIPTION

STATE OF NEW YORK · JONATHAN RICHARD MURATORE · 096440 · LICENSED PROFESSIONAL ENGINEER

10/31/2027 Exp. Date

JONATHAN R. MURATORE, P.E.
NY PROFESSIONAL ENGINEER Lic. No. 096440

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P. ANGELONE	P. ANGELONE	J. MURATORE	J. MURATORE

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202
SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT P
PLUMBING CONSTRUCTION

STATUS

90% SUBMISSION

SHEET TITLE

PLUMBING ENLARGEMENT PLANS

DRAWING No.

MS-P 200.00

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PLUMBING FIXTURE SCHEDULE

FIXTURE TAG	DESCRIPTION	BASIS OF DESIGN						MINIMUM CONNECTION SIZES							SPECIFICATION	REMARKS
		MAKE	MODEL	TRIM / FAUCET				COLD WATER		HOT WATER		DRAIN		VENT		
				MAKE	MODEL	OPERATION	MAX FLOW	SIZE	WFU	SIZE	WFU	SIZE	DFU			
SK-1	LAB SINK	PROVIDED BY CONTRACTOR G		WATERSAVER	L412VB-BH	MANUAL	2.0 GPM	1/2"	1	1/2"	1	1-1/2"	2	1-1/2"	SINK: DROP IN, BLACK EPOXY RESIN, CENTER DRAIN. FAUCET: POLISHED CHROME WITH FOUR ARM HANDLE, HIGH ARCH SPOUT, COLD WATER - HOT WATER - AND GAS CONNECTIONS, IN-LINE VACUUM BREAKER AT WATER OUTLET, COMPLIES WITH ASME A112.18.1.	PROVIDE BRASS ANGLE STOP VALVES WITH FLEXIBLE STAINLESS STEEL SUPPLIES, AND 1-1/2" BRASS P-TRAP.
SK-1 (HC)	LAB SINK - ADA	PROVIDED BY CONTRACTOR G		WATERSAVER	L412VB-BH	MANUAL	2.0 GPM	1/2"	1	1/2"	1	1-1/2"	2	1-1/2"	SINK: DROP IN, BLACK EPOXY RESIN, CENTER DRAIN, ADA. FAUCET: POLISHED CHROME WITH FOUR ARM HANDLE, HIGH ARCH SPOUT, COLD WATER - HOT WATER - AND GAS CONNECTIONS. COMPLIES WITH ASME A112.18.1.	PROVIDE BRASS ANGLE STOP VALVES WITH FLEXIBLE STAINLESS STEEL SUPPLIES, AND 1-1/2" BRASS P-TRAP.
SK-2	ART ROOM SINK - DROP IN - ADA BOWL SIZE: 22" x 19.5" x 6.5"	ELKAY	LRAD221965	ELKAY	LKD2445BH	MANUAL	2.2 GPM	1/2"	1.5	1/2"	1.5	1-1/2"	2	1-1/2"	SINK: DROP IN, 18-GAUGE STAINLESS STEEL SINK WITH SATIN FINISH, AND GRID STRAINER. COMPLIES WITH ASME A112.19.3. FAUCET: POLISHED CHROME WITH 4" BLADE HANDLES, HIGH ARCH SPOUT, 2.2 GPM AT 60 PSIG. COMPLIES WITH NSF 61, CONNECTIONS. COMPLIES WITH ASME A112.18.1.	PROVIDE BRASS ANGLE STOP VALVES WITH FLEXIBLE STAINLESS STEEL SUPPLIES, AND 1-1/2" BRASS P-TRAP.
SK-3	ART ROOM SINK - DROP IN - BOWL SIZE: 22" x 19.5" x 10"	ELKAY	LRAD221910	ELKAY	LKD2445BH	MANUAL	2.2 GPM	1/2"	1.5	1/2"	1.5	1-1/2"	2	1-1/2"	SINK: DROP IN, 18-GAUGE STAINLESS STEEL SINK WITH SATIN FINISH, AND GRID STRAINER. COMPLIES WITH ASME A112.19.3. FAUCET: POLISHED CHROME WITH 4" BLADE HANDLES, HIGH ARCH SPOUT, 2.2 GPM AT 60 PSIG. COMPLIES WITH NSF 61, CONNECTIONS. COMPLIES WITH ASME A112.18.1.	PROVIDE BRASS ANGLE STOP VALVES WITH FLEXIBLE STAINLESS STEEL SUPPLIES, AND 1-1/2" BRASS P-TRAP.

NOTES:

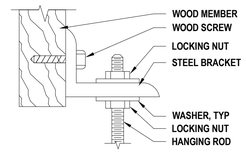
*HC REPRESENTS HANDICAPPED PLUMBING FIXTURE, OR ADA. REFER TO ARCHITECTURAL PLANS FOR MOUNTING HEIGHTS FOR ACCESSIBLE FIXTURES

HANGER SPACING

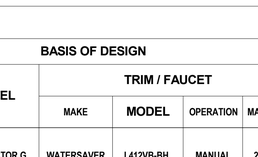
PIPING MATERIAL	MAX. HORIZONTAL (FT)	MAX. VERTICAL (FT)
POLYETHYLENE	2.67	4
PEX	2.67	10
CPVC 1" OR SMALLER	3	10
ABS/PVC/CPVC (>1")	4	10
CAST-IRON	5	15
COPPER (<1-1/2)	6	10
COPPER (≥ 1-1/2")/BRASS)	10	10
STEEL	12	15

HANGER ROD SCHEDULE

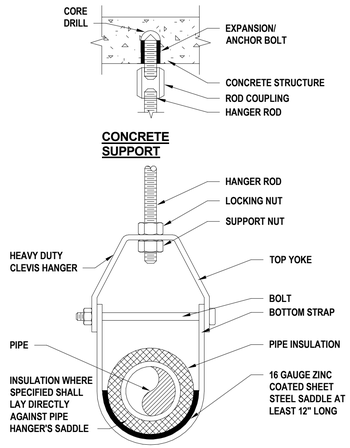
PIPE SIZE	ROD SIZE (DIA.)	PIPE SIZE	ROD SIZE (DIA.)
≤ 2"	3/8"	4" THRU 5"	5/8"
2 1/2" THRU 3 1/2"	1/2"	6" THRU 8"	3/4"



WOOD SUPPORT



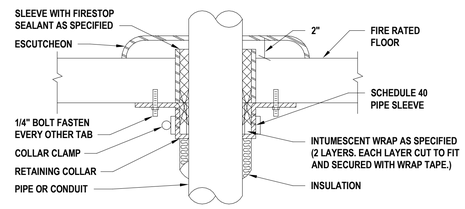
STEEL SUPPORT



CONCRETE SUPPORT

1 Pipe Hanger Detail

SCALE: NTS



2 Pipe Penetation Through Floors Detail

SCALE: NTS

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CONSULTANTS:

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10/31/2027
JONATHAN R. MURATORE, P.E. Exp. Date
NY PROFESSIONAL ENGINEER Lic. No. 096440

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P. ANGELONE	P. ANGELONE	J. MURATORE	J. MURATORE

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

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250 US-202
SOMERS, NY 10589

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CONTRACT

CONTRACT P
PLUMBING CONSTRUCTION

STATUS

90% SUBMISSION

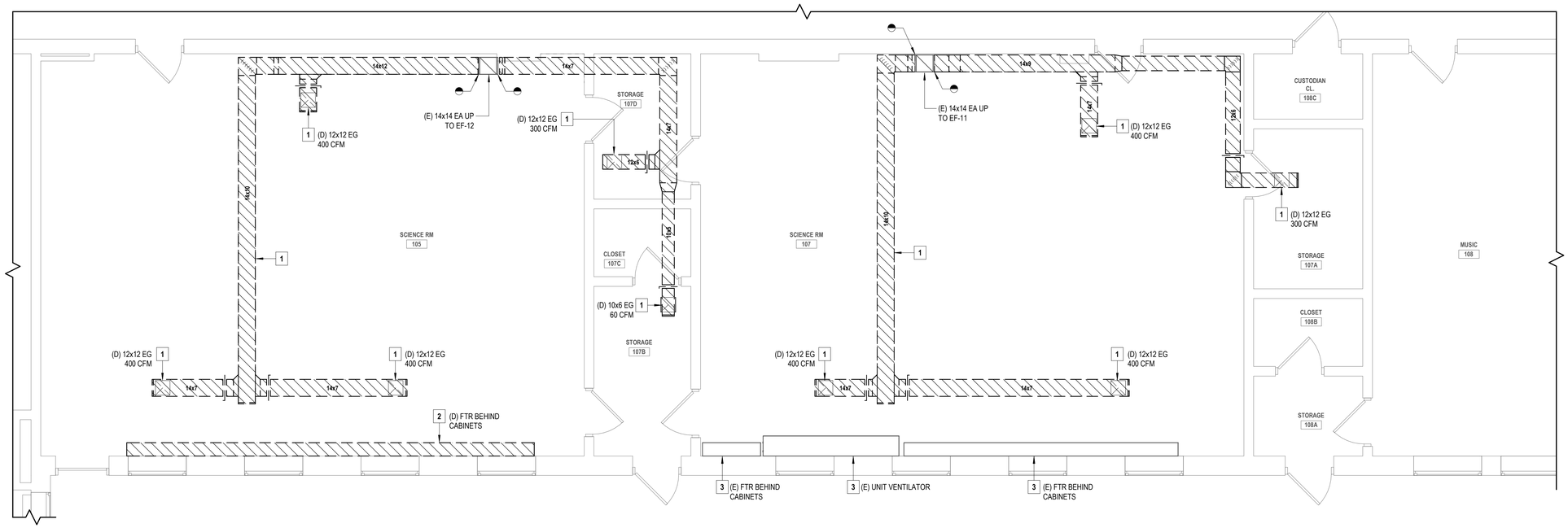
SHEET TITLE

PLUMBING SCHEDULES AND DETAILS

DRAWING No.

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1 PARTIAL FIRST FLOOR DEMOLITION PLAN - SCIENCE CLASSROOMS

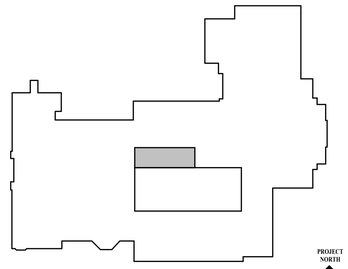
SCALE: 1/4" = 1'-0"

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 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 SURFACES OUTSIDE OF 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 SYSTEM, INCLUDING ALL DUCT MAINS, BRANCH DUCTS, DUCT SUPPORTS, EXHAUST GRILLES, VOLUME DAMPERS, AND RELATED APPURTENANCES. TEMPORARILY CAP DUCTWORK AT THE POINTS INDICATED.
2. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF THE EXISTING STEAM FINNED-TUBE RADIATOR, CONTROL VALVE, RADIATOR ENCLOSURE, WALL BRACKETS, AND ALL RELATED APPURTENANCES IN APPROXIMATELY THIS LOCATION. DISCONNECT, REMOVE, AND DISPOSE OF ASSOCIATED STEAM AND CONDENSATE RETURN PIPING BACK TO THE POINT INDICATED ON THE DRAWING OR THE ASSOCIATED PIPING MAINS. FOR PIPING NOT SHOWN, THE CONTRACTOR SHALL FIELD VERIFY THE ROUTING OF THE EXISTING PIPING BACK TO THE NEAREST PIPING MAINS. TEMPORARILY CAP PIPING.
3. EXISTING TO REMAIN.



KEY PLAN

SCALE: 1" = 100'-0"

PROJECT NORTH

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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:
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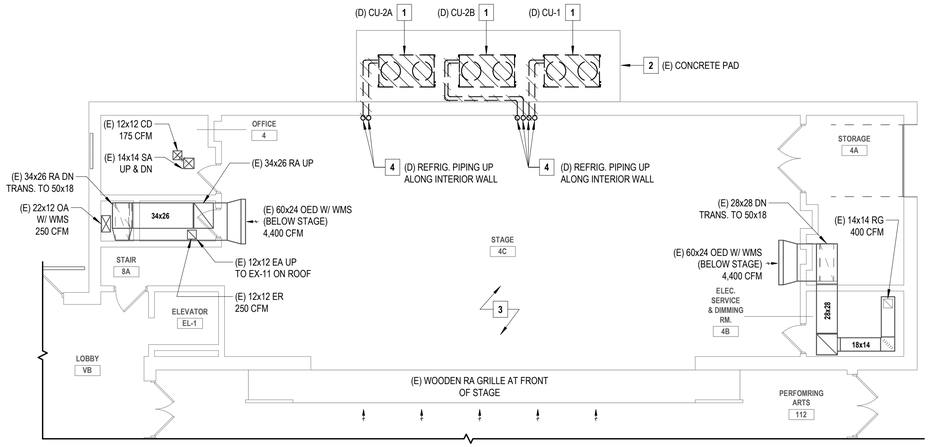
MECHANICAL
PARTIAL FIRST FLOOR
DEMOLITION PLAN

DRAWING No.

MS-MD 110.00

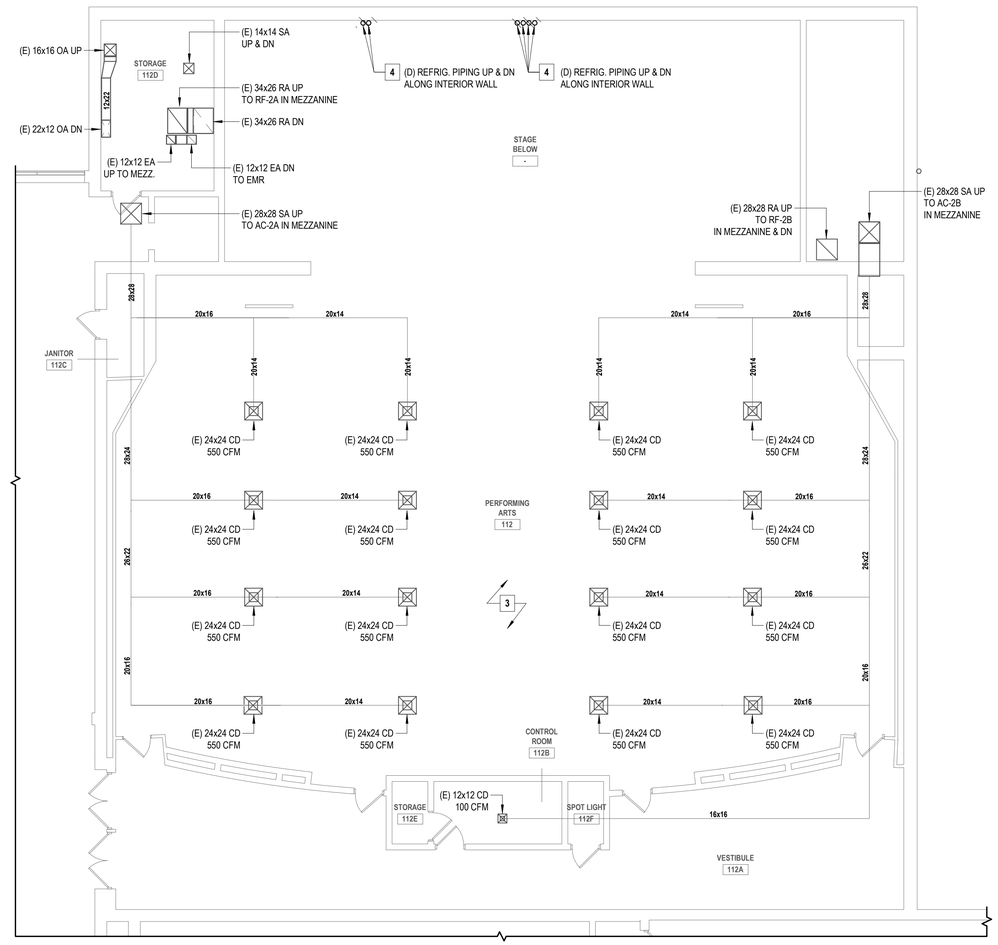
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7/14/2026 2:29:59 PM



1 PARTIAL BASEMENT DEMOLITION PLAN - AUDITORIUM

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



2 PARTIAL FIRST FLOOR DEMOLITION PLAN - AUDITORIUM

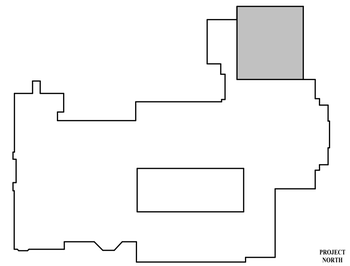
SCALE: 1/8" = 1'-0"

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 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 SURFACES OUTSIDE OF 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 REMOTE CONDENSING UNIT SERVING THE AIR HANDLING UNIT IN THE AUDITORIUM MECHANICAL MEZZANINE, INCLUDING ALL REFRIGERANT LIQUID AND SUCTION PIPING, INSULATION, PIPE HANGERS, AND RELATED APPURTENANCES.
2. EXISTING CONCRETE HOUSEKEEPING PAD SHALL BE RE-USED FOR NEW REPLACEMENT CONDENSING UNITS. CLEAN AND PREPARE PAD TO ACCEPT NEW UNITS.
3. EXISTING AUDITORIUM SUPPLY AND RETURN DUCTWORK SHOWN FOR REFERENCE AND FOR BALANCING PURPOSES.
4. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF THE EXISTING REFRIGERANT PIPING, VALVES, INSULATION, AND RELATED APPURTENANCES.



KEY PLAN

SCALE: 1" = 100'-0"

PROJECT NORTH

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CONSULTANTS:

MARK	DATE	DESCRIPTION

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

05/31/2028
Exp. Date

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

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

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202
SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT M
MECHANICAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

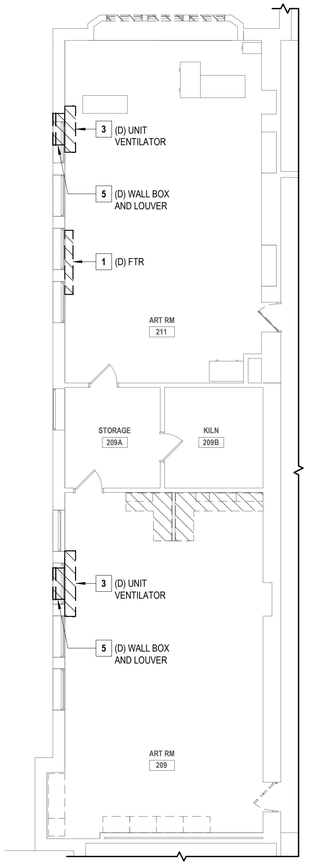
MECHANICAL
PARTIAL FIRST FLOOR
DEMOLITION PLAN

DRAWING No.

MS-MD 111.00

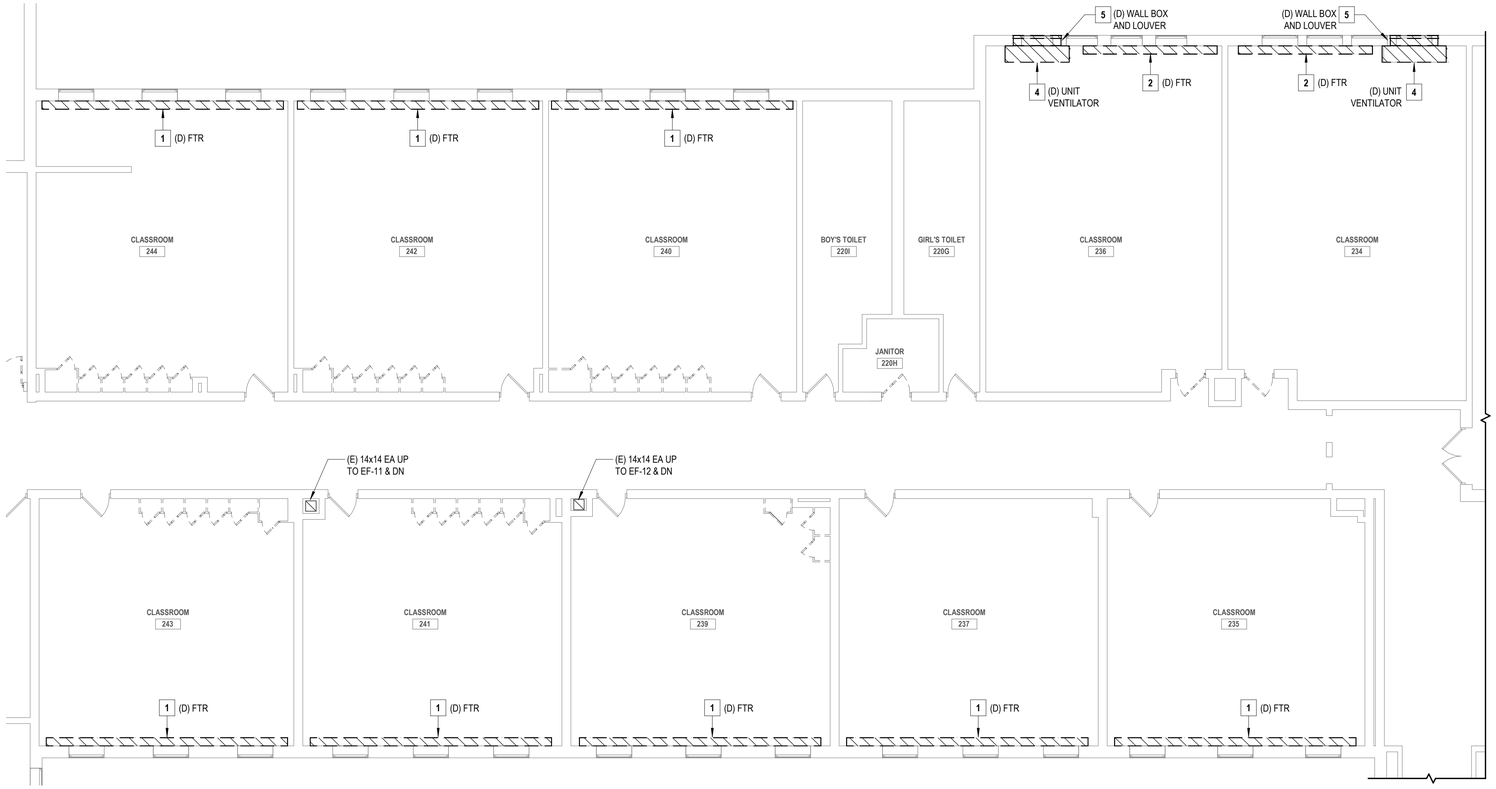
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1 PARTIAL SECOND FLOOR DEMOLITION PLAN

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



2 PARTIAL SECOND FLOOR DEMOLITION PLAN - CLASSROOMS

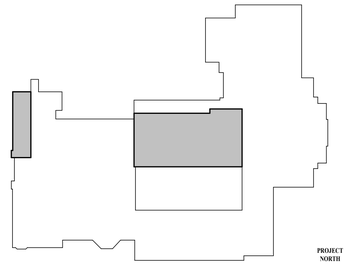
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3. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL CONSTRUCTION DEBRIS AND UNWANTED MATERIAL LEGALLY OFF-SITE IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS.

X MECHANICAL DEMOLITION KEYNOTES

1. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF THE EXISTING STEAM FINNED-TUBE RADIATOR, CONTROL VALVE, RADIATOR ENCLOSURE, WALL BRACKETS, AND ALL RELATED APPURTENANCES IN APPROXIMATELY THIS LOCATION. DISCONNECT, REMOVE, AND DISPOSE OF ASSOCIATED STEAM AND CONDENSATE RETURN PIPING, VALVES, INSULATION, AND RELATED APPURTENANCES BACK TO THE ASSOCIATED PIPING MAINS AND CAP PIPING. FOR PIPING NOT SHOWN, THE CONTRACTOR SHALL FIELD VERIFY THE ROUTING OF THE EXISTING PIPING BACK TO THE NEAREST PIPING MAINS.
2. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF THE EXISTING HOT WATER FINNED-TUBE RADIATOR, CONTROL VALVE, RADIATOR ENCLOSURE, WALL BRACKETS, AND ALL RELATED APPURTENANCES IN APPROXIMATELY THIS LOCATION. DISCONNECT, REMOVE, AND DISPOSE OF ASSOCIATED HOT WATER SUPPLY AND RETURN PIPING, VALVES, INSULATION, AND RELATED APPURTENANCES BACK TO THE ASSOCIATED PIPING MAINS AND CAP PIPING. FOR PIPING NOT SHOWN, THE CONTRACTOR SHALL FIELD VERIFY THE ROUTING OF THE EXISTING PIPING BACK TO THE NEAREST PIPING MAINS.
3. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF THE EXISTING STEAM UNIT VENTILATOR IN APPROXIMATELY THIS LOCATION. DISCONNECT, REMOVE, AND DISPOSE OF THE ASSOCIATED STEAM AND CONDENSATE RETURN PIPING, VALVES, INSULATION AND RELATED APPURTENANCES. TEMPORARILY CAP PIPING AT THE FLOOR AND PREPARE FOR CONNECTION TO NEW REPLACEMENT UNIT VENTILATOR.
4. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF THE EXISTING HOT WATER UNIT VENTILATOR IN APPROXIMATELY THIS LOCATION. DISCONNECT, REMOVE, AND DISPOSE OF THE ASSOCIATED HOT WATER SUPPLY AND RETURN PIPING, VALVES, INSULATION AND RELATED APPURTENANCES. TEMPORARILY CAP PIPING AT THE FLOOR AND PREPARE FOR CONNECTION TO NEW REPLACEMENT UNIT VENTILATOR.
5. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF THE EXISTING WALL BOX AND OUTSIDE AIR INTAKE LOUVER ASSOCIATED WITH THE INDICATED UNIT VENTILATOR. TEMPORARILY SEAL OPENINGS IN WALL TO MAKE WEATHERTIGHT UNTIL NEW LOUVERS ARE INSTALLED DURING THE NEW WORK PHASE.



KEY PLAN

SCALE: 1" = 100'-0"

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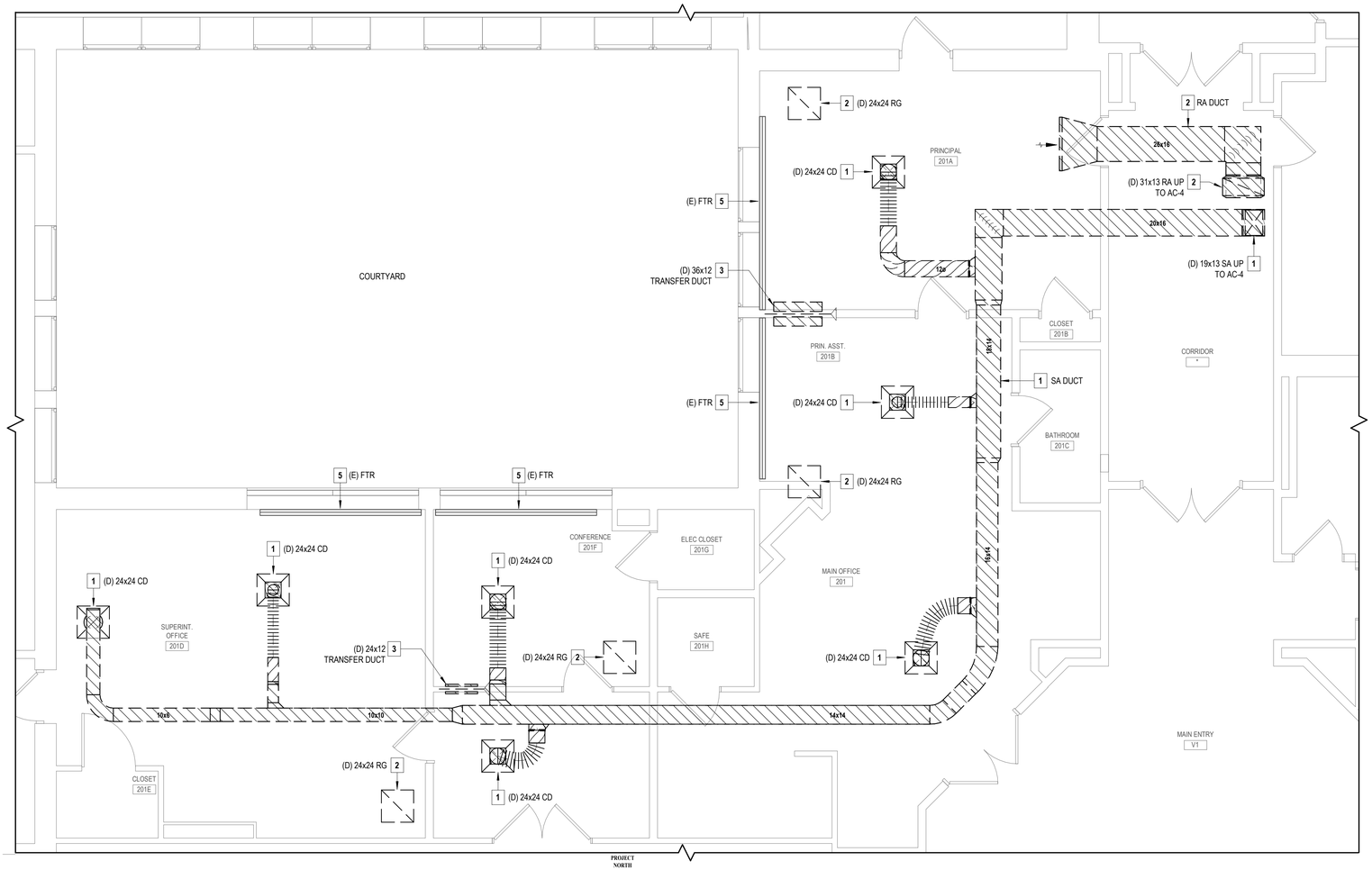
MECHANICAL PARTIAL SECOND FLOOR DEMOLITION PLAN

DRAWING No.

MS-MD 112.00

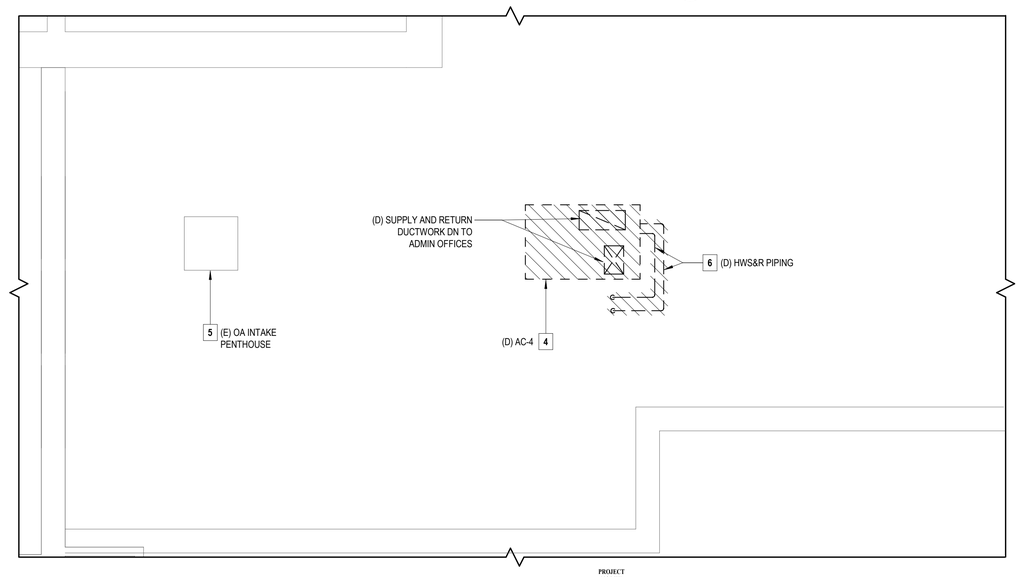
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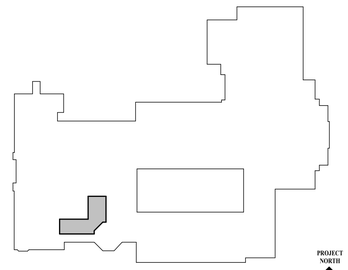
1 PARTIAL SECOND FLOOR DEMOLITION PLAN - ADMINISTRATION OFFICES

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



2 PARTIAL ROOF DEMOLITION PLAN - ADMINISTRATION OFFICES

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



KEY PLAN

SCALE: 1" = 100'-0"

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X MECHANICAL DEMOLTION KEYNOTES

1. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF THE EXISTING SUPPLY AIR DUCTWORK SERVING THE ADMINISTRATION OFFICES IN ITS ENTIRETY, INCLUDING ALL DUCT MAINS, BRANCH DUCTS, FLEXIBLE DUCTWORK, DUCT INSULATION, DUCT HANGERS AND SUPPORTS, 24x24 CEILING DIFFUSERS, AND RELATED APPURTENANCES.
2. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF THE EXISTING RETURN AIR DUCTWORK SERVING THE ADMINISTRATION OFFICES IN ITS ENTIRETY, INCLUDING ALL DUCT MAINS, DUCT INSULATION, DUCT HANGERS AND SUPPORTS, 24x24 RETURN GRILLES, AND RELATED APPURTENANCES.
3. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF EXISTING TRANSFER GRILLE AND FIRE DAMPER IN APPROXIMATELY THIS LOCATION.
4. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF EXISTING ROOFTOP UNIT "AC-4" AND ASSOCIATED ROOF CURB. DISCONNECT, REMOVE, AND DISPOSE OF ALL ASSOCIATED UNIT CONTROLS, CONTROL PANELS, THERMOSTATS, ETC.
5. EXISTING TO REMAIN.
6. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF THE EXISTING HOT WATER SUPPLY AND RETURN PIPING, VALVES, INSULATION, AND RELATED APPURTENANCES ASSOCIATED WITH "AC-4". CAP PIPING AT THE NEAREST PIPING MAINS.

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

05/31/2028
Exp. Date

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CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

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250 US-202
SOMERS, NY 10589

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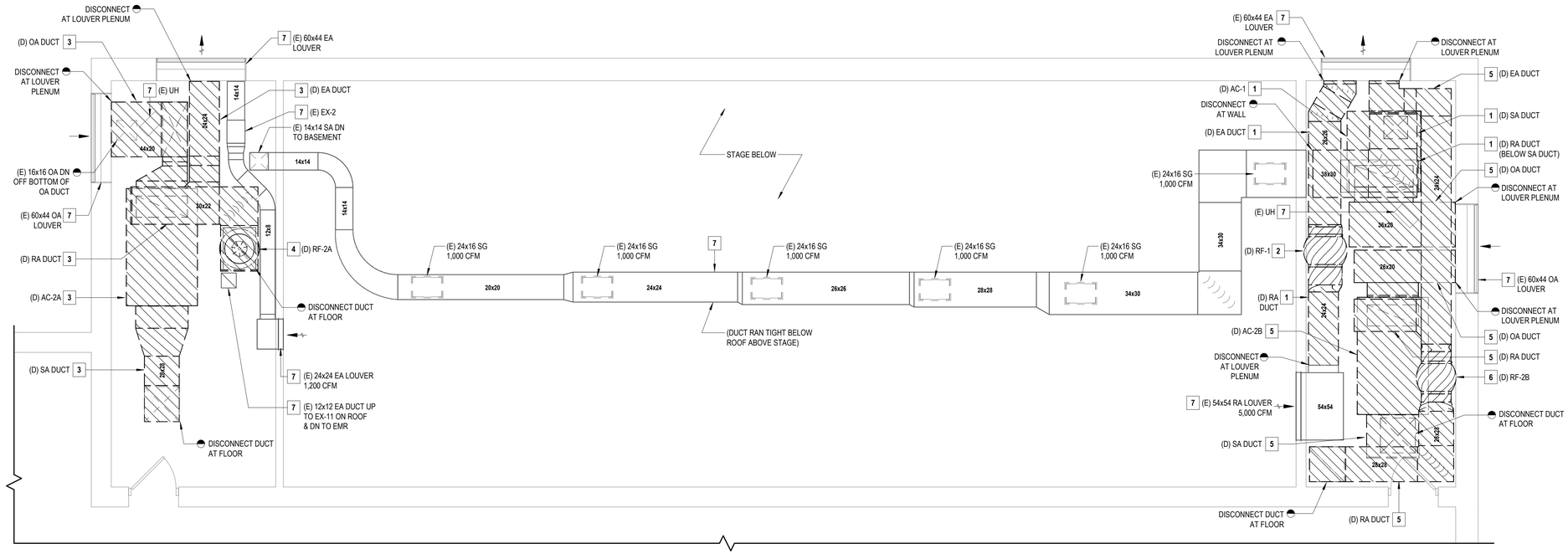
MECHANICAL
PARTIAL SECOND FLOOR
DEMOLITION PLAN

DRAWING No.

MS-MD 113.00

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1 PARTIAL SECOND FLOOR DUCTWORK DEMOLITION PLAN - AUDITORIUM MECHANICAL MEZZANINE

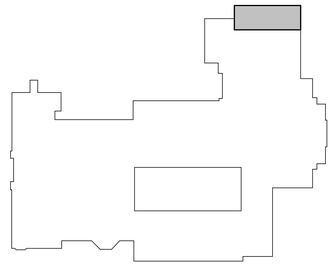
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3. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL CONSTRUCTION DEBRIS AND UNWANTED MATERIAL LEGALLY OFF-SITE IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS.

X MECHANICAL DEMOLITION KEYNOTES

1. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF EXISTING AIR HANDLING UNIT "AC-1" IN APPROXIMATELY THIS LOCATION. DISCONNECT, REMOVE, AND DISPOSE OF THE ASSOCIATED SUPPLY, RETURN, OUTSIDE AIR, AND EXHAUST DUCTWORK (INCLUDING DUCT INSULATION AND DUCT HANGERS AND SUPPORTS) AS INDICATED ON THE DRAWINGS. TEMPORARILY CAP DUCTWORK AT THE POINTS INDICATED.
2. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF EXISTING RETURN FAN "RF-1" IN APPROXIMATELY THIS LOCATION. DISCONNECT, REMOVE, AND DISPOSE OF ASSOCIATED DUCTWORK AND EQUIPMENT HANGERS AND SUPPORTS.
3. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF EXISTING AIR HANDLING UNIT "AC-2A" IN APPROXIMATELY THIS LOCATION. DISCONNECT, REMOVE, AND DISPOSE OF THE ASSOCIATED SUPPLY, RETURN, OUTSIDE AIR, AND EXHAUST DUCTWORK (INCLUDING DUCT INSULATION AND DUCT HANGERS AND SUPPORTS) AS INDICATED ON THE DRAWINGS. TEMPORARILY CAP DUCTWORK AT THE POINTS INDICATED.
4. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF EXISTING RETURN FAN "RF-2A" IN APPROXIMATELY THIS LOCATION. DISCONNECT, REMOVE, AND DISPOSE OF ASSOCIATED DUCTWORK AND EQUIPMENT HANGERS AND SUPPORTS.
5. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF EXISTING AIR HANDLING UNIT "AC-2B" IN APPROXIMATELY THIS LOCATION. DISCONNECT, REMOVE, AND DISPOSE OF THE ASSOCIATED SUPPLY, RETURN, OUTSIDE AIR, AND EXHAUST DUCTWORK (INCLUDING DUCT INSULATION AND DUCT HANGERS AND SUPPORTS) AS INDICATED ON THE DRAWINGS. TEMPORARILY CAP DUCTWORK AT THE POINTS INDICATED.
6. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF EXISTING RETURN FAN "RF-2B" IN APPROXIMATELY THIS LOCATION. DISCONNECT, REMOVE, AND DISPOSE OF ASSOCIATED DUCTWORK AND EQUIPMENT HANGERS AND SUPPORTS.
7. EXISTING TO REMAIN.



KEY PLAN

SCALE: 1" = 100'-0"

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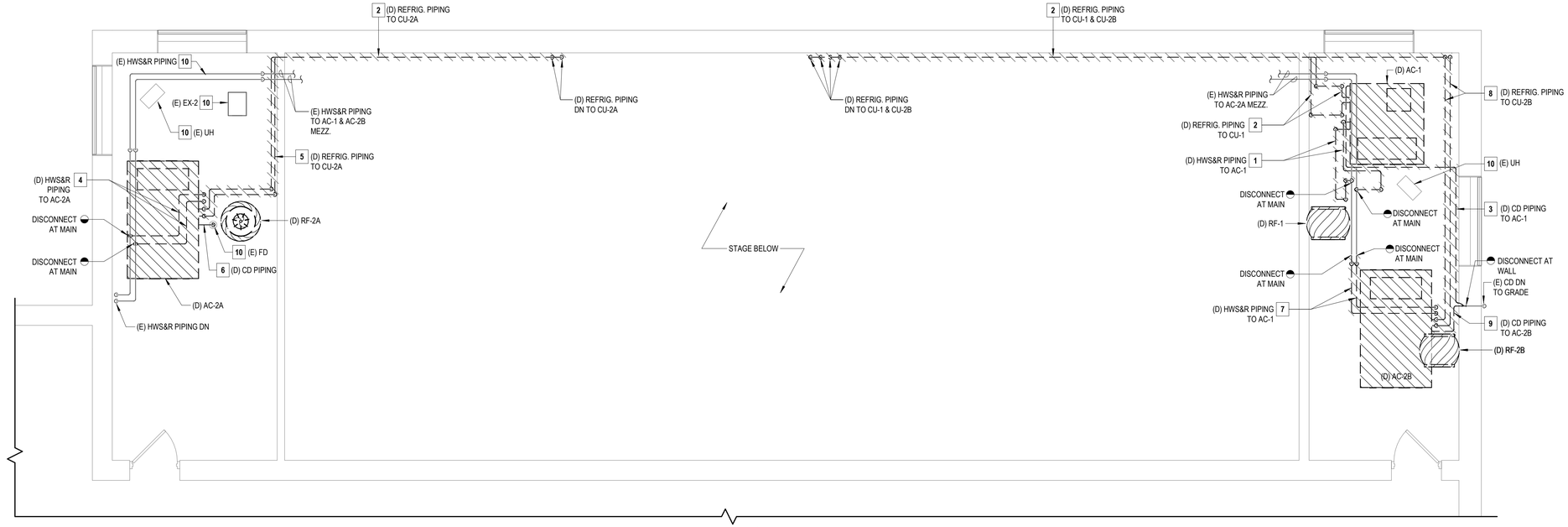
MECHANICAL
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DRAWING No.

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1 PARTIAL SECOND FLOOR PIPING DEMOLITION PLAN - AUDITORIUM MECHANICAL MEZZANINE

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

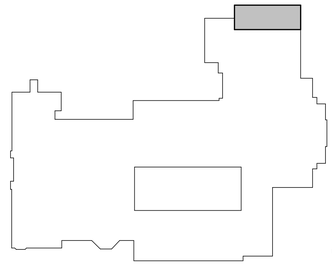
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X MECHANICAL DEMOLITION KEYNOTES

1. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF THE EXISTING HOT WATER SUPPLY AND RETURN PIPING, VALVES, INSULATION, AND RELATED APPURTENANCES ASSOCIATED WITH "AC-1". TEMPORARILY CAP PIPING AT THE POINTS INDICATED.
2. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF THE EXISTING REFRIGERANT LIQUID AND SUCTION PIPING, VALVES, INSULATION, AND RELATED APPURTENANCES ASSOCIATED WITH AIR HANDLING UNIT "AC-1".
3. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF THE EXISTING CONDENSATE DRAIN PIPING, INSULATION, PIPING SUPPORTS, AND RELATED APPURTENANCES ASSOCIATED WITH AIR HANDLING UNIT "AC-1".
4. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF THE EXISTING HOT WATER SUPPLY AND RETURN PIPING, VALVES, INSULATION, AND RELATED APPURTENANCES ASSOCIATED WITH "AC-2A". TEMPORARILY CAP PIPING AT THE POINTS INDICATED.
5. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF THE EXISTING REFRIGERANT LIQUID AND SUCTION PIPING, VALVES, INSULATION, AND RELATED APPURTENANCES ASSOCIATED WITH AIR HANDLING UNIT "AC-2A".
6. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF THE EXISTING CONDENSATE DRAIN PIPING, INSULATION, PIPING SUPPORTS, AND RELATED APPURTENANCES ASSOCIATED WITH AIR HANDLING UNIT "AC-2A".
7. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF THE EXISTING HOT WATER SUPPLY AND RETURN PIPING, VALVES, INSULATION, AND RELATED APPURTENANCES ASSOCIATED WITH "AC-2B". TEMPORARILY CAP PIPING AT THE POINTS INDICATED.
8. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF THE EXISTING REFRIGERANT LIQUID AND SUCTION PIPING, VALVES, INSULATION, AND RELATED APPURTENANCES ASSOCIATED WITH AIR HANDLING UNIT "AC-2B".
9. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF THE EXISTING CONDENSATE DRAIN PIPING, INSULATION, PIPING SUPPORTS, AND RELATED APPURTENANCES ASSOCIATED WITH AIR HANDLING UNIT "AC-2B".
10. EXISTING TO REMAIN.



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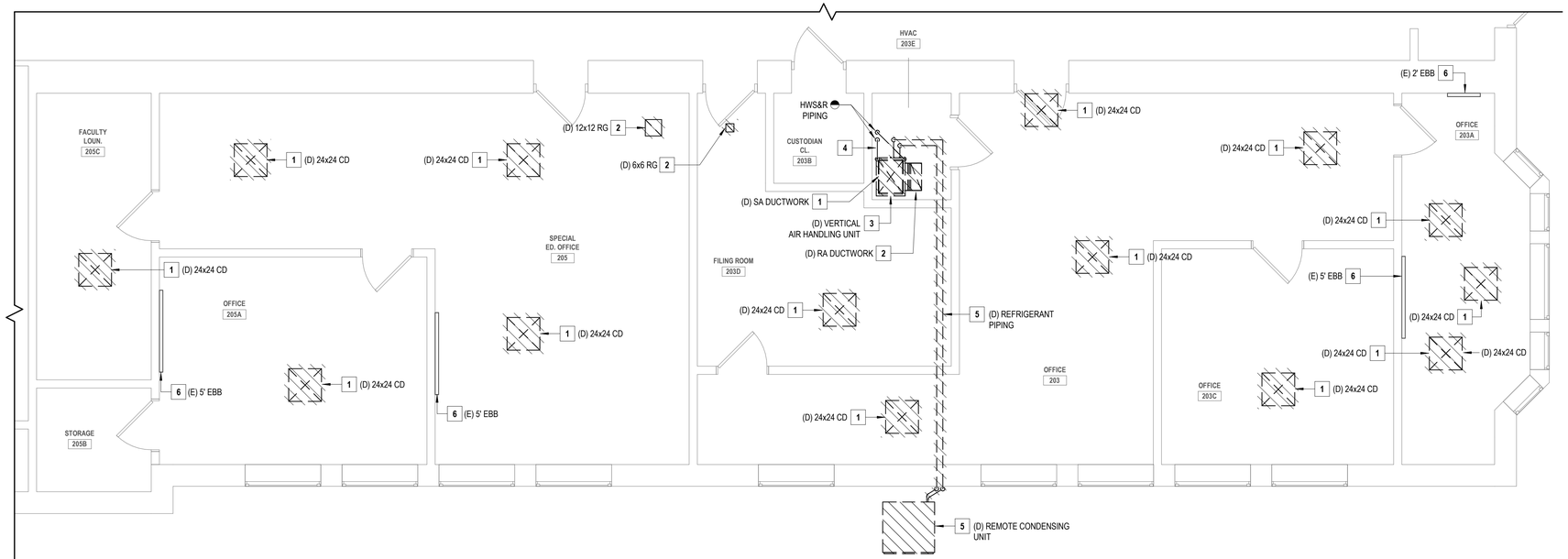
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1 PARTIAL SECOND FLOOR DEMOLITION PLAN - SPECIAL EDUCATION OFFICES

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

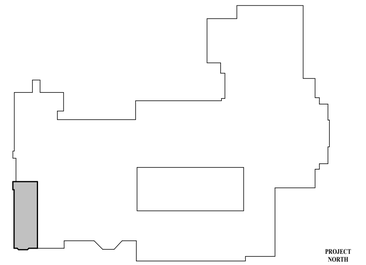
PROJECT NORTH

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 SURFACES OUTSIDE OF 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 SUPPLY DUCTWORK SYSTEM SERVING THE SPECIAL EDUCATION OFFICES IN ITS ENTIRETY, INCLUDING ALL DUCT MAINS, BRANCH DUCTWORK, INSULATION, DUCT HANGERS AND SUPPORTS, FLEXIBLE DUCTWORK, 24x24 CEILING DIFFUSERS, AND ALL RELATED APPURTENANCES. THE CONTRACTOR SHALL FIELD VERIFY THE EXTENT OF DUCTWORK THROUGHOUT THE SPACE.
2. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF THE EXISTING RETURN DUCTWORK SYSTEM SERVING THE SPECIAL EDUCATION OFFICES IN ITS ENTIRETY, INCLUDING ALL DUCT MAINS, BRANCH DUCTWORK, INSULATION, DUCT HANGERS AND SUPPORTS, FLEXIBLE DUCTWORK, CEILING RETURN GRILLES, AND ALL RELATED APPURTENANCES. THE CONTRACTOR SHALL FIELD VERIFY THE EXTENT OF DUCTWORK THROUGHOUT THE SPACE.
3. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF THE EXISTING VERTICAL AIR HANDLING UNIT SERVING THE SPECIAL EDUCATION OFFICES. DISCONNECT, REMOVE, AND DISPOSE OF ALL ASSOCIATED UNIT CONTROLS, CONTROL PANELS, THERMOSTATS, ETC.
4. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF THE EXISTING HOT WATER SUPPLY AND RETURN PIPING ASSOCIATED WITH THE VERTICAL AIR HANDLING UNIT BACK TO THE POINT INDICATED ON THE DRAWINGS. CAP PIPING AT THE FLOOR FOR FUTURE CONNECTION TO NEW CABINET UNIT HEATER IN THE NEW WORK PHASE OF THIS PROJECT.
5. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF THE EXISTING REMOTE CONDENSING UNIT ASSOCIATED WITH THE VERTICAL AIR HANDLING UNIT. DISCONNECT, REMOVE, AND DISPOSE OF ALL ASSOCIATED REFRIGERANT LIQUID AND SUCTION PIPING, VALVES, INSULATION, AND RELATED APPURTENANCES.
6. EXISTING TO REMAIN.



KEY PLAN

SCALE: 1" = 100'-0"

PROJECT NORTH

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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:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202
SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT M
MECHANICAL CONSTRUCTION

STATUS

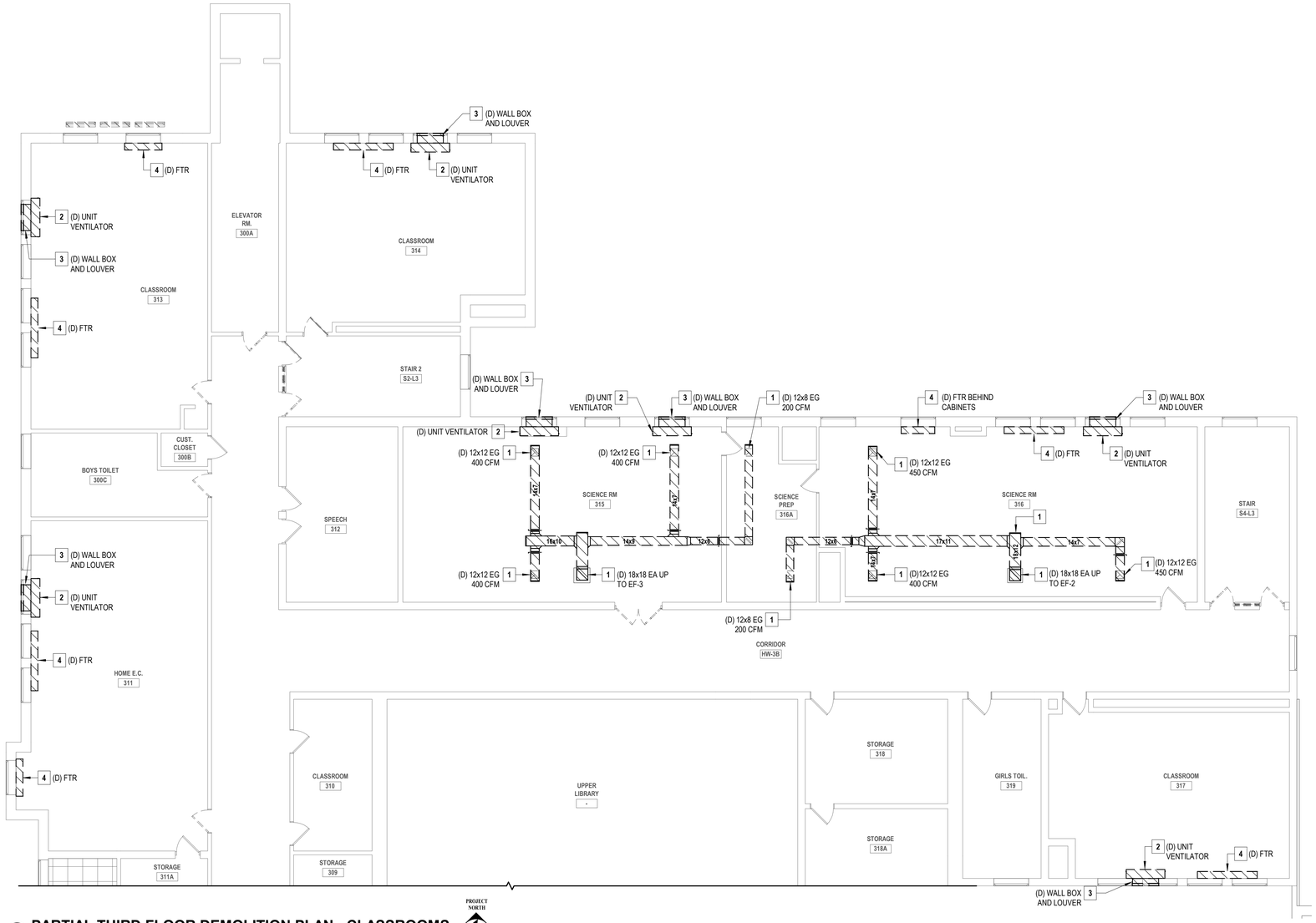
SED SUBMISSION

SHEET TITLE

MECHANICAL
PARTIAL SECOND FLOOR
DEMOLITION PLAN

DRAWING No.

MS-MD 116.00



1 PARTIAL THIRD FLOOR DEMOLITION PLAN - CLASSROOMS

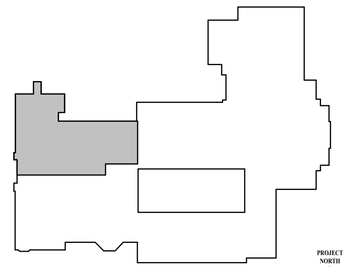
SCALE: 1/8" = 1'-0"

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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 MECHANICAL DEMOLITION KEYNOTES

1. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF THE EXISTING EXHAUST SYSTEM, INCLUDING ALL DUCT MAINS, BRANCH DUCTS, DUCT SUPPORTS, EXHAUST GRILLES, VOLUME DAMPERS, AND RELATED APPURTENANCES.
2. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF THE EXISTING STEAM UNIT VENTILATOR IN APPROXIMATELY THIS LOCATION. DISCONNECT, REMOVE, AND DISPOSE OF THE ASSOCIATED STEAM AND CONDENSATE RETURN PIPING, VALVES, INSULATION, AND RELATED APPURTENANCES. TEMPORARILY CAP PIPING AT THE FLOOR AND PREPARE FOR CONNECTION TO NEW REPLACEMENT UNIT VENTILATOR.
3. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF THE EXISTING WALL BOX AND OUTSIDE AIR INTAKE LOUVER ASSOCIATED WITH THE INDICATED UNIT VENTILATOR. TEMPORARILY SEAL OPENINGS IN WALL TO MAKE WEATHERTIGHT UNTIL NEW LOUVERS ARE INSTALLED DURING THE NEW WORK PHASE.
4. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF THE EXISTING STEAM FINNED-TUBE RADIATOR, CONTROL VALVE, RADIATOR ENCLOSURE, WALL BRACKETS, AND ALL RELATED APPURTENANCES IN APPROXIMATELY THIS LOCATION. DISCONNECT, REMOVE, AND DISPOSE OF THE ASSOCIATED STEAM AND CONDENSATE RETURN PIPING, VALVES, INSULATION, AND RELATED APPURTENANCES BACK TO THE ASSOCIATED PIPING MAINS AND CAP PIPING. FOR PIPING NOT SHOWN, THE CONTRACTOR SHALL FIELD VERIFY THE ROUTING OF THE EXISTING PIPING BACK TO THE NEAREST PIPING MAINS.



KEY PLAN

SCALE: 1" = 100'-0"

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

05/31/2028
Exp. Date

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NY PROFESSIONAL ENGINEER Lic. No. 057554

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

PROJECT No:	DATE:	SCALE:
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CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202
SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT M
MECHANICAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

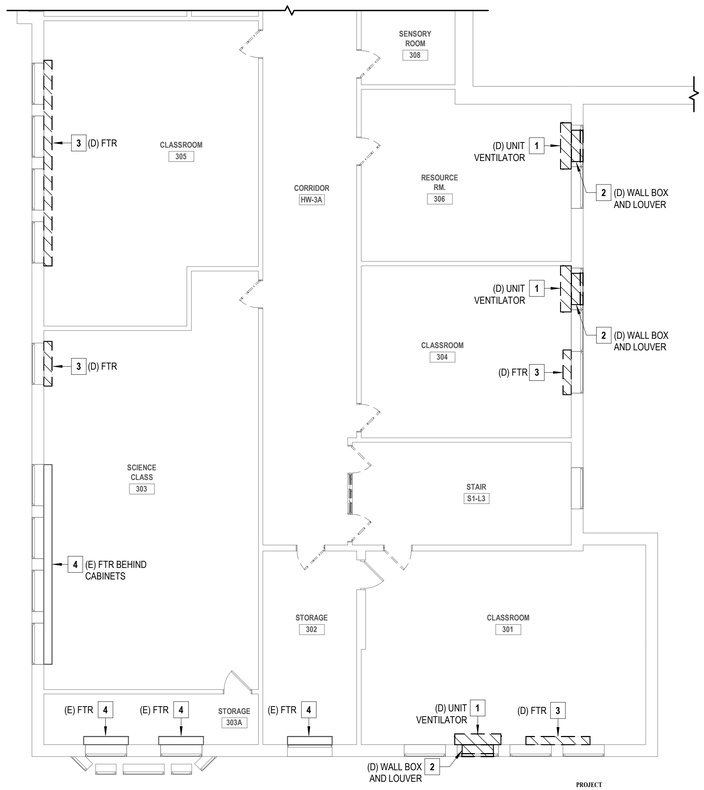
MECHANICAL
PARTIAL THIRD FLOOR
DEMOLITION PLAN

DRAWING No.

MS-MD 117.00

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1 PARTIAL THIRD FLOOR DEMOLITION PLAN - CLASSROOMS

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

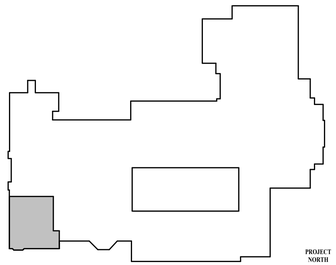
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4. EXISTING TO REMAIN.



PROJECT NORTH

KEY PLAN

SCALE: 1" = 100'-0"

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Exp. Date

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PROJECT No:	DATE:	SCALE:
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CLIENT

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SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

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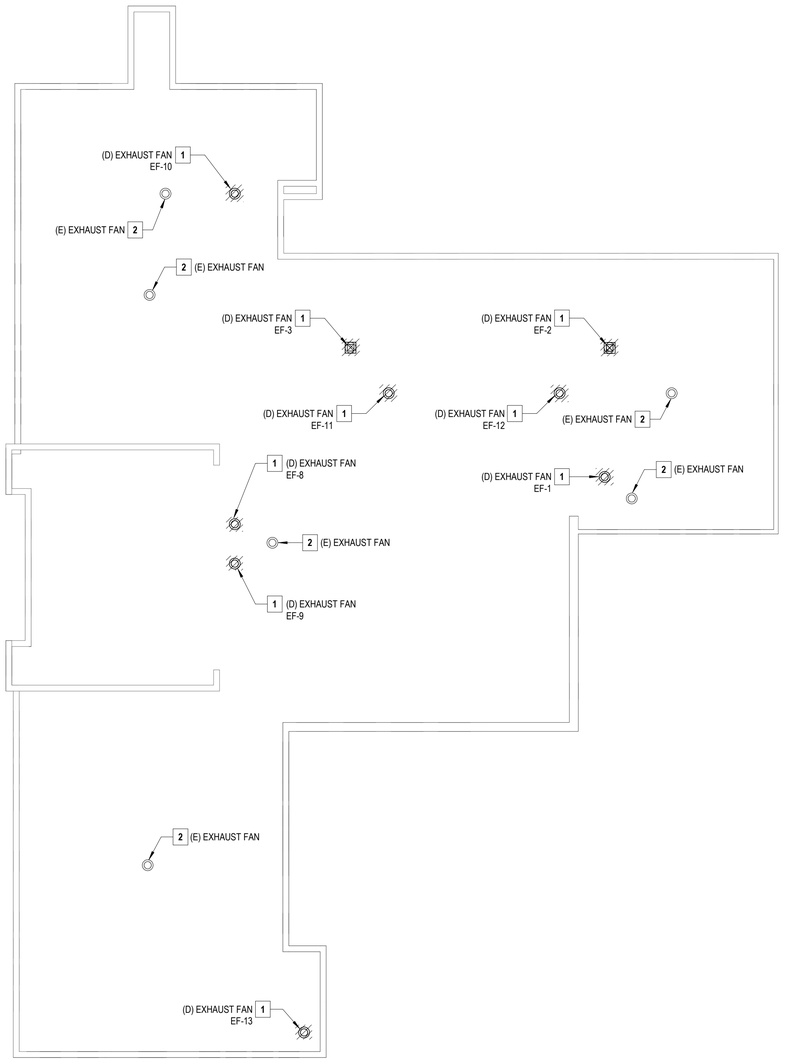
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MECHANICAL
PARTIAL THIRD FLOOR
DEMOLITION PLAN

DRAWING No.

MS-MD 118.00

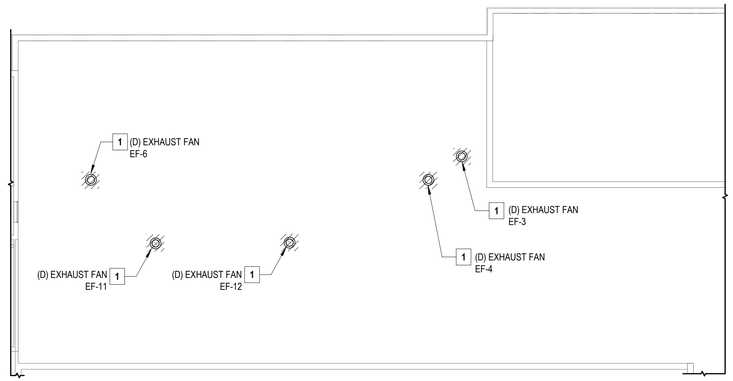
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1 PARTIAL UPPER ROOF DEMOLITION PLAN

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

PROJECT NORTH



2 PARTIAL LOWER ROOF DEMOLITION PLAN

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

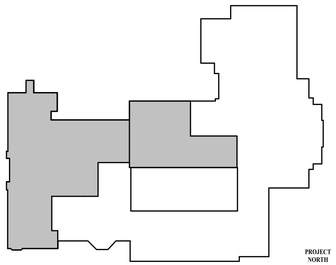
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X MECHANICAL DEMOLITION KEYNOTES

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 THE 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. EXISTING TO REMAIN.



KEY PLAN

SCALE: 1" = 100'-0"

PROJECT NORTH

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STATE OF NEW YORK
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SOMERS CENTRAL SCHOOL DISTRICT

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250 US-202
SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT M
MECHANICAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

MECHANICAL ROOF DEMOLITION PLAN

DRAWING No.

MS-MD 119.00

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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 ALL LOUVERS FOR INSTALLATION BY CONTRACT 'G'. SUBMIT LOUVER COLOR AND CONFIGURATION TO THE ARCHITECT/ENGINEER FOR APPROVAL.
2. INSTALL SMOKE DETECTORS IN DUCTWORK FOR AIR HANDLING UNITS RATED AT 2,000 CFM OR GREATER. SMOKE DETECTOR SUPPLY AND WIRING IS PART OF CONTRACT 'E'.
3. INSTALL SMOKE DETECTORS IN DUCTWORK WHERE A SMOKE DAMPER OR FIRE SMOKE DAMPER IS INSTALLED. SMOKE DETECTOR SUPPLY AND WIRING IS PART OF CONTRACT 'E'.
4. FURNISH AND INSTALL ALL NECESSARY CONTROL WIRING, CONDUIT, AND ACCESSORIES AS REQUIRED TO PROVIDE FULLY FUNCTIONING SYSTEMS AND SEQUENCES OF OPERATION.
5. FURNISH ALL LINTELS FOR DUCT AND PIPE PENETRATIONS IN INTERIOR MASONRY WALLS FOR INSTALLATION BY CONTRACT 'G'.
6. FURNISH ALL SLEEVES FOR PIPE AND CONDUIT FLOOR, WALL, PARTITION, AND ROOF PENETRATIONS FOR INSTALLATION BY CONTRACT 'G'.
7. FURNISH ALL CURBS FOR ALL ROOF MOUNTED EQUIPMENT AND DUCT PENETRATIONS FOR INSTALLATION BY CONTRACT 'G'.
8. REMOVE CHASE ENCLOSURE COVER WHEN PERFORMING WORK IN ANY CHASE, AND REINSTALL THE CHASE ENCLOSURE COVER WHEN WORK IS COMPLETE.
9. 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. OBTAIN THE SERVICES OF A TESTING AND BALANCING COMPANY TO PERFORM OPERATIONAL TESTS PRIOR TO THE MODIFICATION / DEMOLITION OF THE EXISTING HYDRONIC SYSTEM(S). SUBMIT REPORT TO ENGINEER FOR REVIEW/RECORD PURPOSES WITH FINDINGS INCLUDING, BUT NOT LIMITED TO, EXISTING PUMP CURVES, PRESSURE READINGS, HYDRONIC FLOW MEASUREMENTS, ENTERING WATER TEMPERATURE, LEAVING WATER TEMPERATURE, EQUIPMENT/MOTOR NAMEPLATE DATA, ETC.
3. 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 OWNER / ASSIGNED CONSTRUCTION MANAGER. 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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NY Engineering Certificate of Authorization No.: 0018178

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:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202
SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT M
MECHANICAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

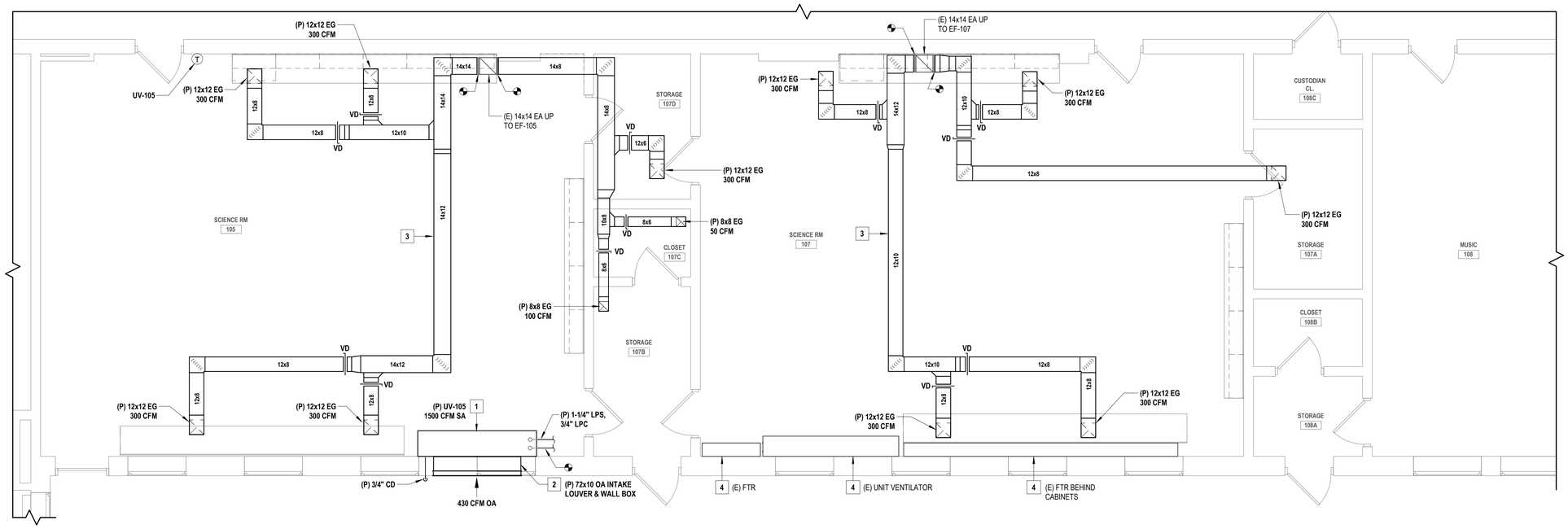
MECHANICAL
GENERAL NOTES, LEGENDS, AND ABBREVIATIONS

DRAWING No.

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1 PARTIAL FIRST FLOOR NEW WORK PLAN - SCIENCE CLASSROOMS

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

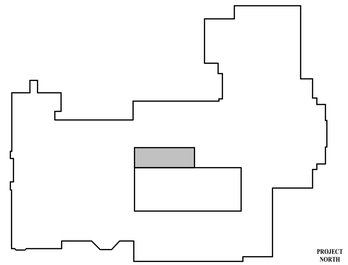
PROJECT NORTH

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 SURFACES OUTSIDE OF 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.
4. THE CONTRACTOR SHALL TAKE ALL NECESSARY MEASURES TO MAINTAIN THE ROOF WARRANTY.
5. THE CONTRACTOR SHALL TAKE CARE TO INSTALL ALL NEW ROOFTOP EQUIPMENT A MINIMUM OF 10'-0" AWAY FROM ALL ROOF EDGES.
6. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW EQUIPMENT IN ACCORDANCE WITH THE MANUFACTURER'S SERVICE AND OPERATING CLEARANCES, RECOMMENDATIONS, INSTALLATION INSTRUCTIONS, AND PREVAILING CODE.
7. THE CONTRACTOR SHALL COORDINATE ALL CEILING-MOUNTED EQUIPMENT (DIFFUSERS, GRILLES, ETC.) WITH ALL EXISTING AND NEW EQUIPMENT, INCLUDING LIGHT FIXTURES, FIRE ALARM DEVICES, AND THE CEILING GRID.
8. THE CONTRACTOR SHALL FURNISH AND INSTALL DUCT / PIPING SUPPORTS AS REQUIRED. MINIMUM EVERY 10'-0" AND CHANGE IN DIRECTION.

X MECHANICAL NEW WORK KEYNOTES

1. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW FLOOR-MOUNTED STEAM UNIT VENTILATOR WITH DX COOLING COILS FOR FUTURE CONNECTION TO CONDENSING UNIT. UNIT VENTILATOR TO BE PROVIDED WITH FULL ADAPTER BACK FOR WALL BOX / LOUVER ALIGNMENTS. PROVIDE EACH UNIT VENTILATOR WITH A REMOTE, WALL MOUNTED THERMOSTAT. FURNISH AND INSTALL ALL REQUIRED STEAM AND CONDENSATE RETURN PIPING, VALVES, FITTINGS, AND ALL REQUIRED APPURTENANCES BACK TO THE NEAREST PIPING MAINS (FIELD VERIFY PIPING CONNECTION LOCATIONS). SIZE STEAM AND CONDENSATE RETURN PIPING AS INDICATED ON THE DRAWINGS. FURNISH AND INSTALL NEW CAPPED 3/4" CONDENSATE DRAIN PIPING FOR EACH UV. COORDINATE FINAL INSTALLATION LOCATION WITH ARCHITECTURAL DRAWINGS AND EXISTING / NEW CASEWORK. INTERFACE UV WITH THE BUILDING'S EXISTING ATC/DDC SYSTEM.
2. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW WALL BOX AND OUTSIDE AIR INTAKE LOUVER FOR THE NEW UNIT VENTILATOR. SIZE WALL BOX AND LOUVER AS PER THE MANUFACTURER'S INSTRUCTIONS. LOUVER SHALL BE INSTALLED A MINIMUM OF 12" ABOVE GRADE.
3. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW EXHAUST DUCTWORK AS INDICATED ON THE DRAWINGS, INCLUDING ALL DUCT MAINS, BRANCH DUCTWORK, DUCT HANGERS AND SUPPORTS, VOLUME DAMPERS, EXHAUST GRILLES, AND ALL REQUIRED APPURTENANCES. RECONNECT TO EXISTING DUCT RISER AT THE POINTS INDICATED. COORDINATE FINAL INSTALLATION LOCATION WITH THE ARCHITECT'S REFLECTED CEILING PLANS AND EXISTING ABOVE-CEILING CONDITIONS.
4. EXISTING TO REMAIN.



KEY PLAN

SCALE: 1" = 100'-0"

PROJECT NORTH

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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:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202
SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT M
MECHANICAL CONSTRUCTION

STATUS

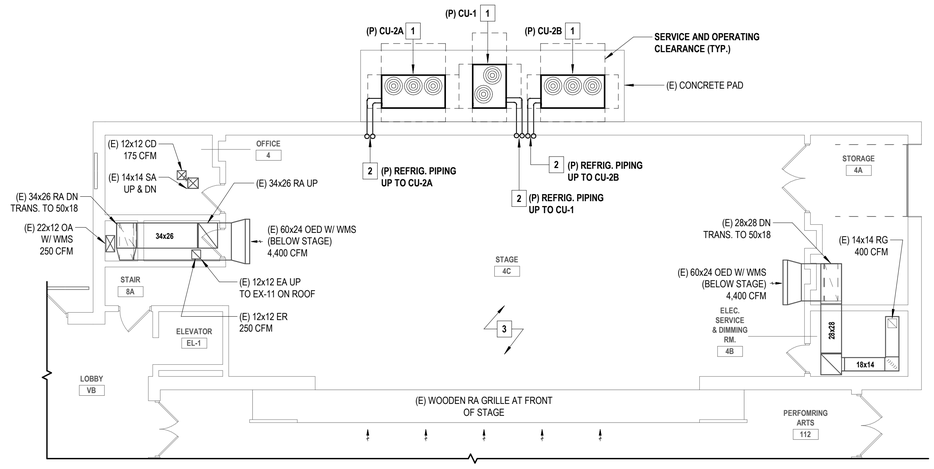
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SHEET TITLE

MECHANICAL
PARTIAL FIRST FLOOR NEW WORK PLAN

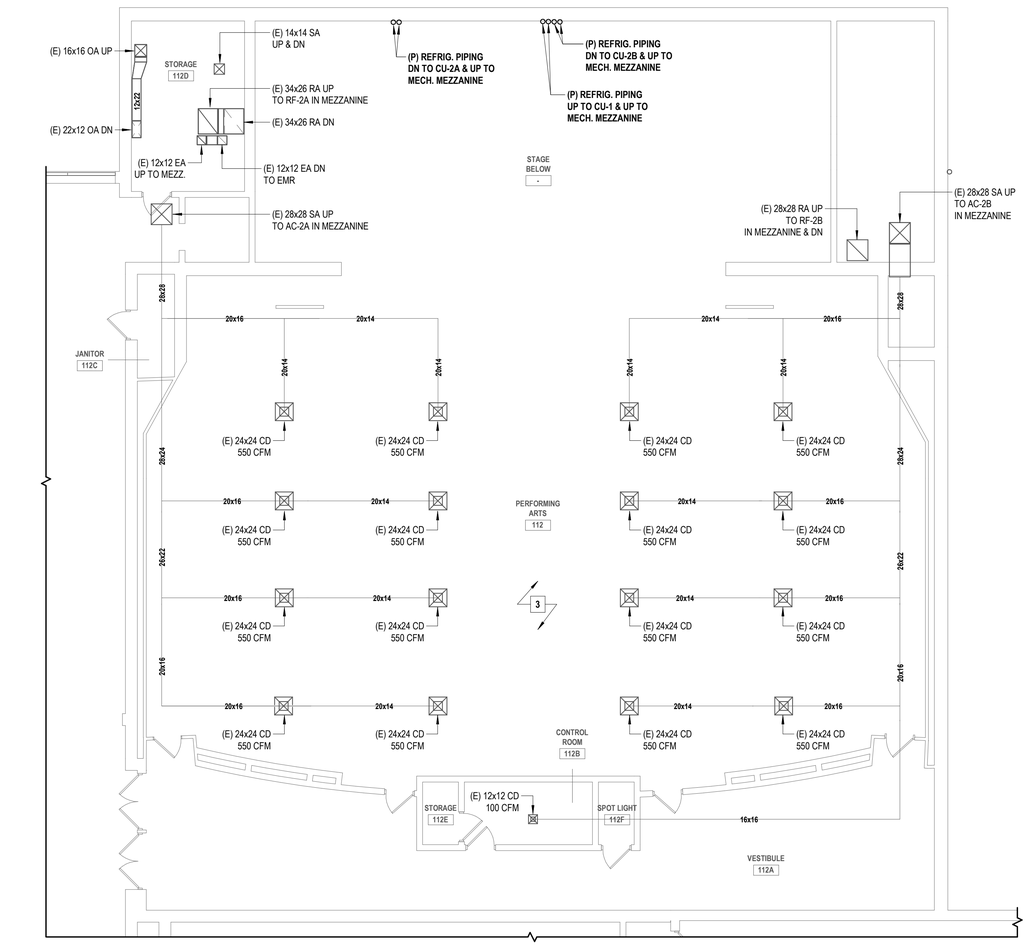
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1 PARTIAL BASEMENT NEW WORK PLAN - AUDITORIUM

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



2 PARTIAL FIRST FLOOR NEW WORK PLAN - AUDITORIUM

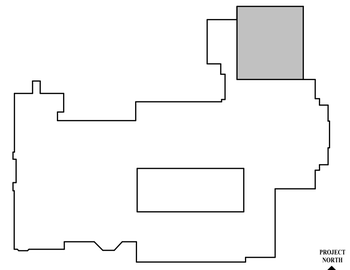
SCALE: 1/8" = 1'-0"

GENERAL NOTES

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2. THE CONTRACTOR SHALL TAKE CARE NOT TO DAMAGE ADJOINING SURFACES OUTSIDE OF 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.
4. THE CONTRACTOR SHALL TAKE ALL NECESSARY MEASURES TO MAINTAIN THE ROOF WARRANTY.
5. THE CONTRACTOR SHALL TAKE CARE TO INSTALL ALL NEW ROOFTOP EQUIPMENT A MINIMUM OF 10'-0" AWAY FROM ALL ROOF EDGES.
6. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW EQUIPMENT IN ACCORDANCE WITH THE MANUFACTURER'S SERVICE AND OPERATING CLEARANCES, RECOMMENDATIONS, INSTALLATION INSTRUCTIONS, AND PREVAILING CODE.
7. THE CONTRACTOR SHALL COORDINATE ALL CEILING-MOUNTED EQUIPMENT (DIFFUSERS, GRILLES, ETC.) WITH ALL EXISTING AND NEW EQUIPMENT, INCLUDING LIGHT FIXTURES, FIRE ALARM DEVICES, AND THE CEILING GRID.
8. THE CONTRACTOR SHALL FURNISH AND INSTALL DUCT / PIPING SUPPORTS AS REQUIRED. MINIMUM EVERY 10'-0" AND CHANGE IN DIRECTION.

X MECHANICAL NEW WORK KEYNOTES

1. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW REMOTE CONDENSING UNIT IN APPROXIMATELY THIS LOCATION. INSTALL UNITS ON EXISTING CONCRETE PAD. INTERFACE CONDENSING UNIT WITH THE BUILDING'S EXISTING ATC/DDC SYSTEM.
2. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW REFRIGERANT PIPING BETWEEN THE CONDENSING UNIT AND THE AIR HANDLING UNIT IN THE MECHANICAL MEZZANINE ABOVE THE AUDITORIUM. ROUTE PIPING UP ALONG INTERIOR WALL BEHIND THE STAGE. RE-USE EXISTING EXTERIOR WALL PIPING PENETRATIONS WHERE POSSIBLE. SIZE PIPING PER MANUFACTURER'S INSTALLATION INSTRUCTIONS AND RECOMMENDATIONS.
3. EXISTING AUDITORIUM SUPPLY AND RETURN DUCTWORK SHOWN FOR REFERENCE AND FOR BALANCING PURPOSES.



KEY PLAN

SCALE: 1" = 100'-0"

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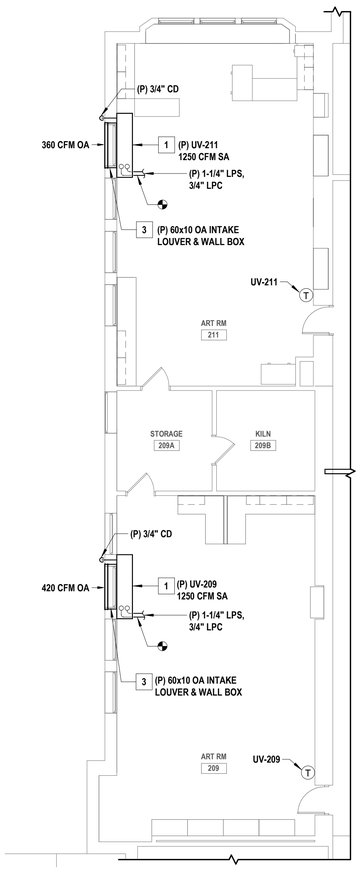
SHEET TITLE

MECHANICAL
PARTIAL FIRST FLOOR NEW WORK PLAN

DRAWING No.

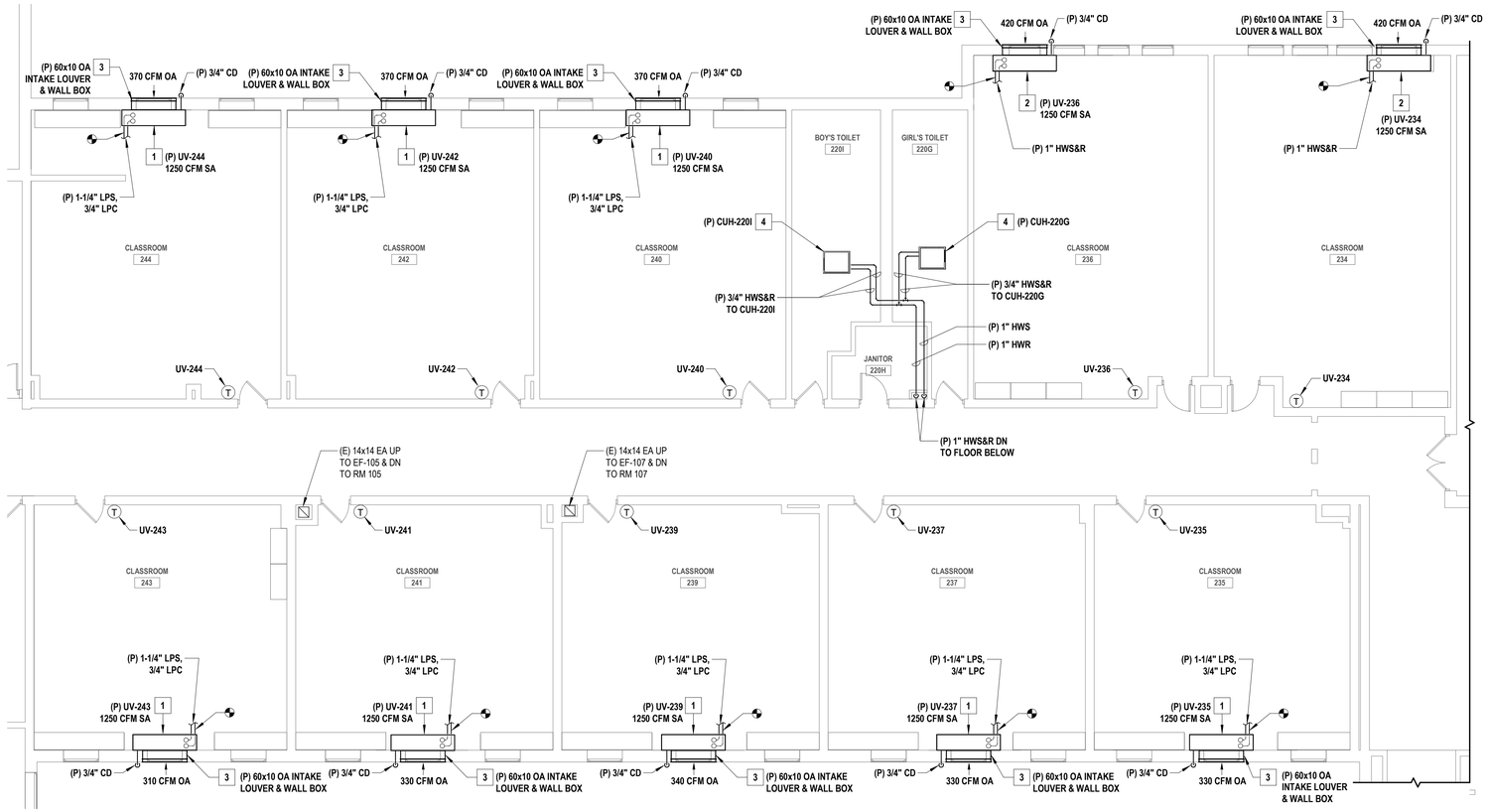
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1 PARTIAL SECOND FLOOR NEW WORK PLAN

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



2 PARTIAL SECOND FLOOR NEW WORK PLAN - CLASSROOMS

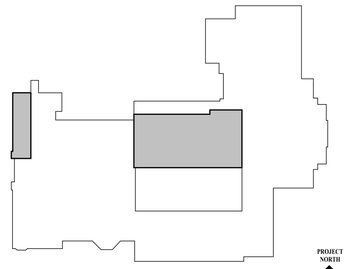
SCALE: 1/8" = 1'-0"

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5. THE CONTRACTOR SHALL TAKE CARE TO INSTALL ALL NEW ROOFTOP EQUIPMENT A MINIMUM OF 10'-0" AWAY FROM ALL ROOF EDGES.
6. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW EQUIPMENT IN ACCORDANCE WITH THE MANUFACTURER'S SERVICE AND OPERATING CLEARANCES, RECOMMENDATIONS, INSTALLATION INSTRUCTIONS, AND PREVAILING CODE.
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8. THE CONTRACTOR SHALL FURNISH AND INSTALL DUCT / PIPING SUPPORTS AS REQUIRED. MINIMUM EVERY 10'-0" AND CHANGE IN DIRECTION.

X MECHANICAL NEW WORK KEYNOTES

1. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW FLOOR-MOUNTED STEAM UNIT VENTILATOR WITH DX COOLING COILS FOR FUTURE CONNECTION TO CONDENSING UNIT. UNIT VENTILATOR TO BE PROVIDED WITH FULL ADAPTER BACK FOR WALL BOX / LOUVER ALIGNMENTS. PROVIDE EACH UNIT VENTILATOR WITH A REMOTE, WALL MOUNTED THERMOSTAT. FURNISH AND INSTALL ALL REQUIRED STEAM AND CONDENSATE RETURN PIPING, VALVES, FITTINGS, AND ALL REQUIRED APPURTENANCES BACK TO THE NEAREST PIPING MAINS (FIELD VERIFY PIPING CONNECTION LOCATIONS), SIZE STEAM AND CONDENSATE RETURN PIPING AS INDICATED ON THE DRAWINGS. FURNISH AND INSTALL NEW CAPPED 3/4" CONDENSATE DRAIN PIPING FOR EACH UV. COORDINATE FINAL INSTALLATION LOCATION WITH ARCHITECTURAL DRAWINGS AND EXISTING / NEW CASEWORK. INTERFACE UV WITH THE BUILDING'S EXISTING ATC/DDC SYSTEM.
2. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW FLOOR-MOUNTED HOT WATER UNIT VENTILATOR WITH DX COOLING COILS FOR FUTURE CONNECTION TO CONDENSING UNIT. UNIT VENTILATOR TO BE PROVIDED WITH FULL ADAPTER BACK FOR WALL BOX / LOUVER ALIGNMENTS. PROVIDE EACH UNIT VENTILATOR WITH A REMOTE, WALL MOUNTED THERMOSTAT. FURNISH AND INSTALL ALL REQUIRED HOT WATER SUPPLY AND RETURN PIPING, VALVES, FITTINGS, AND ALL REQUIRED APPURTENANCES BACK TO THE NEAREST PIPING MAINS (FIELD VERIFY PIPING CONNECTION LOCATIONS), SIZE PIPING AS INDICATED ON THE DRAWINGS. FURNISH AND INSTALL NEW CAPPED 3/4" CONDENSATE DRAIN PIPING FOR EACH UV. COORDINATE FINAL INSTALLATION LOCATION WITH ARCHITECTURAL DRAWINGS AND EXISTING / NEW CASEWORK. INTERFACE UV WITH THE BUILDING'S EXISTING ATC/DDC SYSTEM.
3. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW WALL BOX AND OUTSIDE AIR INTAKE LOUVER FOR THE NEW UNIT VENTILATOR. SIZE WALL BOX AND LOUVER AS PER THE MANUFACTURER'S INSTRUCTIONS.
4. THE CONTRACTOR SHALL FURNISH AND INSTALL A NEW CEILING-MOUNTED HOT WATER CABINET UNIT HEATER TO SERVE THE EXISTING TOILET ROOM. FURNISH AND INSTALL NEW HOT WATER SUPPLY AND RETURN PIPING AS INDICATED ON THE DRAWINGS TO CONNECT THE NEW CABINET HEATER INTO THE BUILDING'S EXISTING HOT WATER SYSTEM. SEE EQUIPMENT SCHEDULE FOR ADDITIONAL INFORMATION. INTERFACE CABINET HEATER WITH THE BUILDING'S EXISTING ATC/DDC SYSTEM.



KEY PLAN

SCALE: 1" = 100'-0"

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CONSULTANTS:

MARK	DATE	DESCRIPTION

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

05/31/2028
Exp. Date

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

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

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202
SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT M
MECHANICAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

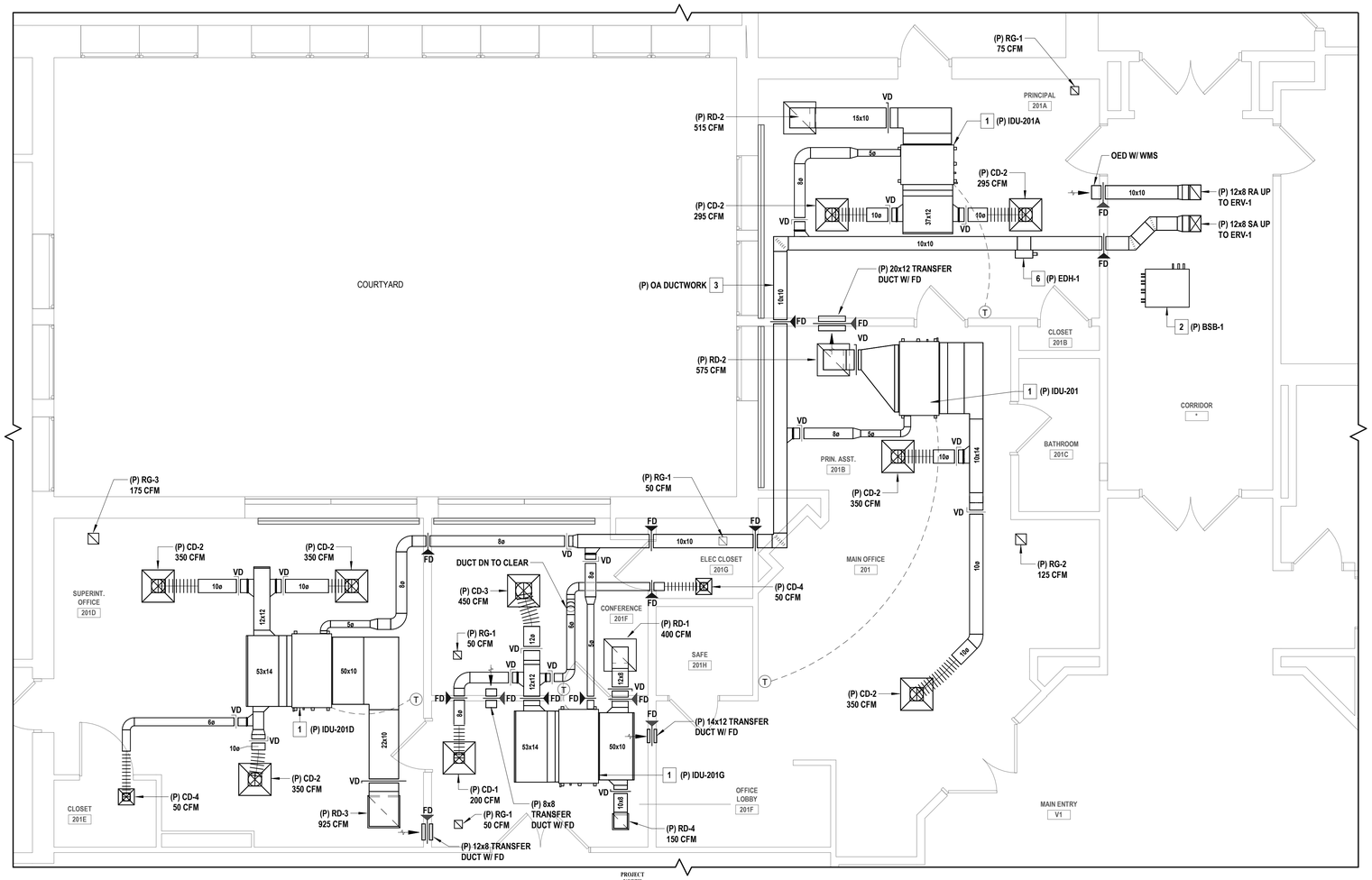
MECHANICAL
PARTIAL SECOND FLOOR NEW WORK PLAN

DRAWING No.

MS-M 112.00

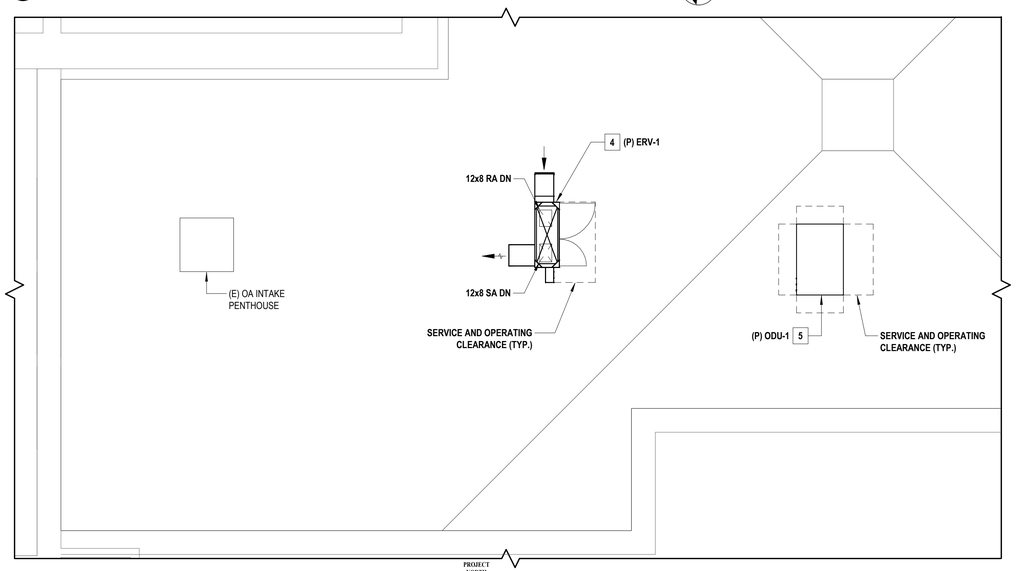
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1 PARTIAL SECOND FLOOR DUCTWORK PLAN - ADMINISTRATION OFFICES

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



2 PARTIAL ROOF NEW WORK PLAN - DUCTWORK

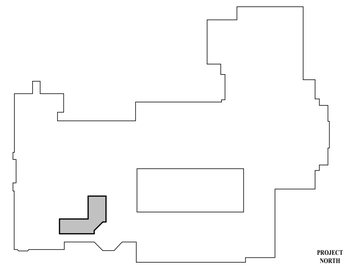
SCALE: 1/4" = 1'-0"

GENERAL NOTES

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2. THE CONTRACTOR SHALL TAKE CARE NOT TO DAMAGE ADJOINING SURFACES OUTSIDE OF 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.
4. THE CONTRACTOR SHALL TAKE ALL NECESSARY MEASURES TO MAINTAIN THE ROOF WARRANTY.
5. THE CONTRACTOR SHALL TAKE CARE TO INSTALL ALL NEW ROOFTOP EQUIPMENT A MINIMUM OF 10'-0" AWAY FROM ALL ROOF EDGES.
6. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW EQUIPMENT IN ACCORDANCE WITH THE MANUFACTURER'S SERVICE AND OPERATING CLEARANCES, RECOMMENDATIONS, INSTALLATION INSTRUCTIONS, AND PREVAILING CODE.
7. THE CONTRACTOR SHALL COORDINATE ALL CEILING-MOUNTED EQUIPMENT (DIFFUSERS, GRILLES, ETC.) WITH ALL EXISTING AND NEW EQUIPMENT, INCLUDING LIGHT FIXTURES, FIRE ALARM DEVICES, AND THE CEILING GRID.
8. THE CONTRACTOR SHALL FURNISH AND INSTALL DUCT / PIPING SUPPORTS AS REQUIRED. MINIMUM EVERY 10'-0" AND CHANGE IN DIRECTION.

X MECHANICAL NEW WORK KEYNOTES

1. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW VRF INDOOR CASSETTE IN APPROXIMATELY THIS LOCATION. PROVIDE EACH UNIT WITH A REMOTE WALL-MOUNTED THERMOSTAT. REFER TO PIPING PLANS FOR REFRIGERANT AND CONDENSATE PIPING CONNECTIONS AND ROUTING TO THE NEW VRF INDOOR CASSETTES. INTERFACE INDOOR CASSETTES WITH THE BUILDING'S EXISTING ATC/DDC SYSTEM.
2. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW BRANCH SELECTOR BOX AS PART OF THE VRF HEAT RECOVERY SYSTEM. REFER TO PIPING PLANS FOR REFRIGERANT PIPING CONNECTIONS AND ROUTING TO THE BRANCH SELECTOR BOX. INTERFACE BRANCH SELECTOR WITH THE BUILDING'S EXISTING ATC/DDC SYSTEM.
3. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW OUTSIDE AIR DUCTWORK TO SERVE THE NEW VRF HEAT RECOVERY SYSTEM. PROVIDE DUCTWORK, DUCT SUPPORTS, INSULATION, VOLUME DAMPERS, AND CEILING DIFFUSERS AS REQUIRED AND AS INDICATED ON THE DRAWINGS. CONNECT OA DUCTWORK TO THE VRF INDOOR CASSETTES AS INDICATED.
4. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW ENERGY RECOVERY VENTILATOR "ERV-1" IN APPROXIMATELY THIS LOCATION TO SERVE THE ADMINISTRATION OFFICES. INSTALL ERV ON THE MANUFACTURER'S STANDARD ROOF CURB. ENSURE INTAKES ARE A MINIMUM OF 10' FROM ANY ADJACENT EXHAUST VENTS. INTERFACE ERV WITH THE BUILDING'S EXISTING ATC/DDC SYSTEM.
5. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW VRF CONDENSING UNIT "ODU-1" IN APPROXIMATELY THIS LOCATION TO SERVE THE ADMINISTRATION OFFICES. INSTALL UNIT ON APPROVED WIND-RATED ROOFTOP EQUIPMENT SUPPORT RAILS. INTERFACE THE CONDENSING UNIT WITH THE BUILDING'S EXISTING ATC/DDC SYSTEM.
6. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW ELECTRIC DUCT HEATER IN APPROXIMATELY THE LOCATION SHOWN. INTERLOCK DUCT HEATER WITH "ERV-1". INTERFACE THE DUCT HEATER WITH THE BUILDING'S EXISTING ATC/DDC SYSTEM.



KEY PLAN

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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:
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CLIENT

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250 US-202
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CONTRACT

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MECHANICAL CONSTRUCTION

STATUS

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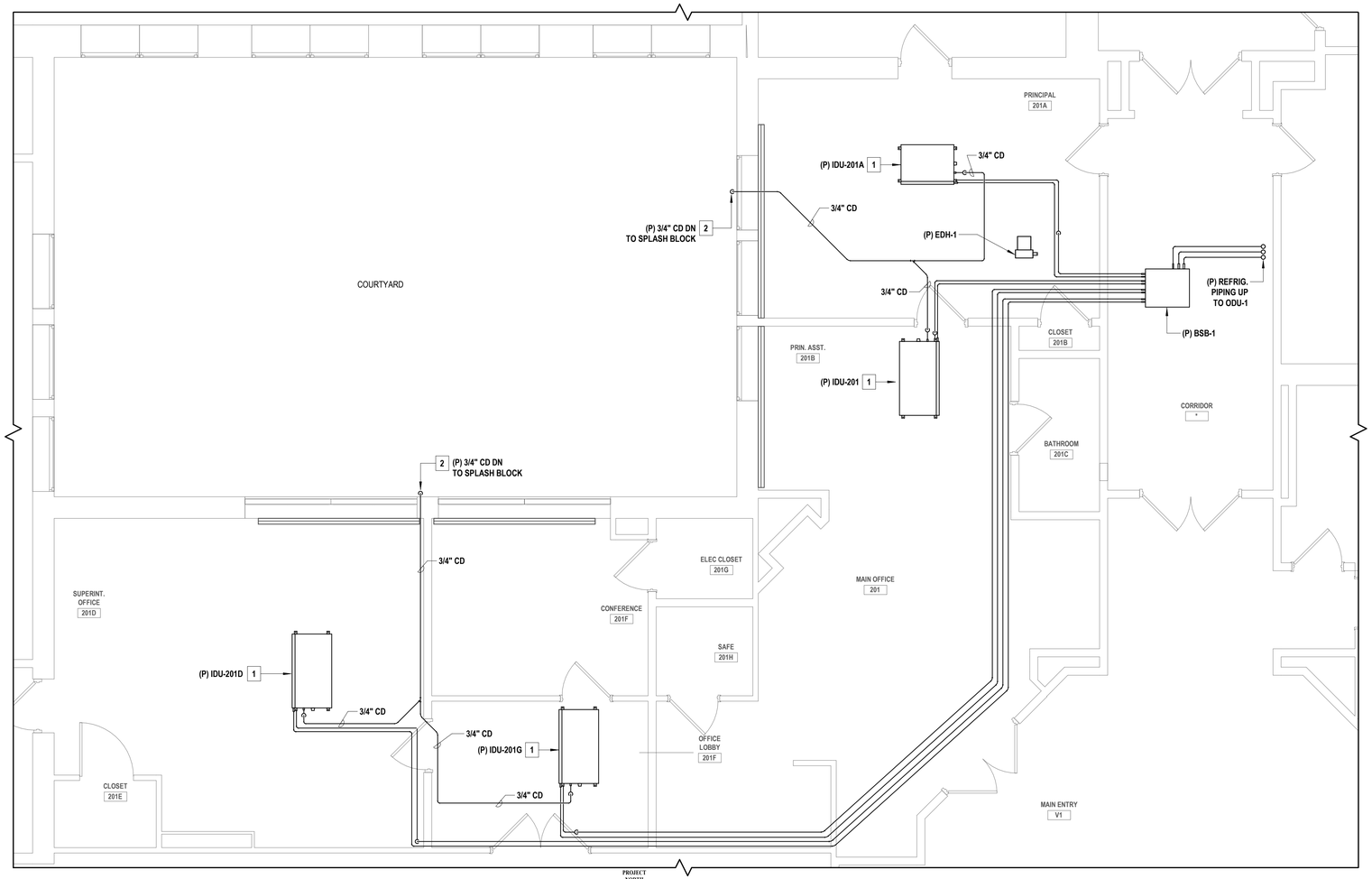
MECHANICAL
PARTIAL SECOND FLOOR NEW WORK PLAN

DRAWING No.

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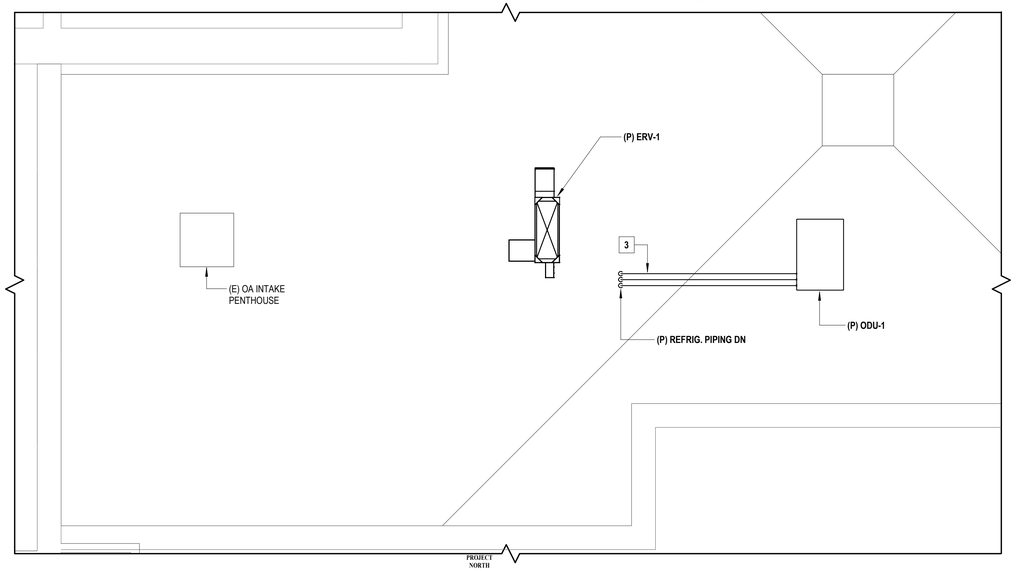
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1 PARTIAL SECOND FLOOR PIPING PLAN - ADMINISTRATION OFFICES

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



2 PARTIAL ROOF NEW WORK PLAN - PIPING

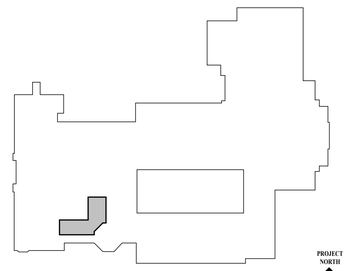
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2. THE CONTRACTOR SHALL TAKE CARE NOT TO DAMAGE ADJOINING SURFACES OUTSIDE OF THE CONTRACT AREA OR SCOPE OF WORK. THE CONTRACTOR SHALL BE RESPONSIBLE TO RESTORE EXISTING CONDITIONS AND/OR FINISHES DAMAGED DURING CONSTRUCTION, INCLUDING PATCHING AND 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.
4. THE CONTRACTOR SHALL TAKE ALL NECESSARY MEASURES TO MAINTAIN THE ROOF WARRANTY.
5. THE CONTRACTOR SHALL TAKE CARE TO INSTALL ALL NEW ROOFTOP EQUIPMENT A MINIMUM OF 10'-0" AWAY FROM ALL ROOF EDGES.
6. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW EQUIPMENT IN ACCORDANCE WITH THE MANUFACTURER'S SERVICE AND OPERATING CLEARANCES, RECOMMENDATIONS, INSTALLATION INSTRUCTIONS, AND PREVAILING CODE.
7. THE CONTRACTOR SHALL COORDINATE ALL CEILING-MOUNTED EQUIPMENT (DIFFUSERS, GRILLES, ETC.) WITH ALL EXISTING AND NEW EQUIPMENT, INCLUDING LIGHT FIXTURES, FIRE ALARM DEVICES, AND THE CEILING GRID.
8. THE CONTRACTOR SHALL FURNISH AND INSTALL DUCT / PIPING SUPPORTS AS REQUIRED. MINIMUM EVERY 10'-0" AND CHANGE IN DIRECTION.

X MECHANICAL NEW WORK KEYNOTES

1. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW VRF INDOOR CASSETTE IN APPROXIMATELY THIS LOCATION. ROUTE REFRIGERANT PIPING AS INDICATED ON THE DRAWINGS. SIZE PIPING AS PER THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND RECOMMENDATIONS. FIELD-COORDINATE FINAL PIPE ROUTING WITH THE DUCTWORK SHOWN ON THE DUCTWORK DRAWINGS.
2. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW CONDENSATE DRAIN PIPING TO SERVE THE NEW VRF INDOOR CASSETTES. SIZE PIPING AS INDICATED ON THE DRAWINGS. CONDENSATE PIPING SHALL DISCHARGE TO A NEW PRE-CAST SPLASH BLOCK IN COURTYARD AREA. PROVIDE CONDENSATE DRAIN PIPING CLEAN-OUTS AT EVERY CHANGE IN DIRECTION.
3. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW REFRIGERANT PIPING, VALVES, INSULATION AND RELATED APPURTENANCES TO SERVE "ODU-1" AND THE NEW VRF HEAT RECOVERY SYSTEM. PROVIDE ROOFTOP PIPING SUPPORTS MINIMUM EVERY 10 FEET AND CHANGE IN DIRECTION. THE CONTRACTOR SHALL PROVIDE PIPE PORTAL / PIPE CURB ASSEMBLY (MANUFACTURED BY PATE, SIGRIST, OR APPROVED EQUAL). INSTALL AS PER THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.



KEY PLAN

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CONSULTANTS:

MARK	DATE	DESCRIPTION

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

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:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202
SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT M
MECHANICAL CONSTRUCTION

STATUS

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SHEET TITLE

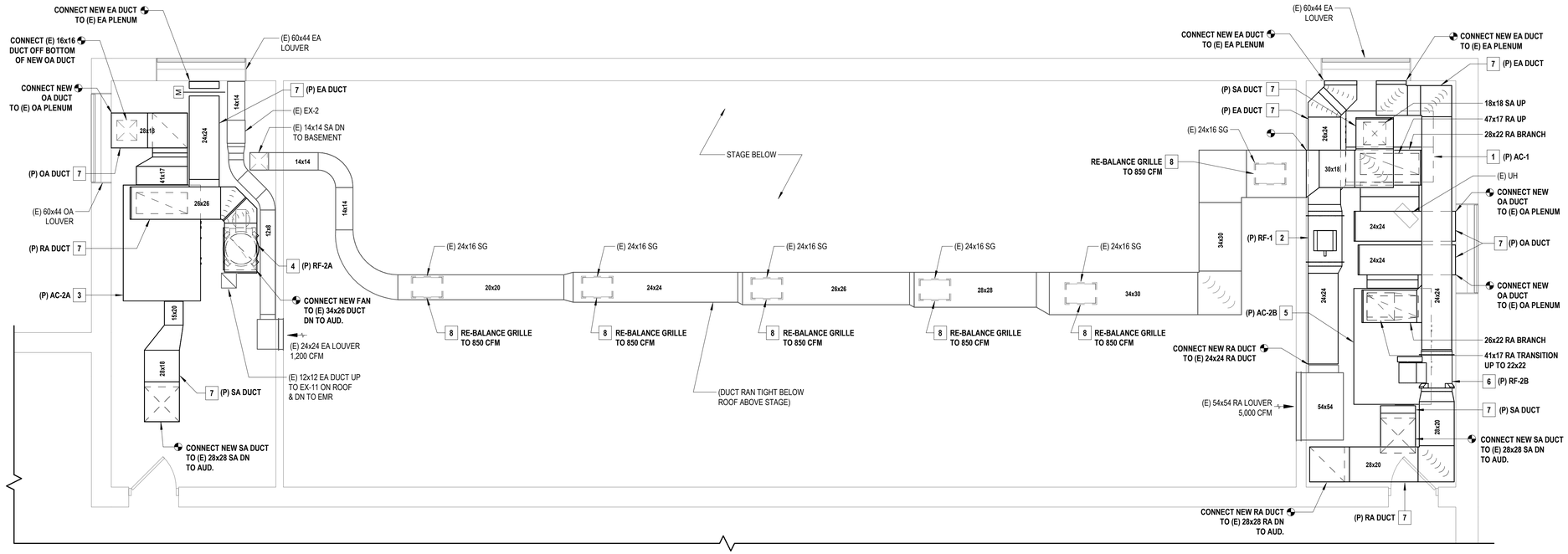
MECHANICAL
PARTIAL SECOND FLOOR NEW WORK PLAN

DRAWING No.

MS-M 114.00

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1 PARTIAL SECOND FLOOR DUCTWORK NEW WORK PLAN - AUDITORIUM MECHANICAL MEZZANINE

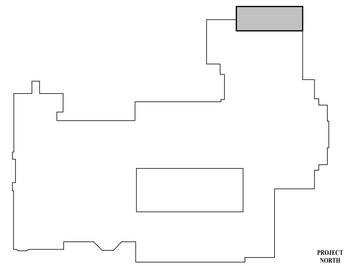
SCALE: 1/4" = 1'-0"

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2. THE CONTRACTOR SHALL TAKE CARE NOT TO DAMAGE ADJOINING SURFACES OUTSIDE OF 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.
4. THE CONTRACTOR SHALL TAKE ALL NECESSARY MEASURES TO MAINTAIN THE ROOF WARRANTY.
5. THE CONTRACTOR SHALL TAKE CARE TO INSTALL ALL NEW ROOFTOP EQUIPMENT A MINIMUM OF 10'-0" AWAY FROM ALL ROOF EDGES.
6. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW EQUIPMENT IN ACCORDANCE WITH THE MANUFACTURER'S SERVICE AND OPERATING CLEARANCES, RECOMMENDATIONS, INSTALLATION INSTRUCTIONS, AND PREVAILING CODE.
7. THE CONTRACTOR SHALL COORDINATE ALL CEILING-MOUNTED EQUIPMENT (DIFFUSERS, GRILLES, ETC.) WITH ALL EXISTING AND NEW EQUIPMENT, INCLUDING LIGHT FIXTURES, FIRE ALARM DEVICES, AND THE CEILING GRID.
8. THE CONTRACTOR SHALL FURNISH AND INSTALL DUCT / PIPING SUPPORTS AS REQUIRED. MINIMUM EVERY 10'-0" AND CHANGE IN DIRECTION.

X MECHANICAL NEW WORK KEYNOTES

1. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW REPLACEMENT INDOOR AIR HANDLING UNIT "AC-1" IN APPROXIMATELY THIS LOCATION. FURNISH AND INSTALL UNIT ON APPROVED SPRING VIBRATION ISOLATORS. THE CONTRACTOR SHALL FIELD-DISASSEMBLE UNIT SECTIONS AS REQUIRED IN ORDER TO FIT THROUGH THE EXISTING 36" WIDE DOOR, AND RE-ASSEMBLE THE SECTION IN THE MECHANICAL ROOM. INTERFACE THE NEW AIR HANDLING UNIT WITH THE BUILDING'S EXISTING ATC/DDC SYSTEM.
2. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW REPLACEMENT RETURN-EXHAUST FAN "RF-1" IN APPROXIMATELY THIS LOCATION. FAN SHALL BE MOUNTED VERTICALLY IN THE DUCTWORK. INSTALL UNIT WITH APPROVED SPRING VIBRATION ISOLATORS / EQUIPMENT HANGERS. INTERFACE THE FAN WITH THE BUILDING'S EXISTING ATC/DDC SYSTEM.
3. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW REPLACEMENT INDOOR AIR HANDLING UNIT "AC-2A" IN APPROXIMATELY THIS LOCATION. FURNISH AND INSTALL UNIT ON APPROVED SPRING VIBRATION ISOLATORS. THE CONTRACTOR SHALL FIELD-DISASSEMBLE UNIT SECTIONS AS REQUIRED IN ORDER TO FIT THROUGH THE EXISTING 36" WIDE DOOR, AND RE-ASSEMBLE THE SECTION IN THE MECHANICAL ROOM. INTERFACE THE NEW AIR HANDLING UNIT WITH THE BUILDING'S EXISTING ATC/DDC SYSTEM.
4. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW REPLACEMENT RETURN-EXHAUST FAN "RF-2A" IN APPROXIMATELY THIS LOCATION. INSTALL UNIT WITH APPROVED SPRING VIBRATION ISOLATORS / EQUIPMENT HANGERS. INTERFACE THE FAN WITH THE BUILDING'S EXISTING ATC/DDC SYSTEM.
5. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW REPLACEMENT INDOOR AIR HANDLING UNIT "AC-2B" IN APPROXIMATELY THIS LOCATION. FURNISH AND INSTALL UNIT ON APPROVED SPRING VIBRATION ISOLATORS. THE CONTRACTOR SHALL FIELD-DISASSEMBLE UNIT SECTIONS AS REQUIRED IN ORDER TO FIT THROUGH THE EXISTING 36" WIDE DOOR, AND RE-ASSEMBLE THE SECTION IN THE MECHANICAL ROOM. INTERFACE THE NEW AIR HANDLING UNIT WITH THE BUILDING'S EXISTING ATC/DDC SYSTEM.
6. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW REPLACEMENT RETURN-EXHAUST FAN "RF-2B" IN APPROXIMATELY THIS LOCATION. INSTALL UNIT WITH APPROVED SPRING VIBRATION ISOLATORS / EQUIPMENT HANGERS. INTERFACE THE FAN WITH THE BUILDING'S EXISTING ATC/DDC SYSTEM.
7. THE CONTRACTOR SHALL FURNISH AND INSTALL ALL REQUIRED SUPPLY, RETURN, EXHAUST, AND OUTSIDE AIR DUCTWORK, DUCT SUPPORTS, INSULATION, AND RELATED APPURTENANCES. SIZE DUCTWORK AS INDICATED ON THE DRAWINGS.
8. RE-BALANCE EXISTING SUPPLY GRILLES TO MATCH THE AIRFLOW SHOWN ON THE DRAWINGS.



KEY PLAN

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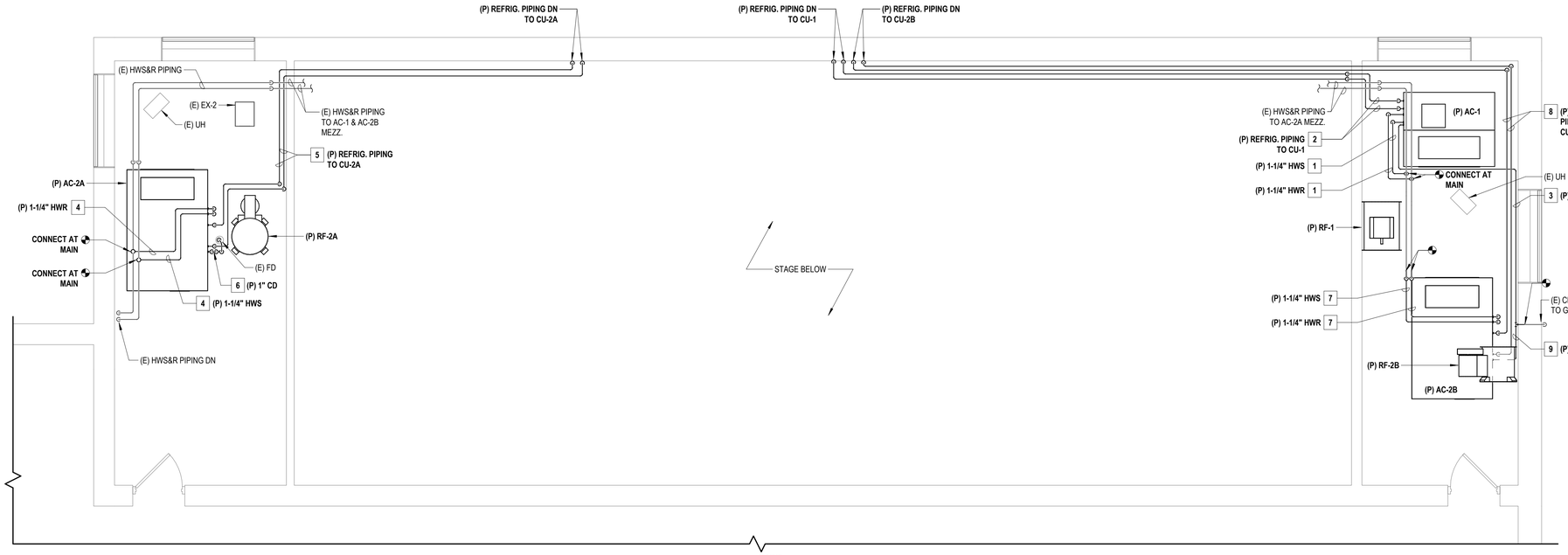
MECHANICAL PARTIAL SECOND FLOOR NEW WORK PLAN

DRAWING No.

MS-M 115.00

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1 PARTIAL SECOND FLOOR PIPING NEW WORK PLAN - AUDITORIUM MECHANICAL MEZZANINE

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

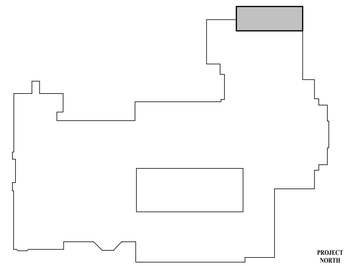
PROJECT NORTH

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4. THE CONTRACTOR SHALL TAKE ALL NECESSARY MEASURES TO MAINTAIN THE ROOF WARRANTY.
5. THE CONTRACTOR SHALL TAKE CARE TO INSTALL ALL NEW ROOFTOP EQUIPMENT A MINIMUM OF 10'-0" AWAY FROM ALL ROOF EDGES.
6. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW EQUIPMENT IN ACCORDANCE WITH THE MANUFACTURER'S SERVICE AND OPERATING CLEARANCES, RECOMMENDATIONS, INSTALLATION INSTRUCTIONS, AND PREVAILING CODE.
7. THE CONTRACTOR SHALL COORDINATE ALL CEILING-MOUNTED EQUIPMENT (DIFFUSERS, GRILLES, ETC.) WITH ALL EXISTING AND NEW EQUIPMENT, INCLUDING LIGHT FIXTURES, FIRE ALARM DEVICES, AND THE CEILING GRID.
8. THE CONTRACTOR SHALL FURNISH AND INSTALL DUCT / PIPING SUPPORTS AS REQUIRED. MINIMUM EVERY 10'-0" AND CHANGE IN DIRECTION.

X MECHANICAL NEW WORK KEYNOTES

1. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW HOT WATER SUPPLY AND RETURN PIPING, VALVES, INSULATION, PIPE HANGERS AND SUPPORTS, AND RELATED APPURTENANCES TO SERVE "AC-1". SIZE PIPING AS INDICATED ON THE DRAWINGS.
2. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW REFRIGERANT PIPING FROM "AC-1" TO NEW CONDENSING UNIT "CU-1". SIZE PIPING AS PER THE MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS. FIELD COORDINATE FINAL ROUTING OF PIPING FROM MECHANICAL MEZZANINE DOWN TO CONDENSING UNIT ON GRADE.
3. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW CONDENSATE DRAIN PIPING, INSULATION, AND PIPE SUPPORTS TO SERVE "AC-1". RE-CONNECT TO EXISTING CONDENSATE DRAIN PIPING AS INDICATED.
4. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW HOT WATER SUPPLY AND RETURN PIPING, VALVES, INSULATION, PIPE HANGERS AND SUPPORTS, AND RELATED APPURTENANCES TO SERVE "AC-2A". SIZE PIPING AS INDICATED ON THE DRAWINGS.
5. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW REFRIGERANT PIPING FROM "AC-2A" TO NEW CONDENSING UNIT "CU-2A". SIZE PIPING AS PER THE MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS. FIELD COORDINATE FINAL ROUTING OF PIPING FROM MECHANICAL MEZZANINE DOWN TO CONDENSING UNIT ON GRADE.
6. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW CONDENSATE DRAIN PIPING, INSULATION, AND PIPE SUPPORTS TO SERVE "AC-2A". CONDENSATE SHALL DISCHARGE TO ADJACENT EXISTING FLOOR DRAIN AS INDICATED.
7. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW HOT WATER SUPPLY AND RETURN PIPING, VALVES, INSULATION, PIPE HANGERS AND SUPPORTS, AND RELATED APPURTENANCES TO SERVE "AC-2B". SIZE PIPING AS INDICATED ON THE DRAWINGS.
8. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW REFRIGERANT PIPING FROM "AC-2B" TO NEW CONDENSING UNIT "CU-2B". SIZE PIPING AS PER THE MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS. FIELD COORDINATE FINAL ROUTING OF PIPING FROM MECHANICAL MEZZANINE DOWN TO CONDENSING UNIT ON GRADE.
9. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW CONDENSATE DRAIN PIPING, INSULATION, AND PIPE SUPPORTS TO SERVE "AC-2B". RE-CONNECT TO EXISTING CONDENSATE DRAIN PIPING AS INDICATED.



KEY PLAN

SCALE: 1" = 100'-0"

PROJECT NORTH

H2M architects + engineers
1133 Westchester Avenue, Suite N-210
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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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DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
W. MAGIERA	W. MAGIERA	K. WEILER	C. MORRIS

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202
SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT M MECHANICAL CONSTRUCTION

STATUS

SED SUBMISSION

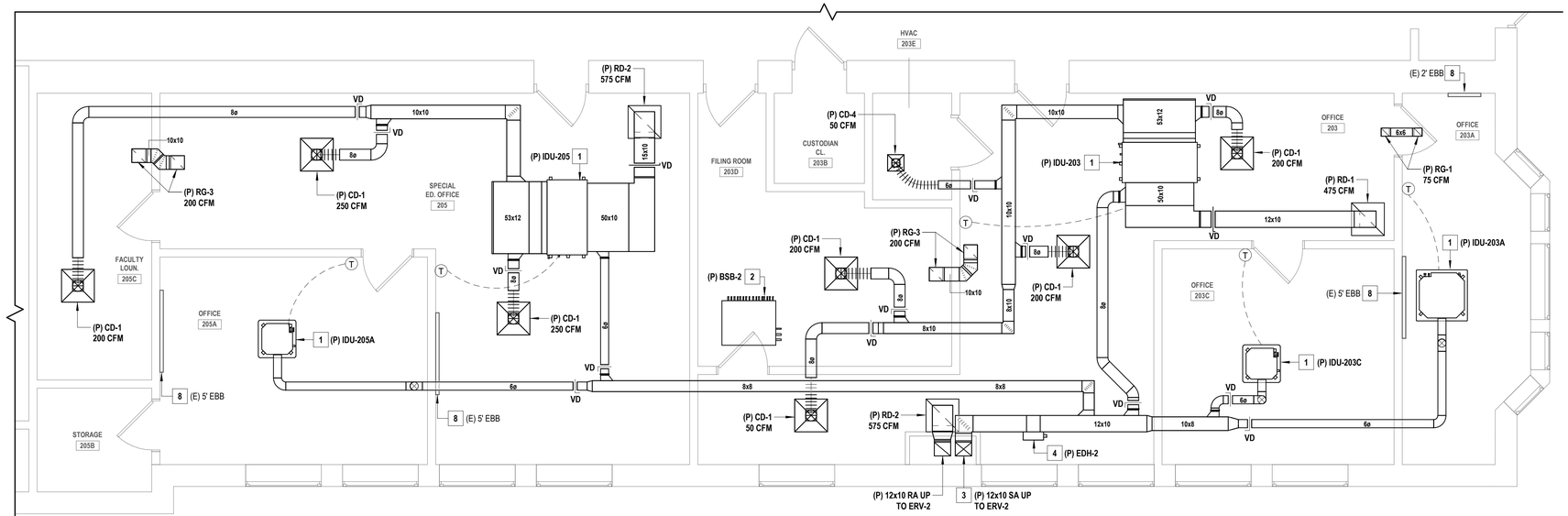
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MECHANICAL PARTIAL SECOND FLOOR NEW WORK PLAN

DRAWING No.

MS-M 116.00

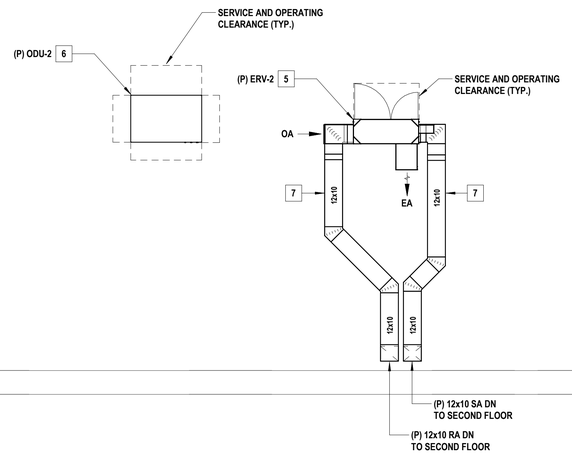
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1 PARTIAL SECOND FLOOR DUCTWORK PLAN - SPECIAL EDUCATION OFFICES

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

PROJECT NORTH



2 PARTIAL ROOF DUCTWORK PLAN - SPECIAL EDUCATION OFFICES

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

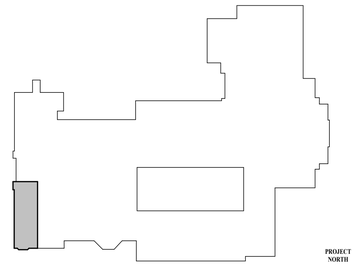
PROJECT NORTH

GENERAL NOTES

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2. THE CONTRACTOR SHALL TAKE CARE NOT TO DAMAGE ADJOINING SURFACES OUTSIDE OF 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.
4. THE CONTRACTOR SHALL TAKE ALL NECESSARY MEASURES TO MAINTAIN THE ROOF WARRANTY.
5. THE CONTRACTOR SHALL TAKE CARE TO INSTALL ALL NEW ROOFTOP EQUIPMENT A MINIMUM OF 10'-0" AWAY FROM ALL ROOF EDGES.
6. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW EQUIPMENT IN ACCORDANCE WITH THE MANUFACTURER'S SERVICE AND OPERATING CLEARANCES, RECOMMENDATIONS, INSTALLATION INSTRUCTIONS, AND PREVAILING CODE.
7. THE CONTRACTOR SHALL COORDINATE ALL CEILING-MOUNTED EQUIPMENT (DIFFUSERS, GRILLES, ETC.) WITH ALL EXISTING AND NEW EQUIPMENT, INCLUDING LIGHT FIXTURES, FIRE ALARM DEVICES, AND THE CEILING GRID.
8. THE CONTRACTOR SHALL FURNISH AND INSTALL DUCT / PIPING SUPPORTS AS REQUIRED. MINIMUM EVERY 10'-0" AND CHANGE IN DIRECTION.

X MECHANICAL NEW WORK KEYNOTES

1. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW VRF INDOOR CASSETTE IN APPROXIMATELY THIS LOCATION. PROVIDE EACH UNIT WITH A REMOTE WALL-MOUNTED THERMOSTAT. REFER TO PIPING PLANS FOR REFRIGERANT AND CONDENSATE PIPING CONNECTIONS AND ROUTING TO THE NEW VRF INDOOR CASSETTES. INTERFACE THE INDOOR CASSETTES WITH THE BUILDING'S EXISTING ATC/DDC SYSTEM.
2. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW BRANCH SELECTOR BOX AS PART OF THE VRF HEAT RECOVERY SYSTEM. REFER TO PIPING PLANS FOR REFRIGERANT PIPING CONNECTIONS AND ROUTING TO THE BRANCH SELECTOR BOX. INTERFACE THE BRANCH SELECTOR WITH THE BUILDING'S EXISTING ATC/DDC SYSTEM.
3. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW OUTSIDE AIR DUCTWORK TO SERVE THE NEW VRF HEAT RECOVERY SYSTEM. PROVIDE DUCTWORK, DUCT SUPPORTS, INSULATION, VOLUME DAMPERS, AND CEILING DIFFUSERS AS REQUIRED AND AS INDICATED ON THE DRAWINGS. CONNECT OA DUCTWORK TO THE VRF INDOOR CASSETTES AS INDICATED.
4. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW ELECTRIC DUCT HEATER IN APPROXIMATELY THE LOCATION SHOWN. INTERLOCK DUCT HEATER WITH "ERV-2", INTERFACE THE DUCT HEATER WITH THE BUILDING'S EXISTING ATC/DDC SYSTEM.
5. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW ENERGY RECOVERY VENTILATOR "ERV-2" IN APPROXIMATELY THIS LOCATION TO SERVE THE ADMINISTRATION OFFICES. INSTALL ERV ON THE MANUFACTURER'S STANDARD ROOF CURB. ENSURE INTAKES ARE A MINIMUM OF 10' FROM ANY ADJACENT EXHAUST VENTS. INTERFACE THE ERV WITH THE BUILDING'S EXISTING ATC/DDC SYSTEM.
6. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW VRF CONDENSING UNIT "ODU-2" IN APPROXIMATELY THIS LOCATION TO SERVE THE ADMINISTRATION OFFICES. INSTALL UNIT ON APPROVED WIND-RATED ROOFTOP EQUIPMENT SUPPORT RAILS. INTERFACE THE CONDENSING UNIT WITH THE BUILDING'S EXISTING ATC/DDC SYSTEM.
7. THE CONTRACTOR SHALL NEW SUPPLY AND RETURN DUCTWORK TO SERVE THE NEW ENERGY RECOVERY VENTILATOR. DUCTWORK SHALL BE RAN ALONG THE ROOF AS INDICATED. PROVIDE ROOF DUCT SUPPORTS MINIMUM EVERY 10 FEET AND CHANGE IN DIRECTION.
8. EXISTING TO REMAIN.



KEY PLAN

SCALE: 1" = 100'-0"

PROJECT NORTH

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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:
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CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202
SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT M
MECHANICAL CONSTRUCTION

STATUS

SED SUBMISSION

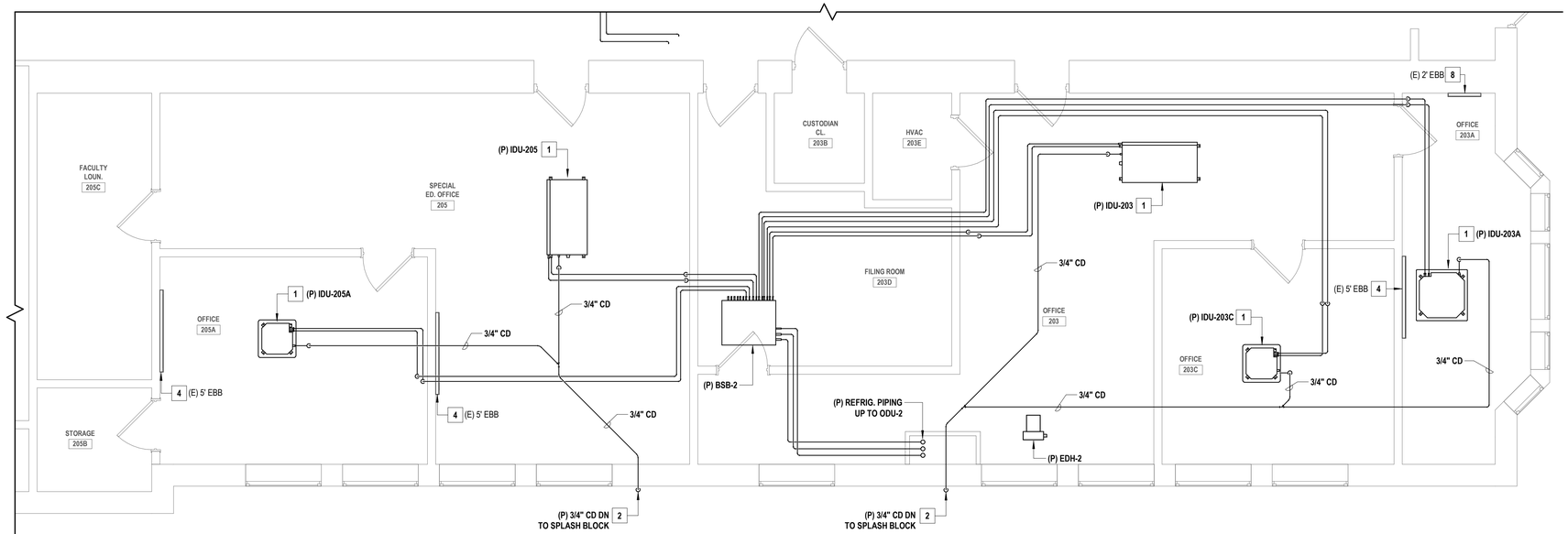
SHEET TITLE

MECHANICAL
PARTIAL SECOND FLOOR AND ROOF NEW WORK PLANS

DRAWING No.

MS-M 117.00

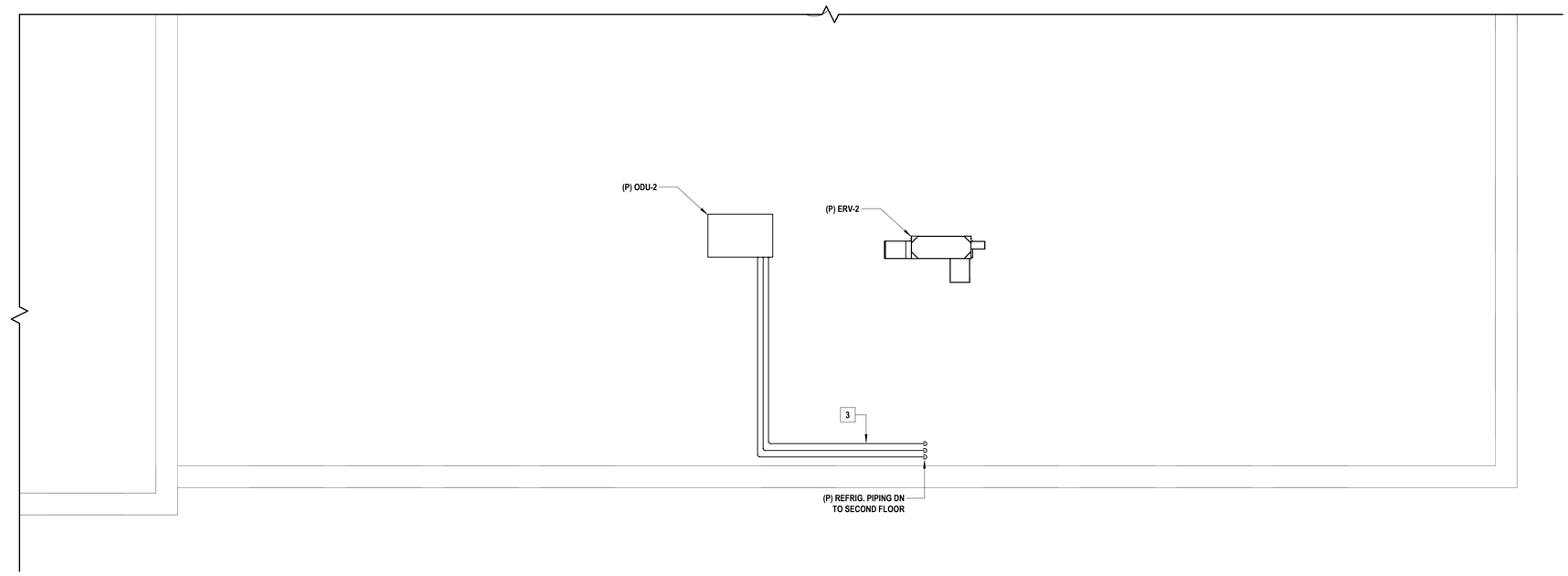
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1 PARTIAL SECOND FLOOR PIPING PLAN - SPECIAL EDUCATION OFFICES

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

PROJECT NORTH



2 PARTIAL ROOF PIPING PLAN - SPECIAL EDUCATION OFFICES

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

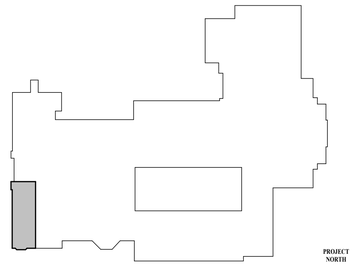
PROJECT NORTH

GENERAL NOTES

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4. THE CONTRACTOR SHALL TAKE ALL NECESSARY MEASURES TO MAINTAIN THE ROOF WARRANTY.
5. THE CONTRACTOR SHALL TAKE CARE TO INSTALL ALL NEW ROOFTOP EQUIPMENT A MINIMUM OF 10'-0" AWAY FROM ALL ROOF EDGES.
6. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW EQUIPMENT IN ACCORDANCE WITH THE MANUFACTURER'S SERVICE AND OPERATING CLEARANCES, RECOMMENDATIONS, INSTALLATION INSTRUCTIONS, AND PREVAILING CODE.
7. THE CONTRACTOR SHALL COORDINATE ALL CEILING-MOUNTED EQUIPMENT (DIFFUSERS, GRILLES, ETC.) WITH ALL EXISTING AND NEW EQUIPMENT, INCLUDING LIGHT FIXTURES, FIRE ALARM DEVICES, AND THE CEILING GRID.
8. THE CONTRACTOR SHALL FURNISH AND INSTALL DUCT / PIPING SUPPORTS AS REQUIRED. MINIMUM EVERY 10'-0" AND CHANGE IN DIRECTION.

X MECHANICAL NEW WORK KEYNOTES

1. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW VRF INDOOR CASSETTE IN APPROXIMATELY THIS LOCATION. ROUTE REFRIGERANT PIPING AS INDICATED ON THE DRAWINGS. SIZE PIPING AS PER THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND RECOMMENDATIONS. FIELD-COORDINATE FINAL PIPE ROUTING WITH THE DUCTWORK SHOWN ON THE DUCTWORK DRAWINGS.
2. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW CONDENSATE DRAIN PIPING TO SERVE THE NEW VRF INDOOR CASSETTES. SIZE PIPING AS INDICATED ON THE DRAWINGS. CONDENSATE PIPING SHALL DISCHARGE TO A NEW PRE-CAST SPLASH BLOCK IN COURTYARD AREA. PROVIDE CONDENSATE DRAIN PIPING CLEAN-OUTS AT EVERY CHANGE IN DIRECTION.
3. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW REFRIGERANT PIPING, VALVES, INSULATION AND RELATED APPURTENANCES TO SERVE "ODU-1" AND THE NEW VRF HEAT RECOVERY SYSTEM. PROVIDE ROOFTOP PIPING SUPPORTS MINIMUM EVERY 10 FEET AND CHANGE IN DIRECTION. THE CONTRACTOR SHALL PROVIDE PIPE PORTAL / PIPE CURB ASSEMBLY (MANUFACTURED BY PATE, SIGRIST, OR APPROVED EQUAL). INSTALL AS PER THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.
4. EXISTING TO REMAIN.



KEY PLAN

SCALE: 1" = 100'-0"

PROJECT NORTH

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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:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202
SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT M
MECHANICAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

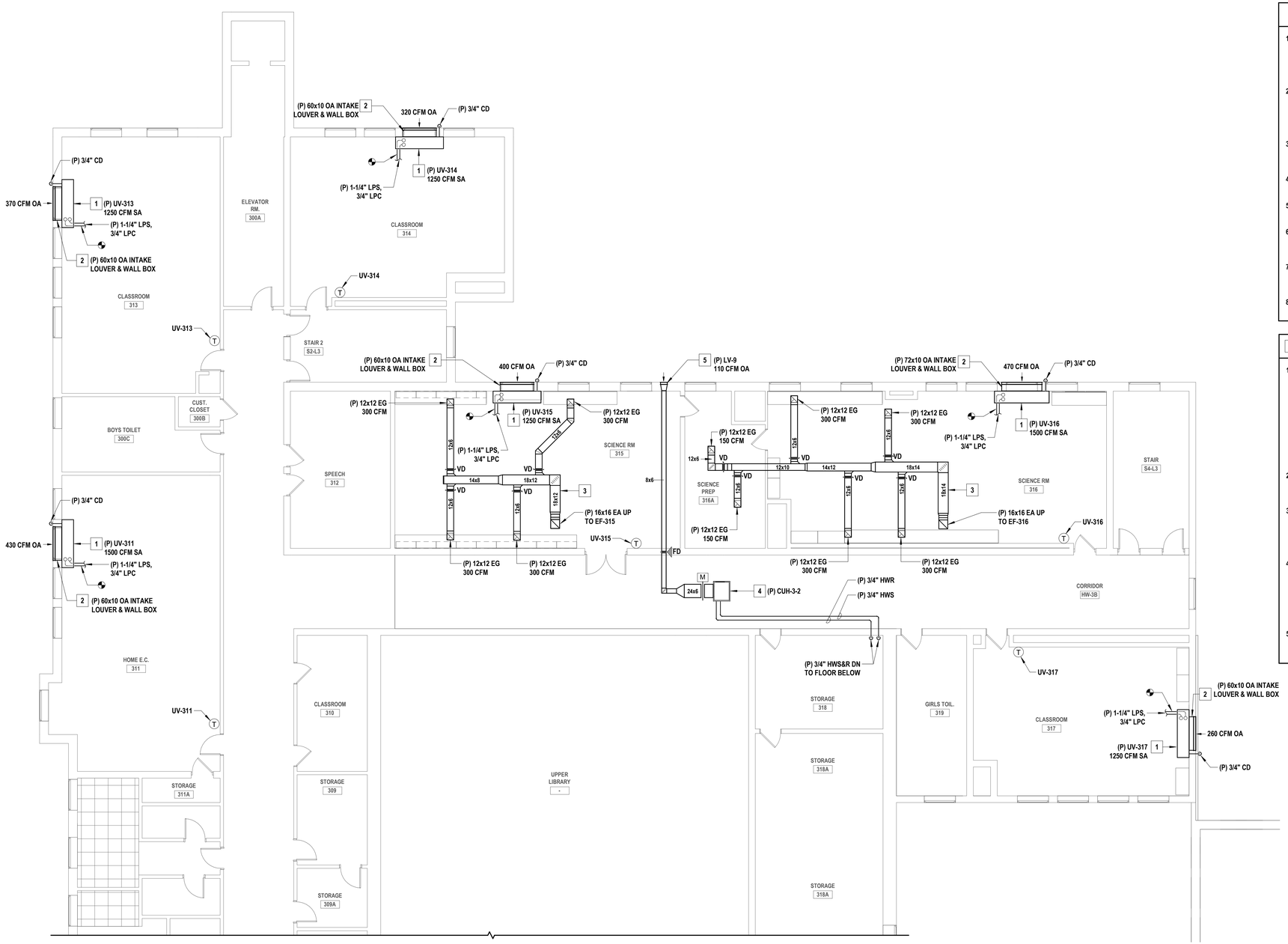
MECHANICAL
PARTIAL SECOND FLOOR AND ROOF NEW WORK PLANS

DRAWING No.

MS-M 118.00

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1 PARTIAL THIRD FLOOR NEW WORK PLAN - CLASSROOMS

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

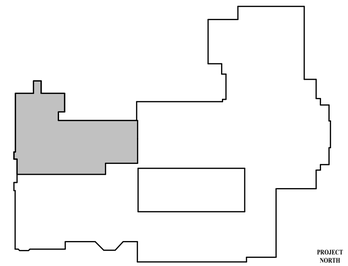
PROJECT NORTH

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2. THE CONTRACTOR SHALL TAKE CARE NOT TO DAMAGE ADJOINING SURFACES OUTSIDE OF 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.
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4. THE CONTRACTOR SHALL TAKE ALL NECESSARY MEASURES TO MAINTAIN THE ROOF WARRANTY.
5. THE CONTRACTOR SHALL TAKE CARE TO INSTALL ALL NEW ROOFTOP EQUIPMENT A MINIMUM OF 10'-0" AWAY FROM ALL ROOF EDGES.
6. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW EQUIPMENT IN ACCORDANCE WITH THE MANUFACTURER'S SERVICE AND OPERATING CLEARANCES, RECOMMENDATIONS, INSTALLATION INSTRUCTIONS, AND PREVAILING CODE.
7. THE CONTRACTOR SHALL COORDINATE ALL CEILING-MOUNTED EQUIPMENT (DIFFUSERS, GRILLES, ETC.) WITH ALL EXISTING AND NEW EQUIPMENT, INCLUDING LIGHT FIXTURES, FIRE ALARM DEVICES, AND THE CEILING GRID.
8. THE CONTRACTOR SHALL FURNISH AND INSTALL DUCT / PIPING SUPPORTS AS REQUIRED. MINIMUM EVERY 10'-0" AND CHANGE IN DIRECTION.

X MECHANICAL NEW WORK KEYNOTES

1. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW FLOOR-MOUNTED STEAM UNIT VENTILATOR WITH DX COOLING COILS FOR FUTURE CONNECTION TO CONDENSING UNIT. UNIT VENTILATOR TO BE PROVIDED WITH FULL ADAPTER BACK FOR WALL BOX / LOUVER ALIGNMENTS. PROVIDE EACH UNIT VENTILATOR WITH A REMOTE, WALL-MOUNTED THERMOSTAT. FURNISH AND INSTALL ALL REQUIRED STEAM AND CONDENSATE RETURN PIPING, VALVES, FITTINGS, AND ALL REQUIRED APPURTENANCES BACK TO THE NEAREST PIPING MAINS (FIELD VERIFY PIPING CONNECTION LOCATIONS). SIZE STEAM AND CONDENSATE RETURN PIPING AS INDICATED ON THE DRAWINGS. FURNISH AND INSTALL NEW CAPPED 3/4" CONDENSATE DRAIN PIPING FOR EACH UV. COORDINATE FINAL INSTALLATION LOCATION WITH ARCHITECTURAL DRAWINGS AND EXISTING / NEW CASEWORK. INTERFACE THE UV WITH THE BUILDING'S EXISTING ATC/DDC SYSTEM.
2. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW WALL BOX AND OUTSIDE AIR INTAKE LOUVER FOR THE NEW UNIT VENTILATOR. SIZE WALL BOX AND LOUVER AS PER THE MANUFACTURER'S INSTRUCTIONS.
3. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW EXHAUST DUCTWORK AS INDICATED ON THE DRAWINGS, INCLUDING ALL DUCT MAINS, BRANCH DUCTWORK, DUCT HANGERS AND SUPPORTS, VOLUME DAMPERS, EXHAUST GRILLES, AND ALL REQUIRED APPURTENANCES. COORDINATE FINAL INSTALLATION LOCATION WITH THE ARCHITECT'S REFLECTED CEILING PLANS AND EXISTING ABOVE-CEILING CONDITIONS.
4. THE CONTRACTOR SHALL FURNISH AND INSTALL A NEW CEILING-MOUNTED HOT WATER CABINET UNIT HEATER (CUH) TO SERVE THE EXISTING CORRIDOR. FURNISH AND INSTALL NEW HOT WATER SUPPLY AND RETURN PIPING AS INDICATED ON THE DRAWINGS TO CONNECT THE NEW CABINET HEATER INTO THE BUILDING'S EXISTING HOT WATER SYSTEM. THE CONTRACTOR SHALL FIELD VERIFY FINAL LOCATION OF NEW CUH IN EXISTING CEILING GRID. SEE EQUIPMENT SCHEDULE FOR ADDITIONAL INFORMATION. INTERFACE THE CABINET HEATER WITH THE BUILDING'S EXISTING ATC/DDC SYSTEM.
5. THE CONTRACTOR SHALL FURNISH AND INSTALL A NEW OUTSIDE AIR INTAKE LOUVER TO SERVE THE HOT WATER CABINET UNIT HEATER. FIELD-COORDINATE FINAL ROUTING OF ASSOCIATED OUTSIDE AIR INTAKE DUCTWORK.



KEY PLAN

SCALE: 1" = 100'-0"

PROJECT NORTH

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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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SOMERS CENTRAL SCHOOL DISTRICT

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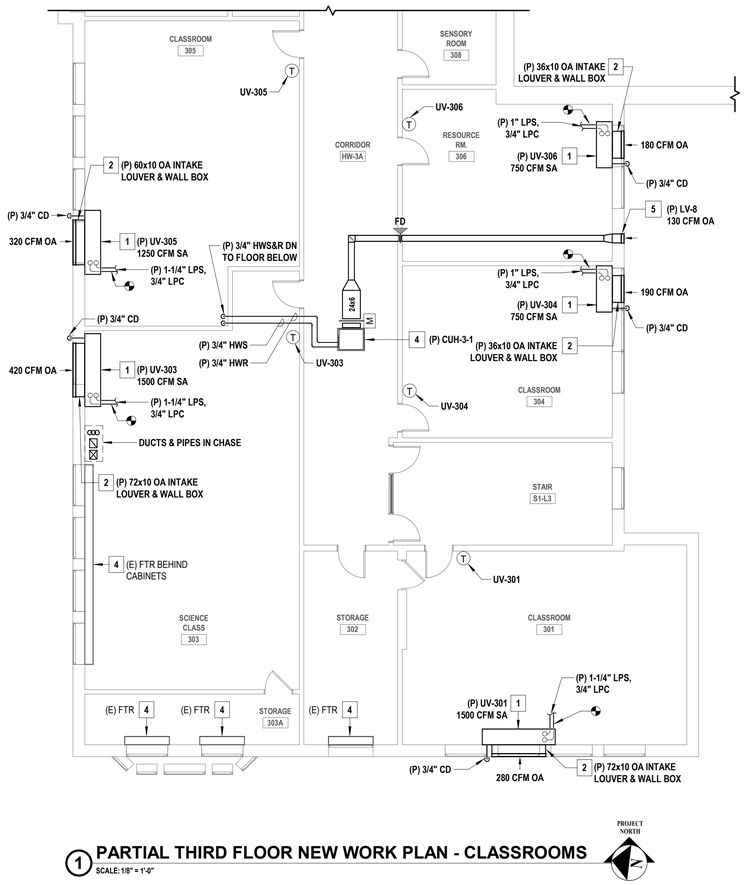
MECHANICAL
PARTIAL THIRD FLOOR NEW WORK PLAN

DRAWING No.

MS-M 119.00

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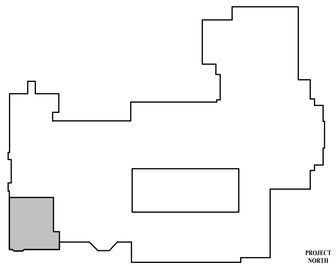
1 **PARTIAL THIRD FLOOR NEW WORK PLAN - CLASSROOMS**
SCALE: 1/8" = 1'-0"

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4. THE CONTRACTOR SHALL TAKE ALL NECESSARY MEASURES TO MAINTAIN THE ROOF WARRANTY.
5. THE CONTRACTOR SHALL TAKE CARE TO INSTALL ALL NEW ROOFTOP EQUIPMENT A MINIMUM OF 10'-0" AWAY FROM ALL ROOF EDGES.
6. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW EQUIPMENT IN ACCORDANCE WITH THE MANUFACTURER'S SERVICE AND OPERATING CLEARANCES, RECOMMENDATIONS, INSTALLATION INSTRUCTIONS, AND PREVAILING CODE.
7. THE CONTRACTOR SHALL COORDINATE ALL CEILING-MOUNTED EQUIPMENT (DIFFUSERS, GRILLES, ETC.) WITH ALL EXISTING AND NEW EQUIPMENT, INCLUDING LIGHT FIXTURES, FIRE ALARM DEVICES, AND THE CEILING GRID.
8. THE CONTRACTOR SHALL FURNISH AND INSTALL DUCT / PIPING SUPPORTS AS REQUIRED. MINIMUM EVERY 10'-0" AND CHANGE IN DIRECTION.

X MECHANICAL NEW WORK KEYNOTES

1. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW FLOOR-MOUNTED STEAM UNIT VENTILATOR WITH DX COOLING COILS FOR FUTURE CONNECTION TO CONDENSING UNIT. UNIT VENTILATOR TO BE PROVIDED WITH FULL ADAPTER BACK FOR WALL BOX / LOUVER ALIGNMENTS. PROVIDE EACH UNIT VENTILATOR WITH A REMOTE, WALL-MOUNTED THERMOSTAT. FURNISH AND INSTALL ALL REQUIRED STEAM AND CONDENSATE RETURN PIPING, VALVES, FITTINGS, AND ALL REQUIRED APPURTENANCES BACK TO THE NEAREST PIPING MAINS (FIELD VERIFY PIPING CONNECTION LOCATIONS). SIZE STEAM AND CONDENSATE RETURN PIPING AS INDICATED ON THE DRAWINGS. FURNISH AND INSTALL NEW CAPPED 3/4" CONDENSATE DRAIN PIPING FOR EACH UV. COORDINATE FINAL INSTALLATION LOCATION WITH ARCHITECTURAL DRAWINGS AND EXISTING / NEW CASEWORK. INTERFACE THE UV WITH THE BUILDING'S EXISTING ATC/DDC SYSTEM.
2. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW WALL BOX AND OUTSIDE AIR INTAKE LOUVER FOR THE NEW UNIT VENTILATOR. SIZE FOR WALL BOX AND LOUVER SHALL BE AS PER THE MANUFACTURER'S INSTRUCTIONS.
3. THE CONTRACTOR SHALL FURNISH AND INSTALL A NEW CEILING-MOUNTED HOT WATER CABINET UNIT HEATER (CUH) TO SERVE THE EXISTING CORRIDOR. FURNISH AND INSTALL NEW HOT WATER SUPPLY AND RETURN PIPING AS INDICATED ON THE DRAWINGS TO CONNECT THE NEW CABINET HEATER INTO THE BUILDING'S EXISTING HOT WATER SYSTEM. THE CONTRACTOR SHALL FIELD VERIFY FINAL LOCATION OF NEW CUH IN EXISTING CEILING GRID. SEE EQUIPMENT SCHEDULE FOR ADDITIONAL INFORMATION. INTERFACE THE CABINET HEATER WITH THE BUILDING'S EXISTING ATC/DDC SYSTEM.
4. EXISTING TO REMAIN.
5. THE CONTRACTOR SHALL FURNISH AND INSTALL A NEW OUTSIDE AIR INTAKE LOUVER TO SERVE THE HOT WATER CABINET UNIT HEATER. FIELD-COORDINATE FINAL ROUTING OF ASSOCIATED OUTSIDE AIR INTAKE DUCTWORK.



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

PROJECT NORTH

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White Plains, NY 10605
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NY Architecture & Landscape Architecture: No Certificate Required
NY Engineering Certificate of Authorization No.: 0018178

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:
SMSD2507	JULY 2026	AS SHOWN

CLIENT
SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202
SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

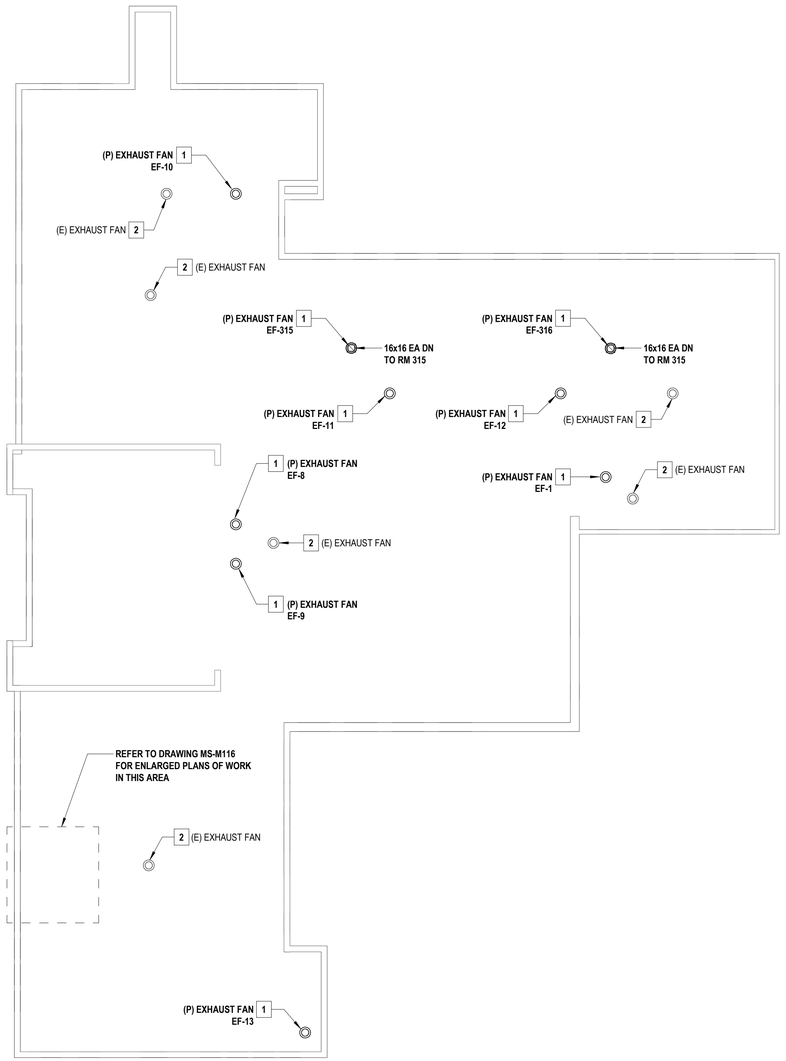
CONTRACT
CONTRACT M
MECHANICAL CONSTRUCTION

STATUS
SED SUBMISSION

SHEET TITLE
MECHANICAL
PARTIAL THIRD FLOOR NEW WORK PLAN

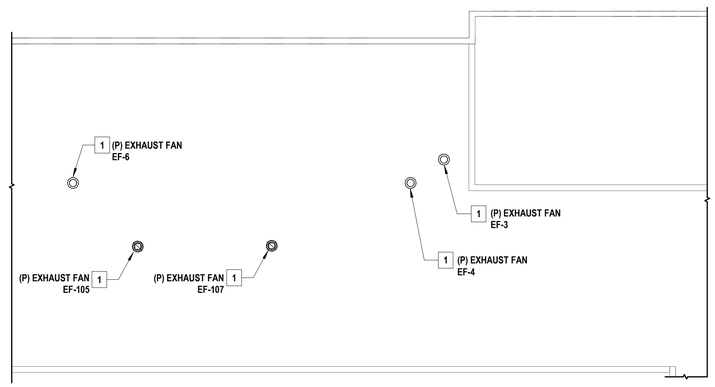
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1 PARTIAL UPPER ROOF NEW WORK PLAN

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



2 PARTIAL LOWER ROOF NEW WORK PLAN

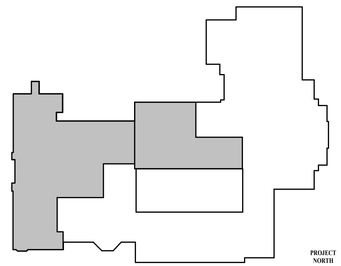
SCALE: 1/16" = 1'-0"

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8. THE CONTRACTOR SHALL FURNISH AND INSTALL DUCT / PIPING SUPPORTS AS REQUIRED. MINIMUM EVERY 10'-0" AND CHANGE IN DIRECTION.

X MECHANICAL NEW WORK KEYNOTES

1. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW REPLACEMENT ROOF-MOUNTED EXHAUST FAN IN APPROXIMATELY THIS LOCATION. FURNISH AND INSTALL ON NEW APPROVED WIND-RATED ROOF CURB. RECONNECT TO EXISTING DUCTWORK AND CONTROLS. INTERFACE THE EXHAUST FAN WITH THE BUILDING'S EXISTING ATC/DDC SYSTEM.
2. EXISTING TO REMAIN.



KEY PLAN

SCALE: 1" = 100'-0"

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

05/31/2028
Exp. Date

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PROJECT No:	DATE:	SCALE:
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250 US-202
SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT M
MECHANICAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

MECHANICAL ROOF NEW WORK PLAN

DRAWING No.

MS-M 121.00

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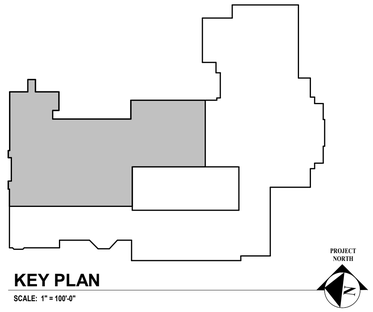
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X MECHANICAL NEW WORK KEYNOTES

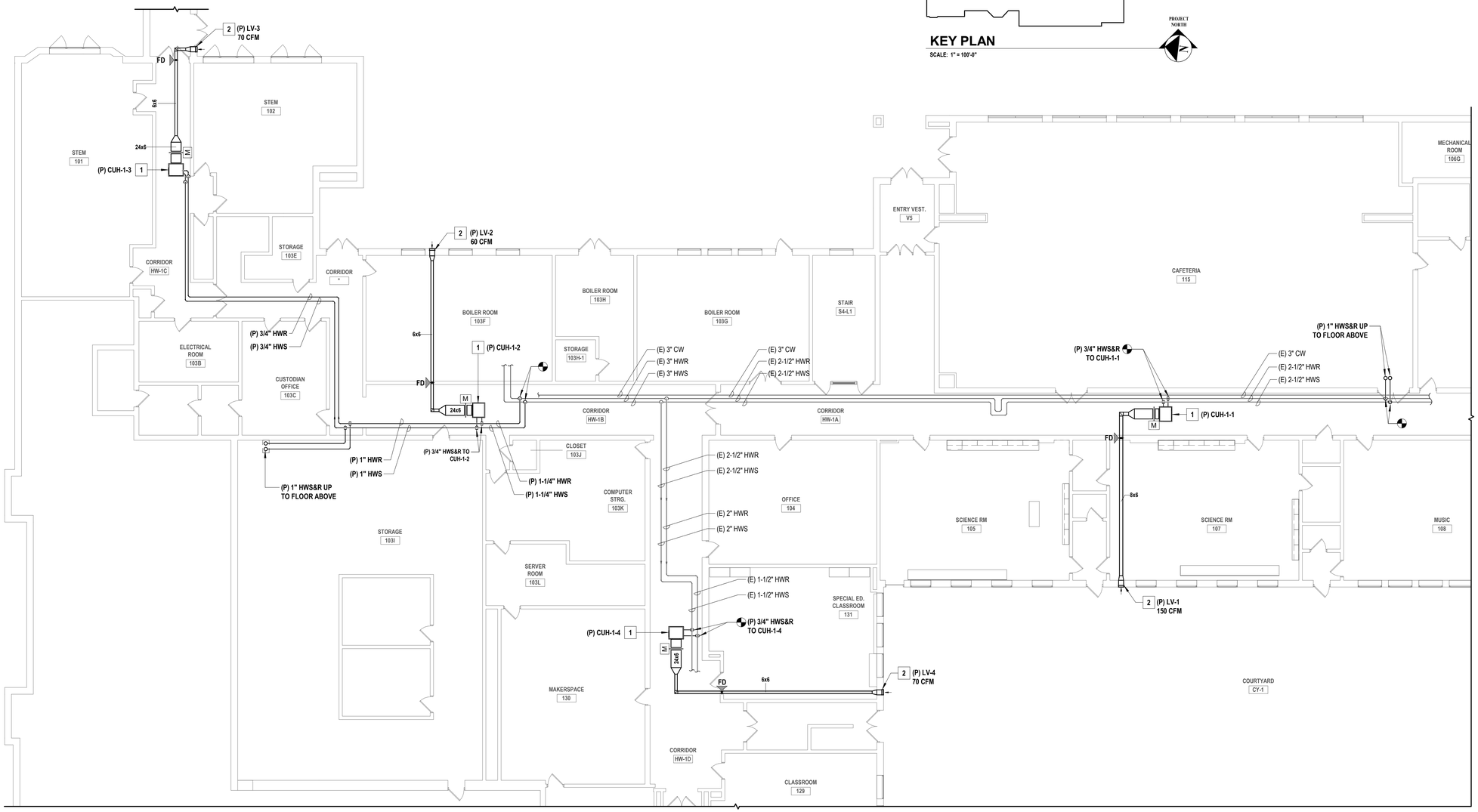
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KEY PLAN
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1 PARTIAL FIRST FLOOR NEW WORK PLAN - CORRIDORS
SCALE: 3/32" = 1'-0"



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CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

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SOMERS, NY 10589

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CONTRACT

CONTRACT M
MECHANICAL CONSTRUCTION

STATUS

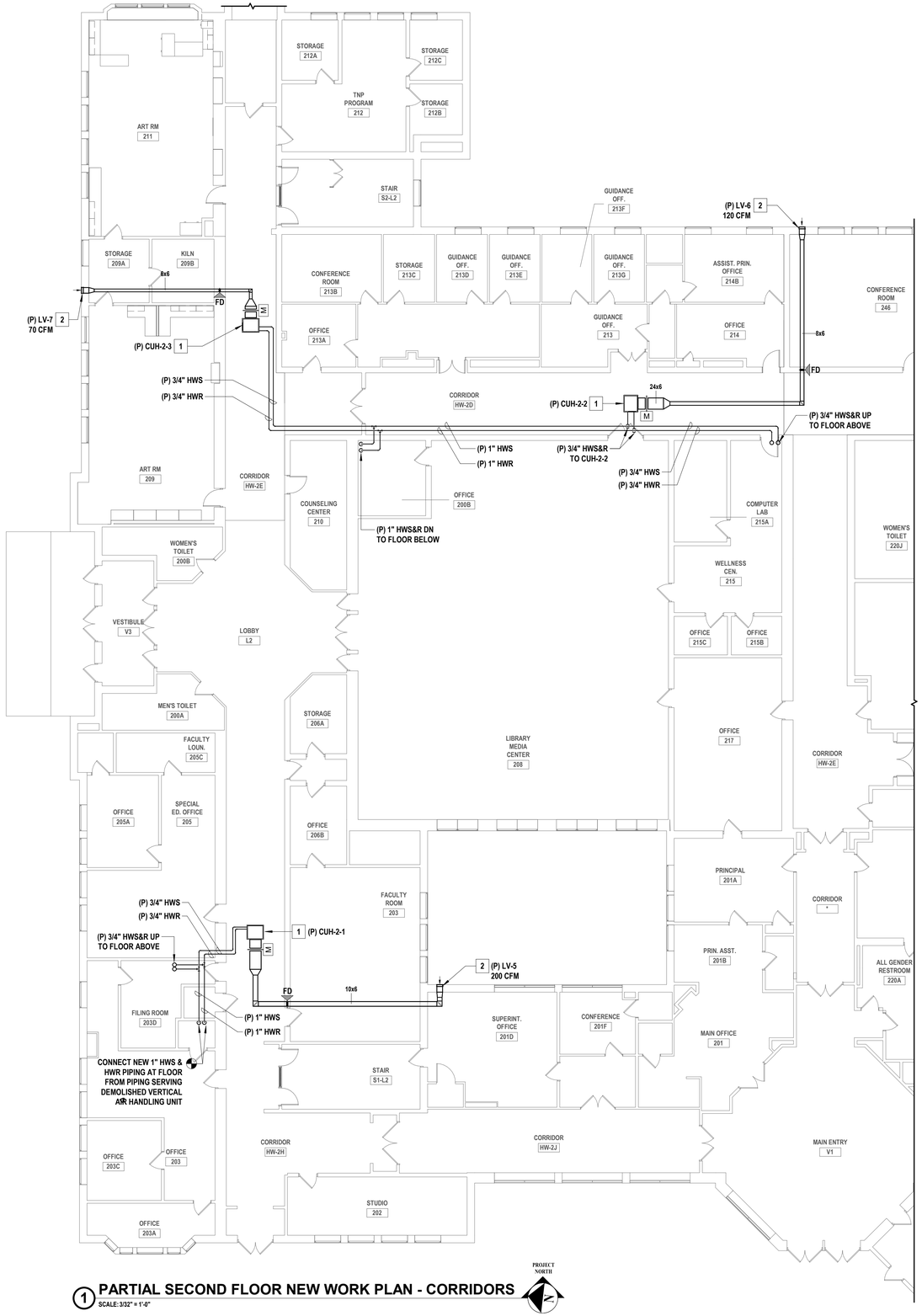
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SHEET TITLE

MECHANICAL
FIRST FLOOR CORRIDOR NEW WORK PLAN

DRAWING No.

MS-M 122.00



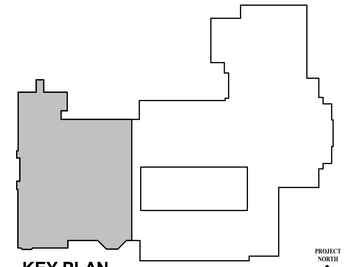
1 **PARTIAL SECOND FLOOR NEW WORK PLAN - CORRIDORS**
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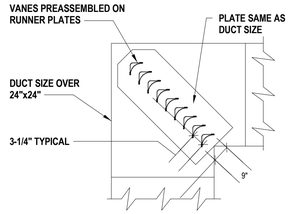
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MECHANICAL CONSTRUCTION

STATUS
SED SUBMISSION

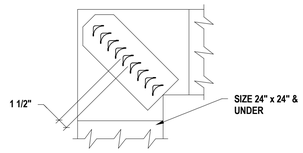
SHEET TITLE
MECHANICAL
SECOND FLOOR CORRIDOR NEW WORK PLAN

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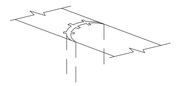


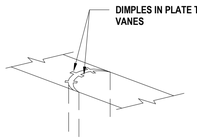
SQUARE ELBOW WITH TYPE "A" DOUBLE THICKNESS VANES



SQUARE ELBOW WITH TYPE "B" DOUBLE THICKNESS VANES.

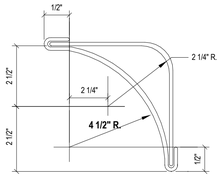
PREFERENCE FOR SECURING EDGE 1ST WELD OR 2ND RIVET





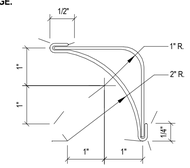
NOTE:

1. USE GALVANIZED STEEL FOR VANES IN EITHER STEEL OR ALUMINUM DUCTWORK.



TYPE "A"

TYPE "A" DOUBLE THICKNESS VANES FOR USE IN DUCTS GREATER THAN 24" x 24" IN SIZE. USE SAME GAUGE GALVANIZED IRON AS DUCT NOT TO EXCEED 20 GAUGE.

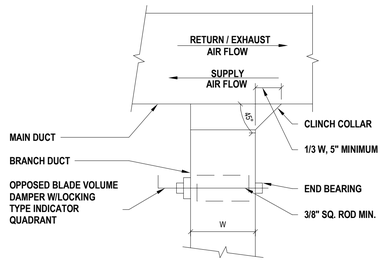


TYPE "B"

DOUBLE THICKNESS VANES FOR USE IN DUCTS 24" x 24" AND UNDER

1 TURNING VANES DETAIL

SCALE:NTS

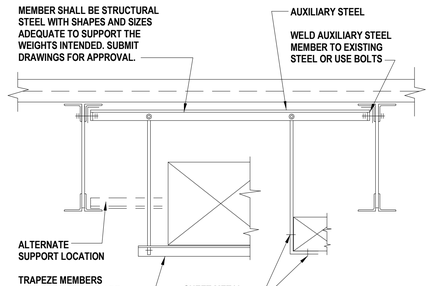


NOTES:

1. FURNISH THIS TYPE OF CONNECTION WHEN SINGLE LINE DUCTWORK IS INDICATED AS SHOWN FOR LOW PRESSURE BRANCHES WITH LESS THAN 33% CAPACITY OF MAIN DUCT.

2 BRANCH DUCT TAKEOFF DETAIL

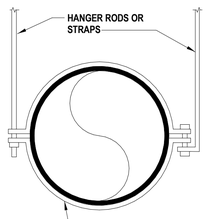
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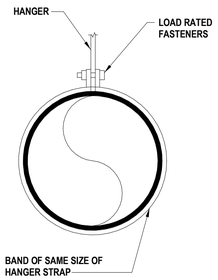


3 DUCT SUPPORT DETAILS

SCALE:NTS

HANGERS MUST NOT DEFORM DUCT SHAPE

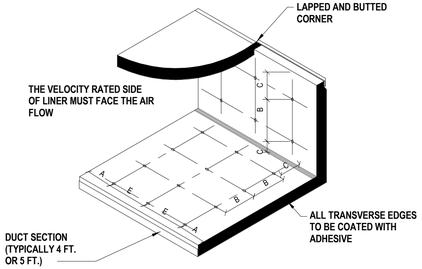




DUCT DIAMETER	BLK. OR GALV. ROD	GALV. STEEL STRAP
TO 10"	1/4"	1" X 22 GA.
11" TO 18"	1/4"	1" X 22 GA.
19" TO 24"	1/4"	1" X 22 GA.

NOTES:

1. SPACING 8'-0" ON CENTERS MAX

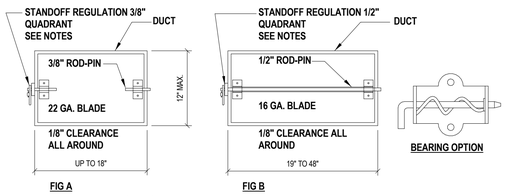


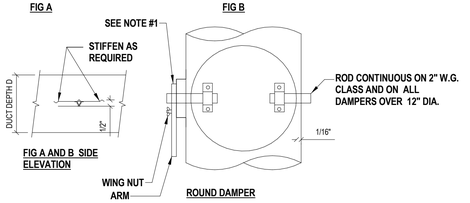
MAXIMUM SPACING FOR FASTENERS. ACTUAL INTERVALS ARE APPROXIMATE.

LINER ADHERED TO THE DUCT WITH 90% MIN. AREA COVERAGE OF ADHESIVE

VELOCITY*	DIMENSIONS			
	A	B	C	E
0-1500 FPM	3"	12"	4"	18"
1501-3500 FPM	3"	6"	4"	16"

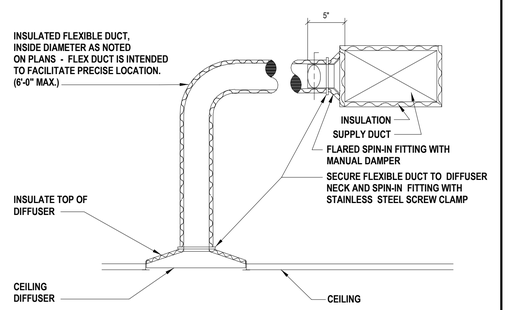
* UNLESS A LOWER LEVEL IS SET BY MANUFACTURER OR LISTING AGENCY





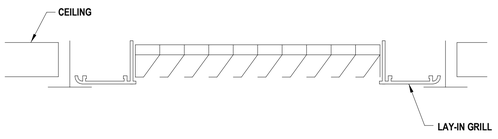
NOTES:

1. PROVIDE 2" HIGH STANDOFF REGULATORS FOR EXTERNALLY INSULATED DUCTWORK. PROVIDE REGULATORS WITH SEALS.
2. STANDOFF BASE HEIGHT TO MATCH INSULATION THICKNESS. BASE CONSTRUCTION 16 GAUGE.
3. RAPIT DAMPER REGULATORS AND JIFFY DAMPERS ARE NOT ACCEPTABLE ON RECTANGULAR OR ROUND DUCTWORK.



4 ROUND DUCT HANGER DETAIL

SCALE:NTS

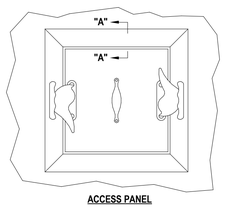


NOTES:

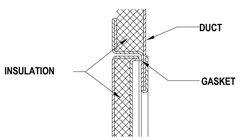
1. PROVIDE A GRILLE WITH A LAY-IN, ALUMINUM FRAME / BORDER.
2. PROVIDE CONCEALED SCREW HOLES IN NECK.

5 ACOUSTICAL LINER FASTENING DETAIL

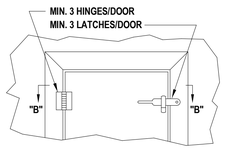
SCALE:NTS



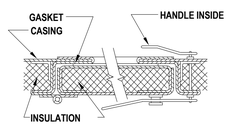
ACCESS PANEL



SECTION "A-A"



ACCESS DOOR



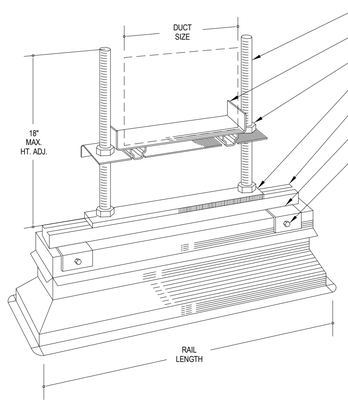
SECTION "B-B"

NOTES:

1. LATCHES SHALL BE OF THE WEDGE TYPE TO CLOSE DOORS TIGHTLY.
2. HINGES ON THE ACCESS DOORS SHALL HAVE NON-CORROSIVE PINS.
3. PROVIDE ACCESS DOORS ON AIR HANDLING UNITS AND DUCTWORK INSTALLED IN EQUIPMENT ROOMS. PROVIDE ACCESS PANELS ON ALL EQUIPMENT AND DUCTWORK INSTALLED ABOVE FINISHED CEILINGS WHERE SPACE LIMITATIONS DO NOT ALLOW HINGED DOORS TO OPEN.

6 VOLUME DAMPER DETAIL

SCALE:NTS



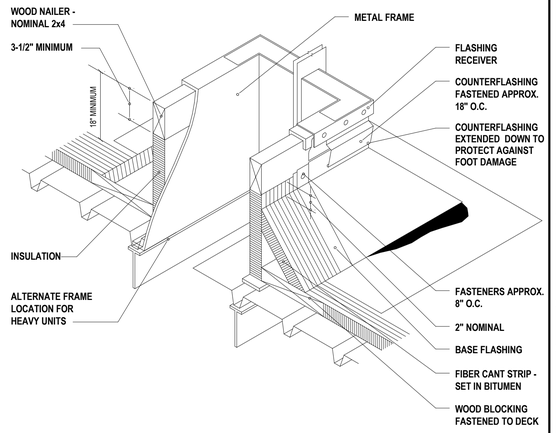
NOTES:

1. WHEN DUCT IS INSULATED, TOTAL OUTSIDE DIMENSION OF DUCT AND COVERING TO BE USED TO DETERMINE SIZE OF SLIDE ASSEMBLY.

SIZE CHART	
DUCT SIZE	EQUIPMENT RAIL LENGTH
UP TO 12"	2'-0"
12 1/4" TO 24"	3'-0"
24 1/4" TO 36"	4'-0"
36 1/4" TO 48"	5'-0"
48 1/4" TO 60"	6'-0"
60 1/4" TO 72"	7'-0"
72 1/4" TO 84"	8'-0"

7 CEILING DIFFUSER DETAIL

SCALE:NTS



8 CEILING PLENUM TRANSFER GRILLE DETAIL

SCALE:NTS

9 ACCESS DOOR & PANEL DETAIL

SCALE:NTS

10 ROOF DUCT SUPPORT DETAIL

SCALE:NTS

11 ROOFTOP EQUIPMENT MOUNTING DETAIL

SCALE:NTS

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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:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202
SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT M MECHANICAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

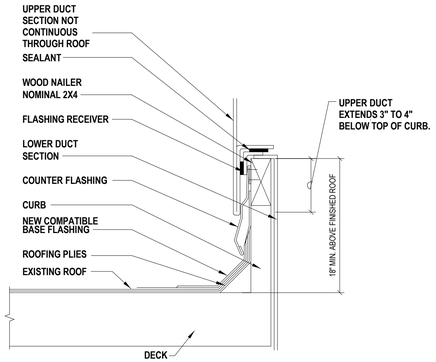
MECHANICAL DETAILS

DRAWING No.

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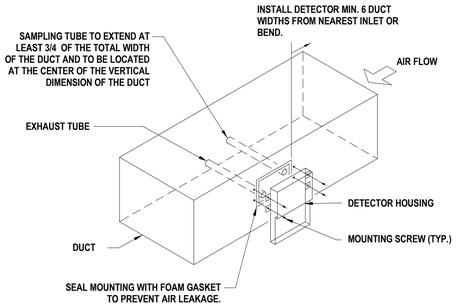
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1 DUCTWORK ROOF PENETRATION DETAIL

SCALE:NTS

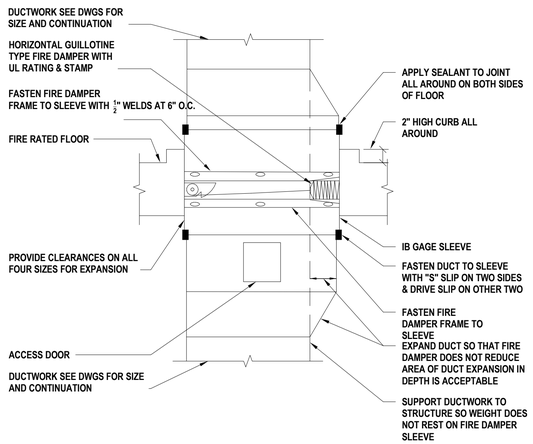


NOTES:

1. NEW DUCT SMOKE DETECTORS SHALL BE FURNISHED AND WIRED BY ELECTRICAL CONTRACTOR . INTERFACE OF NEW DUCT SMOKE DETECTORS WITH BUILDING FIRE ALARM SYSTEM BY ELECTRICAL CONTRACTOR.
2. NEW DUCT SMOKE DETECTOR SHALL BE INSTALLED IN DUCTWORK BY MECHANICAL CONTRACTOR.

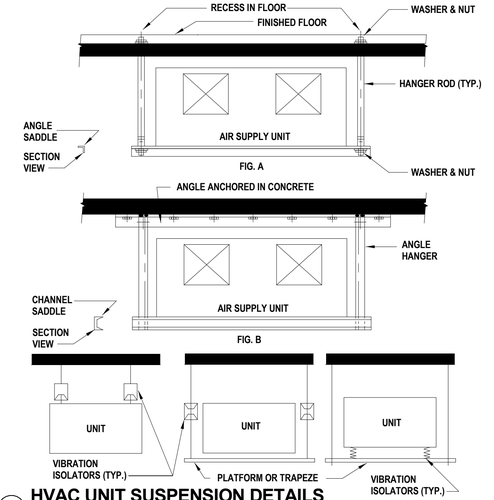
2 DUCT SMOKE DETECTOR MOUNTING DETAIL

SCALE:NTS



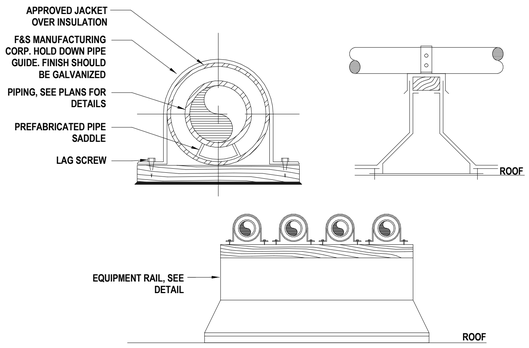
3 FIRE DAMPER AT FLOOR PENETRATION DETAIL

SCALE:NTS



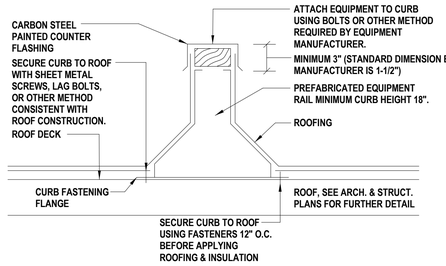
4 HVAC UNIT SUSPENSION DETAILS

SCALE:NTS



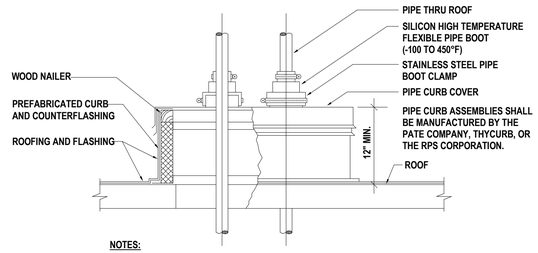
5 ROOFTOP PIPE SUPPORT DETAIL

SCALE:NTS



6 ROOFTOP EQUIPMENT RAIL DETAIL

SCALE:NTS

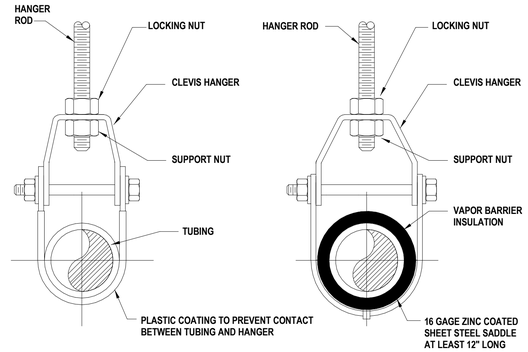


NOTES:

1. ALL ROOF PENETRATIONS TO BE PERFORMED BY EXISTING ROOF MANUFACTURER'S CERTIFIED INSTALLER TO MAINTAIN ROOF WARRANTY.
2. FURNISH & INSTALL GUY WIRE KIT (INCLUDING STRAPS, ANCHORS, & CABLES) FOR EXTENDED PIPING ABOVE THE ROOF.

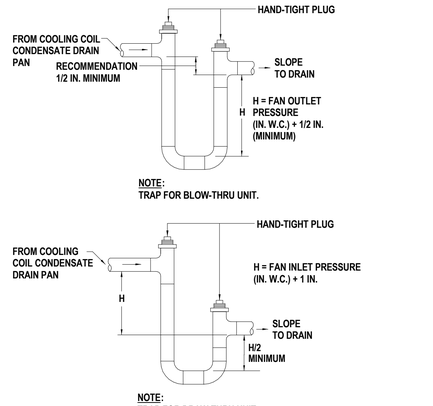
7 ROOFTOP PIPE CURB ASSEMBLY DETAIL

SCALE:NTS



8 PIPE HANGER DETAIL

SCALE:NTS



THE CONTRACTOR SHALL FURNISH AND INSTALL CONDENSATE DRAIN PIPING AS PER HVAC EQUIPMENT MANUFACTURER'S INSTALLATIONS INSTRUCTIONS / RECOMMENDATIONS AND ALL APPLICABLE CODES.

9 CONDENSATE DRAIN PIPING DETAIL

SCALE:NTS

AIR CONDITIONING CONDENSATE

AIR CONDITIONING CONDENSATE PIPING SHALL COMPLY WITH THE 2025 PLUMBING CODE OF NEW YORK STATE, CHAPTER 3, SECTION 314 - CONDENSATE DISPOSAL, AND THE 2025 MECHANICAL CODE OF NEW YORK STATE, CHAPTER 3, SECTION 307 - CONDENSATE DISPOSAL, WHICHEVER IS MORE STRINGENT.

AIR CONDITIONING CONDENSATE PIPING FROM AIR CONDITIONING UNITS SHALL BE SIZED ACCORDING TO THE CONDENSATE-GENERATING CAPACITY OF THE UNITS SERVED. BRANCHES FROM INDIVIDUAL UNITS SHALL BE NO SMALLER THAN THE DRAIN OPENING OR DRAIN CONNECTION ON THE UNIT. TRAPS SHALL BE PROVIDED AT EACH AIR CONDITIONING UNIT OR COOLING COIL TO MAINTAIN ATMOSPHERIC PRESSURE IN THE WASTE PIPING. CONDENSATE WASTE PIPING SHALL BE SLOPED NOT LESS THAN 1/8" PER FOOT. DRAINAGE FITTINGS SHALL BE USED IN SIZES 1-1/4" AND LARGER. MINIMUM PIPE SIZING SHALL BE AS FOLLOWS:

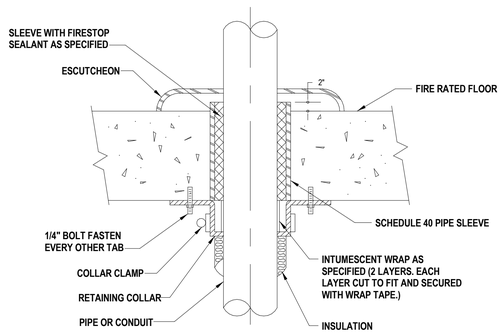
3/4" PIPE SIZE UP TO 20 TONS COOLING CAPACITY.
1" PIPE SIZE OVER 20 TONS TO 40 TONS COOLING CAPACITY.
1-1/4" PIPE SIZE OVER 40 TONS TO 90 TONS COOLING CAPACITY.
1-1/2" PIPE SIZE OVER 90 TONS TO 125 TONS COOLING CAPACITY.
2" PIPE SIZE OVER 125 TONS TO 250 TONS COOLING CAPACITY.

DISCHARGE OF AIR CONDITIONING CONDENSATE SHALL NOT BE PERMITTED TO CREATE A NUISANCE SUCH AS BY FLOWING ACROSS THE GROUND OR PAVED SURFACES. UNLESS EXPRESSLY PROHIBITED BY THE AUTHORITY HAVING JURISDICTION, THE POINT OF INDIRECT DISCHARGE FOR AIR CONDITIONING CONDENSATE SHALL BE ONE OF THE FOLLOWING:

a. THE BUILDING SANITARY DRAINAGE SYSTEM (FLOOR DRAIN PROVIDED UNDER PLUMBING DRAWINGS).
b. THE BUILDING STORM DRAINAGE SYSTEM.
c. AN APPROVED OUTDOOR LOCATION.
d. WITHIN DWELLINGS, A TUB WASTE AND OVERFLOW, LAVATORY TAILPIECE, OR LAUNDRY SINK WITHIN SAME DWELLING.

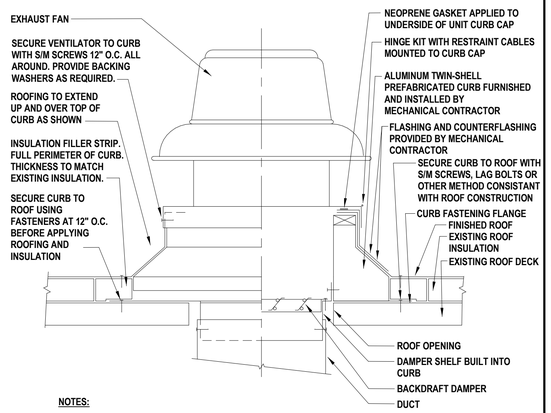
10 A/C CONDENSATE DRAINAGE CODES DETAIL

SCALE:NTS



11 PIPE / CONDUIT FLOOR PENETRATION DETAIL

SCALE:NTS



NOTES:

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

12 DOWNBLAST EXHAUST FAN & CURB DETAIL

SCALE:NTS

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

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202
SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

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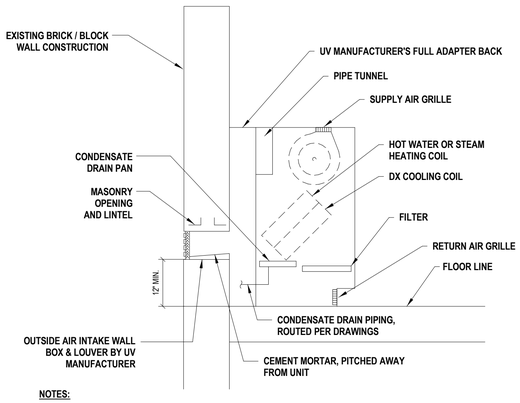
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1 UNIT VENTILATOR DETAIL

SCALE:NTS

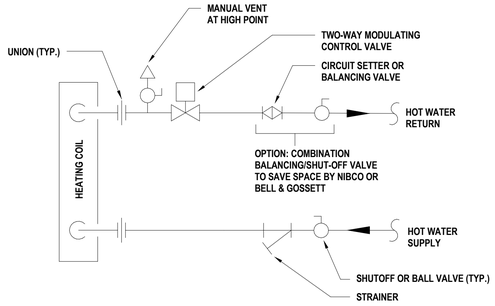


NOTES:

1. PROVIDE ALL BLOCKING AS NECESSARY TO PROVIDE AN AIR TIGHT SEAL FOR THE OUTDOOR AIR INTAKE PLENUM.
2. UNIT VENTILATORS TO BE PROVIDED WITH FULL ADAPTER BACK TO ALLOW FOR WALL BOX & LOUVER TO BE ELEVATED WHERE REQUIRED.

2 UNIT VENTILATOR HOT WATER COIL PIPING DETAIL

SCALE:NTS

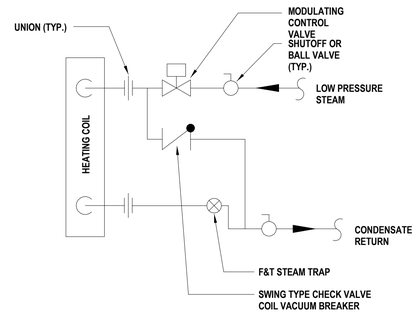


NOTES:

1. ALL COMPONENTS SHALL BE ENCLOSED WITHIN UNIT VENTILATOR CABINET.
2. COMPLY WITH MANUFACTURER'S RECOMMENDATIONS & INSTALLATION INSTRUCTIONS.

3 UNIT VENTILATOR STEAM COIL PIPING DETAIL

SCALE:NTS

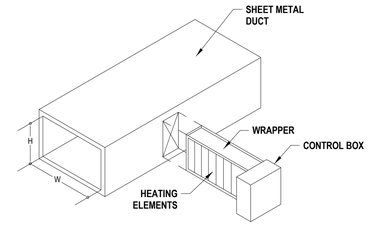


NOTES:

1. ALL COMPONENTS SHALL BE ENCLOSED WITHIN UNIT VENTILATOR CABINET.
2. COMPLY WITH MANUFACTURER'S RECOMMENDATIONS & INSTALLATION INSTRUCTIONS.

4 SLIP-IN ELECTRIC DUCT HEATER DETAIL

SCALE:NTS

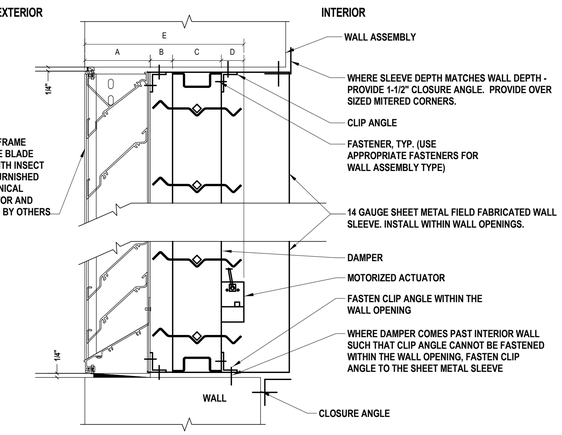


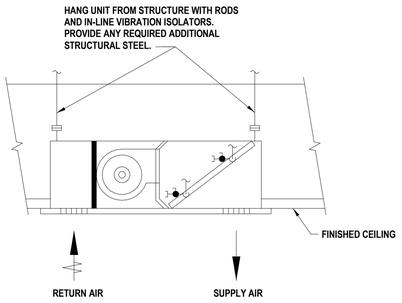
NOTES:

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.

5 HOT WATER CEILING-HUNG CABINET HEATER DETAIL

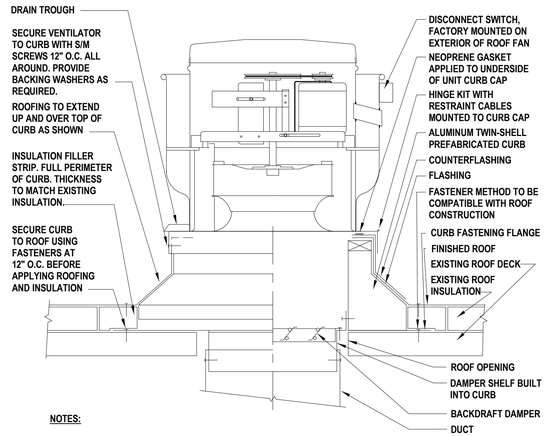
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6 UPBLAST EXHAUST FAN & CURB DETAIL

SCALE:NTS

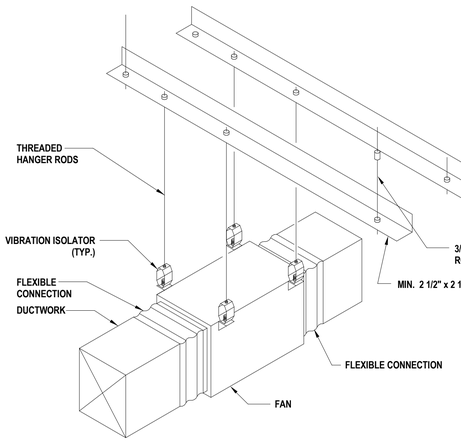


NOTES:

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

7 IN-LINE EXHAUST FAN DETAIL

SCALE:NTS



8 CHANNEL FRAME DRAINABLE BLADE LOUVER DETAIL

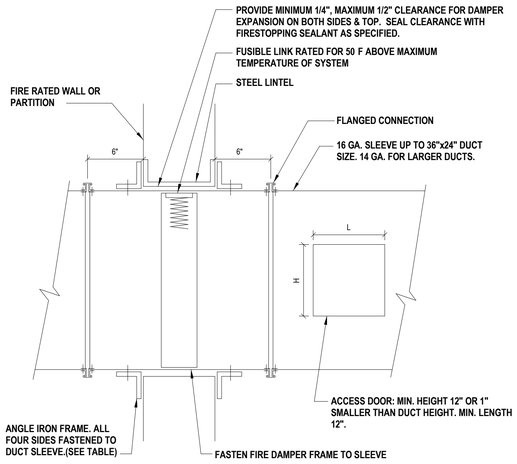
SCALE:NTS

NOTES:

1. OVERALL SIZE OF OPENING SHALL BE 1/4-INCH GREATER IN BOTH DIRECTIONS THAN SIZE OF LOUVER.
2. FASTEN SHEET METAL SLEEVE TO REAR OF LOUVER AND WALL ASSEMBLY. FASTEN MOTORIZED DAMPER TO SHEET METAL SLEEVE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
3. CLIP ANGLES AND FASTENERS SHALL BE SIZED AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS ON ALL SIDES.
4. INSTALL DAMPER ACTUATOR INSIDE OF SHEET METAL SLEEVE.
5. PROVIDE CLOSURE ANGLES TO CLOSE OFF INTERIOR WALL OPENING FOR A FINISHED APPEARANCE.

9 FIRE DAMPER DETAIL

SCALE:NTS



GENERAL NOTES:

1. FIRE DAMPER TO BE U.L. LABELED N.F.P.A. 90A.
2. N.F.P.A. APPROVED INSTALLATION DETAILS TO BE PART OF SUBMISSION OF FIRE DAMPER FOR APPROVAL, WHICH SHALL MEET N.F.P.A. STANDARD 90A.
3. DETAILS SHOWN ARE FOR FIRE DAMPERS IN HORIZONTAL DUCTWORK. FOR FIRE DAMPERS IN VERTICAL DUCTWORK, DETAILS SIMILAR EXCEPT DAMPERS SHALL BE SPRING LOADED.
4. U.L. APPROVED BREAKAWAY SLIP JOINT CONNECTION MAY BE USED IN LIEU OF FLANGED CONNECTION.
5. ACCESS DOOR IS SHOWN ON SIDE OF DUCT. IF FUSIBLE LINK IS MORE ACCESSIBLE FROM BOTTOM OF DUCT, RELOCATE ACCESS DOOR.
6. FROM FIRST 10'-0" OF FAN DISCHARGE DUCTS AND FOR DUCT SIZES LESS THAN 6" DEEP, FIRE DAMPER BLADES SHALL BE INSTALLED IN POCKET OUTSIDE OF AIR STREAM.

ANGLE IRON TABLE	
WALL OPENING	ANGLE SIZE
UP TO 30"	1"x1"x1/8"
31" TO 54"	1-1/2"x1-1/2"x1/8"
55" TO 84"	3"x2"x3/16"
85" TO 120"	3"x2"x3/16"

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CONSULTANTS:

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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:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202
SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

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MECHANICAL CONSTRUCTION

STATUS

SED SUBMISSION

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MECHANICAL DETAILS

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VENTILATION SCHEDULE - CLASSROOMS, CORRIDORS, AUDITORIUM

ROOM NUMBER	ROOM NAME	OCCUPANCY CATEGORY	FLOOR AREA (SQ. FT.)	PROGRAM OCCUP. LOAD	OUTSIDE AIR PER OCCUP. REQUIRED	OUTSIDE AIR PER SF REQUIRED	UNCORRECTED OUTSIDE AIR CFM	SPACE VENT EFFECT.	REQUIRED OUTSIDE AIR CFM	EXHAUST AIR					ACTUAL CFM			EQUIPMENT SERVING SPACE	NOTES
										EXHAUST RATE QUANTITY		EXHAUST RATE CFM / (UNIT OR SF)		REQ'D EXH. CFM	OUTSIDE AIR	SUPPLY AIR	EXHAUST AIR	
105	SCI. CLASSROOM	EDUC., CLASSROOM (AGE 9 PLUS)	1,074	19	10	0.18	381	0.9	424	1,074	SF	1.00	CFM / SF	1,074	430	1,500	1,650	NEW UV-105, NEW EF-105	1-5
107	SCI. CLASSROOM	EDUC., CLASSROOM (AGE 9 PLUS)	1,030	18	10	0.18	366	0.9	406	1,030	SF	1.00	CFM / SF	1,030	410	1,500	1,500	EXISTING UV, NEW EF-107	1-5
235	CLASSROOM	EDUC., CLASSROOM (AGE 9 PLUS)	802	20	10	0.12	293	0.9	325						330	1,250		NEW UV-235	1-5
237	CLASSROOM	EDUC., CLASSROOM (AGE 9 PLUS)	802	20	10	0.12	293	0.9	325						330	1,250		NEW UV-237	1-5
239	CLASSROOM	EDUC., CLASSROOM (AGE 9 PLUS)	839	21	10	0.12	306	0.9	340						340	1,250		NEW UV-239	1-5
240	CLASSROOM	EDUC., CLASSROOM (AGE 9 PLUS)	904	22	10	0.12	330	0.9	367						370	1,250		NEW UV-240	1-5
241	CLASSROOM	EDUC., CLASSROOM (AGE 9 PLUS)	802	20	10	0.12	293	0.9	325						330	1,250		NEW UV-241	1-5
242	CLASSROOM	EDUC., CLASSROOM (AGE 9 PLUS)	907	22	10	0.12	331	0.9	368						370	1,250		NEW UV-242	1-5
243	CLASSROOM	EDUC., CLASSROOM (AGE 9 PLUS)	747	18	10	0.12	273	0.9	303						310	1,250		NEW UV-243	1-5
244	CLASSROOM	EDUC., CLASSROOM (AGE 9 PLUS)	884	22	10	0.12	323	0.9	359						370	1,250		NEW UV-244	1-5
303	CLASSROOM	EDUC., CLASSROOM (AGE 9 PLUS)	1,014	25	10	0.12	370	0.9	411						420	1,500		NEW UV-303	1-5
305	CLASSROOM	EDUC., CLASSROOM (AGE 9 PLUS)	767	19	10	0.12	280	0.9	311						320	1,250		NEW UV-305	1-5
209	ART CLASSROOM	EDUC., CLASSROOM (AGE 9 PLUS)	875	21	10	0.18	372	0.9	413						420	1,250		REPLACEMENT UV-209	1-5
211	CLASSROOM	EDUC., CLASSROOM (AGE 9 PLUS)	871	21	10	0.12	318	0.9	353						360	1,250		REPLACEMENT UV-211	1-5
234	CLASSROOM	EDUC., CLASSROOM (AGE 9 PLUS)	1,032	25	10	0.12	377	0.9	419						420	1,250		REPLACEMENT UV-234	1-5
236	CLASSROOM	EDUC., CLASSROOM (AGE 9 PLUS)	1,010	25	10	0.12	369	0.9	410						410	1,250		REPLACEMENT UV-236	1-5
301	CLASSROOM	EDUC., CLASSROOM (AGE 9 PLUS)	689	17	10	0.12	251	0.9	279						280	1,500		REPLACEMENT UV-301	1-5
304	CLASSROOM	EDUC., CLASSROOM (AGE 9 PLUS)	452	11	10	0.12	165	0.9	183						190	750		REPLACEMENT UV-304	1-5
306	RESOURCE ROOM	EDUC., CLASSROOM (AGE 9 PLUS)	431	11	10	0.12	157	0.9	175						180	750		REPLACEMENT UV-305	1-5
311	HOME ECON. CLASSROOM	EDUC., CLASSROOM (AGE 9 PLUS)	1,051	26	10	0.12	384	0.9	426						430	1,500		REPLACEMENT UV-311	1-5
313	CLASSROOM	EDUC., CLASSROOM (AGE 9 PLUS)	899	22	10	0.12	328	0.9	365						370	1,250		REPLACEMENT UV-313	1-5
314	CLASSROOM	EDUC., CLASSROOM (AGE 9 PLUS)	771	19	10	0.12	281	0.9	313						320	1,250		REPLACEMENT UV-314	1-5
315	SCI. CLASSROOM	EDUC., CLASSROOM (AGE 9 PLUS)	982	24	10	0.12	358	0.9	398	982	SF	1.00	CFM / SF	982	400	1,250	1,200	REPLACEMENT UV-315, NEW EF-315	1-5
316	SCI. CLASSROOM	EDUC., CLASSROOM (AGE 9 PLUS)	1,180	21	10	0.18	419	0.9	465	1,180	SF	1.00	CFM / SF	1,180	470	1,500	1,500	REPLACEMENT UV-316, NEW EF-316	1-5
317	CLASSROOM	EDUC., CLASSROOM (AGE 9 PLUS)	625	15	10	0.12	228	0.9	253						260	1,250		REPLACEMENT UV-317	1-5
HW-1A	CORRIDOR	PUBLIC SPACES, CORRIDORS	1,962	0	0	0.06	118	0.8	147						150	400		NEW CUH 1-1	1-2
HW-1B	CORRIDOR	PUBLIC SPACES, CORRIDORS	787	0	0	0.06	47	0.8	59						60	400		NEW CUH 1-2	1-2
HW-1C	CORRIDOR	PUBLIC SPACES, CORRIDORS	809	0	0	0.06	49	0.8	61						70	400		NEW CUH 1-3	1-2
HW-1D	CORRIDOR	PUBLIC SPACES, CORRIDORS	880	0	0	0.06	53	0.8	66						70	400		NEW CUH 1-4	1-2
L-2	LOBBY (CORRIDOR)	PUBLIC SPACES, CORRIDORS	2,605	0	0	0.06	156	0.8	195						200	400		NEW CUH 2-1	1-2
HW-2D	CORRIDOR	PUBLIC SPACES, CORRIDORS	1,485	0	0	0.06	89	0.8	111						120	400		NEW CUH 2-2	1-2
HW-2E	CORRIDOR	PUBLIC SPACES, CORRIDORS	807	0	0	0.06	48	0.8	61						70	400		NEW CUH 2-3	1-2
HW-3A	CORRIDOR	PUBLIC SPACES, CORRIDORS	1,688	0	0	0.06	101	0.8	127						130	400		NEW CUH 3-1	1-2
HW-3B	CORRIDOR	PUBLIC SPACES, CORRIDORS	1,472	0	0	0.06	88	0.8	110						110	400		NEW CUH 3-2	1-2
4C	STAGE	THEATERS, STAGE	1,981	70	10	0.06	819	0.8	1,024						1,030			REPLACEMENT AC-1	1-2,6
112	AUD., PERFORMING ARTS	EDUC., AUDITORIUM	4,461	627	5	0.06	3,403	1.0	3,403						3,410			REPLACEMENT AC-2A, 2B	1-2,7-8

NOTES:
1. VENTILATION SCHEDULE IS BASED ON THE 2025 NEW YORK STATE MECHANICAL CODE, INCLUDING ASHRAE STANDARD 62.1 AND GOOD ENGINEERING PRACTICE.
2. ASHRAE VENTILATION STANDARD 62.1 SHALL BE USED AS A SECONDARY REFERENCE SOURCE IF A PARTICULAR ROOM IS NOT INCLUDED IN THE IMC.
3. FOR TYPICAL CLASSROOM UNIT VENTILATOR ON A WINDOW WALL WITH RELIEF AIR ON OPPOSING CORRIDOR WALL (MOUNTED HIGH OR LOW) SHOULD USE A ZONE AIR DISTRIBUTION EFFECTIVENESS OF Ez = 0.9.
4. OCCUPANCIES BASED ON EITHER ACTUAL SEATING AND/OR CODE DENSITIES OF THE "NET" (NOT GROSS) OCCUPIABLE FLOOR AREA. CLASSROOMS: 35P/1000SF FOR AGE 9 PLUS. SCIENCE CR AT 25P/1000SF.
5. MIDDLE SCHOOL SERVES STUDENTS IN GRADES 6 THROUGH 8 (11 TO 14 YEARS OLD).
6. MIDDLE SCHOOL STAGE OCCUPANCY MODELED AS A CHORUS PERFORMANCE OF 70 STUDENTS.
7. YEAR 2006 DRAWING A2.4 STATES 624 SEATS.
8. AUDITORIUM SYSTEM HAS LOW RETURN AIR.

VENTILATION SCHEDULE - ADMINISTRATION OFFICES

ROOM NUMBER	ROOM NAME	OCCUPANCY CATEGORY	FLOOR AREA (SQ. FT.)	PROGRAM OCCUP. LOAD	OUTSIDE AIR PER OCCUP. REQUIRED	OUTSIDE AIR PER SF REQUIRED	UNCORRECTED OUTSIDE AIR CFM	SPACE VENT EFFECT.	REQUIRED OUTSIDE AIR CFM	ACTUAL CFM		EQUIPMENT SERVING SPACE		NOTES
										OUTSIDE AIR	SUPPLY AIR			
201	MAIN OFFICE	OFFICES, OFFICE SPACES	377	5	5	0.06	48	0.8	60	75	350	IDU-201		1-4
201B	PRINCIPAL'S ASSISTANT	OFFICES, OFFICE SPACES	167	3	5	0.06	25	0.8	31	50	350	IDU-201		1-4
201A	PRINCIPAL'S OFFICE	OFFICES, OFFICE SPACES	314	5	5	0.06	44	0.8	55	75	590	IDU-201A		1-4
201D	SUPERINTENDENT'S OFFICE	OFFICES, OFFICE SPACES	396	12	5	0.06	84	0.8	105	125	1,050	IDU-201D	ERV-1	1-4
201E	CLOSET	STORAGE ROOM	55			0.12	7	0.8	8	50	50	IDU-201D		1-4
201F	RECEPTION	RECEPTION AREAS	122	2	5	0.06	17	0.8	22	50	200	IDU-201G		1-4
201G	SECRETARY'S OFFICE	OFFICES, OFFICE SPACES	148	3	5	0.06	24	0.8	30	50	450	IDU-201G		1-4
201GG	ELECTRICAL CLOSET	STORAGE ROOM	30			0.12	4	0.8	5	50	50	IDU-201G		1-4

NOTES:
1. VENTILATION SCHEDULE IS BASED ON THE 2025 NEW YORK STATE MECHANICAL CODE, INCLUDING ASHRAE STANDARD 62.1 AND GOOD ENGINEERING PRACTICE.
2. ASHRAE VENTILATION STANDARD 62.1 SHALL BE USED AS A SECONDARY REFERENCE SOURCE IF A PARTICULAR ROOM IS NOT INCLUDED IN THE IMC.
3. OCCUPANCIES BASED ON EITHER ACTUAL SEATING AND/OR CODE DENSITIES OF THE "NET" OCCUPIABLE FLOOR AREA.
4. ADMINISTRATION OFFICES SERVED VIA NEW VRF HEAT RECOVERY SYSTEM AND ASSOCIATED ENERGY RECOVERY VENTILATOR.

VENTILATION SCHEDULE - SPECIAL EDUCATION OFFICES

ROOM NUMBER	ROOM NAME	OCCUPANCY CATEGORY	FLOOR AREA (SQ. FT.)	PROGRAM OCCUP. LOAD	OUTSIDE AIR PER OCCUP. REQUIRED	OUTSIDE AIR PER SF REQUIRED	UNCORRECTED OUTSIDE AIR CFM	SPACE VENT EFFECT.	REQUIRED OUTSIDE AIR CFM	ACTUAL CFM		EQUIPMENT SERVING SPACE		NOTES
										OUTSIDE AIR	SUPPLY AIR			
203	OFFICE	OFFICES, OFFICE SPACES	446	3	5	0.06	42	0.8	52	75	400	IDU-203		1-2
203D	FILING ROOM	STORAGE ROOM	185			0.12	22	0.8	28	50	200	IDU-203		1-2
203E	HVAC ROOM	CLOSET	31			0.12	4	0.8	5	50	50	IDU-203		1-2
203D.1	CORRIDOR	CORRIDORS	88			0.06	5	0.8	7	50	50	IDU-203		1-2
203A	OFFICE	OFFICES, CONFERENCE ROOMS	158	8	5	0.06	49	0.8	62	75	670	IDU-203A		1-2
203C	OFFICE	OFFICES, OFFICE SPACES	142	3	5	0.06	24	0.8	29	50	350	IDU-203C	ERV-2	1-2
205	SPECIAL ED. OFFICES	OFFICES, OFFICE SPACES	511	3	5	0.06	46	0.8	57	75	500	IDU-205		1-2
205C	FACULTY LOUNGE	BREAK ROOMS	123	2	5	0.06	17	0.8	22	50	200	IDU-205		1-2
205A	OFFICE	OFFICES, OFFICE SPACES	207	3	5	0.06	27	0.8	34	50	350	IDU-205A		1-2
205B	STORAGE	STORAGE ROOM	44			0.12	5	0.8	7	50	50	IDU-205A		1-3

NOTES:
1. VENTILATION SCHEDULE IS BASED ON THE 2025 NEW YORK STATE MECHANICAL CODE, INCLUDING ASHRAE STANDARD 62.1 AND GOOD ENGINEERING PRACTICE.
2. ASHRAE VENTILATION STANDARD 62.1 SHALL BE USED AS A SECONDARY REFERENCE SOURCE IF A PARTICULAR ROOM IS NOT INCLUDED IN THE IMC.
3. OCCUPANCIES BASED ON EITHER ACTUAL SEATING AND/OR CODE DENSITIES OF THE "NET" OCCUPIABLE FLOOR AREA.

INDOOR AIR HANDLING UNIT SCHEDULE

TAG	LOCATION	SERVICE	MFR	MODEL / SIZE	MOUNTING	ASSOCIATED CONDENSING UNIT	SUPPLY FAN						HOT WATER HEATING COIL DATA								DX COOLING COIL DATA									FILTER TYPE	ELECTRICAL DATA				PHYSICAL DATA				NOTES
							AIRFLOW		STATIC PRESS.		MOTOR SIZE (HP)	FAN SPEED (RPM)	MBH	FLOW (GPM)	AIR TEMP ENT (F)	AIR TEMP LVG (F)	WATER TEMP EWT (F)	WATER TEMP LWT (F)	ROWS	FINS PER INCH	CAPACITY NOM. TONS	CAPACITY TOTAL MBH	CAPACITY SENS. MBH	AIR TEMP EAT DB/WB (F)	AIR TEMP LAT DB/WB (F)	FACE VEL. (FPM)	ROWS	FINS PER INCH	REFRIG. TYPE		V/PH/HZ	FLA (AMPS)	MCA (AMPS)	MOCP (AMPS)	LENGTH (FT-IN)	WIDTH (FT-IN)	HEIGHT (FT-IN)	WEIGHT OPER. (LBS)	
							SUPPLY CFM	OA CFM	TOTAL (IN WG)	EXT. (IN WG)																											
AC-1	MECH. MEZZ.	STAGE	CARRIER	39L, SIZE 12	FLOOR	CU-1	5,126	1,030	2.65	0.75	5	1,112	222.7	11.4	55.9	94.7	190	150	2	8	12.5	145.0	121.9	80.6/67.2	58.9/58.4	550	8	11	R-454B	MERV 13	208/3/60	14.3	17.9	30	4'-9"	5'-10"	5'-1"	1,377	1-8
AC-2A	MECH. MEZZ.	AUD. LEFT	CARRIER	39L, SIZE 10	FLOOR	CU-2A	4,400	1,705	2.55	0.75	5	1,137	249.4	12.8	42.9	92.5	190	150	2	11	15.0	181.3	125.1	83.0/69.0	57.0/56.2	461	6	11	R-454B	MERV 13	208/3/60	14.3	17.9	30	7'-8"	5'-2"	2'-8"	1,161	1-8
AC-2B	MECH. MEZZ.	AUD. RIGHT	CARRIER	39L, SIZE 10	FLOOR	CU-2B	4,400	1,705	2.55	0.75	5	1,137	249.4	12.8	42.9	92.5	190	150	2	11	15.0	181.3	125.1	83.0/69.0	57.0/56.2	461	6	11	R-454B	MERV 13	208/3/60	14.3	17.9	30	7'-8"	5'-2"	2'-8"	1,161	1-8

NOTES:
1. AIR HANDLING UNIT (AHU) IS A SINGLE ZONE VAV APPLICATION.
2. AHU'S HAVE THE FOLLOWING SECTIONS: FILTER/MIXING BOX WITH DAMPERS, HOT WATER HEATING COIL, DX COOLING COIL, AND SUPPLY FAN. NOTE: AC-1 FAN SECTION ON TOP OF COIL SECTION, OTHERWISE A HORIZONTAL CONFIGURATION.
3. FOR AIR HANDLING UNIT SECTIONS TOO LARGE TO FIT THROUGH A STANDARD 36" DOOR, THE CONTRACTOR SHALL FIELD DISASSEMBLE THE SECTION TO FIT THROUGH THE DOOR, AND REASSEMBLE IN THE MECHANICAL ROOM.
4. FURNISH AND INSTALL DDC CONTROLS, BACNET INTERFACES, AND INTERLOCK WITH EXISTING ATC/DDC SYSTEM. INTERLOCK WITH ASSOCIATED RETURN-EXHAUST FANS.
5. MOUNT AHU'S ON APPROVED VIBRATION ISOLATORS AND/OR BASERAIL.
6. FACTORY-INSTALLED A2L LEAK DETECTION DEVICES, WIRED INTO FAN SYSTEM (DIRECT TO MOTOR OR VFD). RELAY REQUIRED FOR CU (COMPRESSOR SHUT DOWN). CONTRACTOR TO COORDINATE WITH AHU MANUFACTURER & CONTROLS CONTRACTOR FOR COMPLETE SYSTEM.
7. VFD FOR SOFT-START, BALANCING, AND SINGLE-ZONE VAV. WIRING COMPLETED AT FACTORY LEVEL FOR UL COMPLIANCE.
8. PROVIDE MANUFACTURER'S WARRANTY.

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RETURN-EXHAUST FAN SCHEDULE

TAG	ASSOCIATED AHU	LOCATION	MANUFACTURER	MODEL NO.	ORIENTATION	TYPE	DRIVE	AIRFLOW (CFM)	ESP (IN WG)	FAN SPEED (RPM)	FEI (FAN ENERGY INDEX)	SOUND POWER IN/OUT (dBA)	MOTOR DATA V/PH/HZ	MOTOR DATA SIZE HP	MOTOR DATA MOTOR SPEED	PHYSICAL DATA DUCT CONN. DIAM, IN & OUT (IN)	PHYSICAL DATA DUCT CONN. DIAM, IN & OUT (IN)	PHYSICAL DATA DIMENSIONS DIAM. (IN)	PHYSICAL DATA DIMENSIONS L (IN)	PHYSICAL DATA DIMENSIONS CTR TO TOP OF MOTOR (IN)	PHYSICAL DATA WEIGHT (LBS)	NOTES
RF-1	AC-1	MECH MEZZ	TWIN CITY	QSL-200	HORIZ.	MIXED FLOW, INLINE, DUCTED	VAR SPEED BELT	5,000	0.5	1,121	1.12	68/68	208/3/60	1.5	1,800	27.06	27.06	30.31	37.19	36.2	359	1-13
RF-2A	AC-2A	MECH MEZZ	TWIN CITY	QSL-182	VERT.	MIXED FLOW, INLINE, DUCTED	VAR SPEED BELT	4,400	0.5	1,263	1.25	66/67	208/3/60	1.0	1,800	24.69	24.69	28	33.88	34.45	300	1-13
RF-2B	AC-2B	MECH MEZZ	TWIN CITY	QSL-182	HORIZ.	MIXED FLOW, INLINE, DUCTED	VAR SPEED BELT	4,400	0.5	1,263	1.25	66/67	208/3/60	1.0	1,800	24.69	24.69	28	33.88	34.45	300	1-13

NOTES:

1. ACCESS DOOR - BOLTED.
2. FLANGES - INLET/OUTLET, PUNCHED.
3. GUARD - BELT, OSHA, SEALED.
4. VIBRATION ISOLATORS - SPRING HANGERS.
5. MOUNTING BRACKETS - CEILING.
6. EXTENDED LUBE LINES.
7. VARIABLE SPEED V-BELT DRIVE.
8. DISCONNECT SWITCH, UNFUSED (NEMA 3R), MOUNTED & WIRED.
9. MOUNTED TCF MOTOR.
10. REMOTE VFD FOR SOFT START, BALANCING, & SINGLE ZONE VAV APPLICATION WITH ASSOCIATED AIR HANDLER.
11. PROVIDE MANUFACTURER'S STANDARD WARRANTY.
12. UL 705 LISTED, AMCA CERTIFIED.
13. INTERLOCK FAN WITH ASSOCIATED AHU. INTERFACE FAN WITH THE EXISTING BUILDING ATC/DDC SYSTEM.

AIR-COOLED CONDENSING UNIT SCHEDULE

TAG	MANUFACTURER	MODEL NO.	ASSOCIATED AHU	NOMINAL COOLING CAPACITY (TONS)	NOMINAL COOLING CAPACITY (MBH)	CIRCUITS	STAGES	EFFICIENCY EER	EFFICIENCY IEER	REFRIGERANT TYPE	REFRIGERANT SUCTION LINE (IN)	REFRIGERANT LIQUID LINE (IN)	ELECTRICAL DATA V/PH/HZ	ELECTRICAL DATA COND. FAN QUANTITY	ELECTRICAL DATA COND. FAN FLA EACH (AMPS)	ELECTRICAL DATA COMPR. QUANTITY	ELECTRICAL DATA COMPR. TYPE	ELECTRICAL DATA COMPR. RLA EACH (AMPS)	ELECTRICAL DATA MCA (AMPS)	ELECTRICAL DATA MOCP (AMPS)	PHYSICAL DATA L (FT-IN)	PHYSICAL DATA W (FT-IN)	PHYSICAL DATA H (FT-IN)	PHYSICAL DATA WEIGHT (LBS)	NOTES
CU-1	CARRIER	38AXDU14	AC-1	12.5	150	DUAL	3	11.00	14.20	R-454B	(2)-1-3/8	(2)-1-/2	208-3-60	2	2.0	2	SCROLL	18.9, 21.1	49.0	60.0	4'-11.4"	3'-9.9"	4'-2.4"	654	1-11
CU-2A	CARRIER	38AXDU16	AC-2A	15	180	DUAL	3	11.00	14.20	R-454B	(2)-1-3/8	(2)-1-/2	208-3-60	3	3.0	2	SCROLL	26.9, 29.2	68.0	90.0	7'-2.1"	3'-7.4"	4'-2.4"	731	1-11
CU-2B	CARRIER	38AXDU16	AC-2B	15	180	DUAL	3	11.00	14.20	R-454B	(2)-1-3/8	(2)-1-/2	208-3-60	3	3.0	2	SCROLL	26.9, 29.2	68.0	90.0	7'-2.1"	3'-7.4"	4'-2.4"	731	1-11

NOTES:

1. FURNISH AND INSTALL CONDENSING UNITS ON WIND/SEISMIC RATED SPRING ISOLATORS ON EXISTING CONCRETE PAD LOCATED ON-GRADE.
2. FURNISH AND INSTALL REFRIGERANT PIPING AS PER EQUIPMENT MANUFACTURER'S PUBLISHED INSTALLATION INSTRUCTIONS.
3. THE INDOOR AIR HANDLING UNITS AND ASSOCIATED CONDENSING UNITS SHALL BE INTEGRATED INTO THE EXISTING AUTOMATIC TEMPERATURE CONTROL SYSTEM (BACNET OR APPROVED METHODS).
4. COOLING PERFORMANCE BASED ON 95 DEGREES F AMBIENT AND 80/67 DEGREES F ENTERING DRY/WET BULB TEMPERATURES.
5. FACTORY-INSTALLED LOW AMBIENT OPERATION TO -20 DEGREES F.
6. FACTORY-INSTALLED LOUVERED HAIL GUARDS.
7. SERVICE VALVES (LIQUID LINE WITH GAUGE PORT AND SUCTION LINE WITH GAUGE PORT).
8. REFRIGERANT LEAK DETECTION SENSOR IS PROVIDED IN THE AHU AND WIRED BACK TO THE CU.
9. COMPLY WITH NEW YORK STATE ENERGY CODES: 2025 ENERGY CONSERVATION CONSTRUCTION CODE OF NEW YORK STATE, ASHRAE 90.1-2025.
10. FIELD PROVIDED & INSTALLED DISCONNECT SWITCH UNDER THE ELECTRICAL DRAWINGS.
11. PROVIDE MANUFACTURER'S WARRANTY.

UNIT VENTILATOR SCHEDULE

TAG	CLASSROOM SERVED	MANUFACTURER	MODEL NO.	ORIENTATION / MOUNTING	UNIT CONFIGURATIONS SUPPLY AIR	UNIT CONFIGURATIONS RETURN AIR	UNIT CONFIGURATIONS OUTSIDE AIR	SUPPLY FAN DATA AIRFLOW TOTAL CFM	SUPPLY FAN DATA AIRFLOW O.A. CFM	SUPPLY FAN DATA MOTOR TYPE	SUPPLY FAN DATA MOTOR SIZE (HP)	DX CLG COIL (TONS)	STEAM HEATING COIL DATA HTG. CAP (MBH)	STEAM HEATING COIL DATA PRESS. (PSI)	STEAM HEATING COIL DATA FLOW (LB/HR)	STEAM HEATING COIL DATA AIR TEMP ENT (F)	STEAM HEATING COIL DATA AIR TEMP LVG (F)	HOT WATER HEATING COIL DATA HTG. CAP (MBH)	HOT WATER HEATING COIL DATA FLOW (GPM)	HOT WATER HEATING COIL DATA WPD MAX (FT)	HOT WATER HEATING COIL DATA AIR TEMP ENT (F)	HOT WATER HEATING COIL DATA AIR TEMP LVG (F)	HOT WATER HEATING COIL DATA WATER TEMP ENT (F)	HOT WATER HEATING COIL DATA WATER TEMP LVG (F)	ELECTRICAL DATA V/HP/HZ	ELECTRICAL DATA FLA (AMPS)	ELECTRICAL DATA MCA (AMPS)	ELECTRICAL DATA MOP (AMPS)	PHYSICAL DATA DEPTH OR LENGTH (IN)	PHYSICAL DATA WIDTH (IN)	PHYSICAL DATA HEIGHT (IN)	PHYSICAL DATA WGT (LBS)	WALL SLEEVE DEPTH OR LENGTH (IN)	WALL SLEEVE WIDTH (IN)	WALL SLEEVE HEIGHT (IN)	LOUVER WIDTH (IN)	LOUVER HEIGHT (IN)	NOTES
NEW UNIT VENTILATORS:																																						
UV-105	105	CARRIER	40UV11500	VERT., FLR.	TOP GR.	BOTT. GR.	NEW WB/GR	1500	430	HS-ECM	1/2	3.5	52	2	53.9	49.9	82.0	-	-	-	-	-	-	-	115/1/60	6.8	8.5	15	21.83	98	30.26	630	8	72	10.38	71.5	9.75	1-10
UV-235	235	CARRIER	40UV11250	VERT., FLR.	TOP GR.	BOTT. GR.	NEW WB/GR	1250	330	HS-ECM	1/2	3.0	42	2	43.5	51.5	82.6	-	-	-	-	-	-	-	115/1/60	6.8	8.5	15	21.83	86	30.26	570	8	60	10.38	59.5	9.75	1-10
UV-237	237	CARRIER	40UV11250	VERT., FLR.	TOP GR.	BOTT. GR.	NEW WB/GR	1250	330	HS-ECM	1/2	3.0	42	2	43.5	51.5	82.6	-	-	-	-	-	-	-	115/1/60	6.8	8.5	15	21.83	86	30.26	570	8	60	10.38	59.5	9.75	1-10
UV-239	239	CARRIER	40UV11250	VERT., FLR.	TOP GR.	BOTT. GR.	NEW WB/GR	1250	340	HS-ECM	1/2	3.0	42	2	43.5	51.0	82.1	-	-	-	-	-	-	-	115/1/60	6.8	8.5	15	21.83	86	30.26	570	8	60	10.38	59.5	9.75	1-10
UV-240	240	CARRIER	40UV11250	VERT., FLR.	TOP GR.	BOTT. GR.	NEW WB/GR	1250	370	HS-ECM	1/2	3.0	45	2	46.6	49.3	82.6	-	-	-	-	-	-	-	115/1/60	6.8	8.5	15	21.83	86	30.26	570	8	60	10.38	59.5	9.75	1-10
UV-241	240	CARRIER	40UV11250	VERT., FLR.	TOP GR.	BOTT. GR.	NEW WB/GR	1250	330	HS-ECM	1/2	3.0	42	2	43.5	51.5	82.6	-	-	-	-	-	-	-	115/1/60	6.8	8.5	15	21.83	86	30.26	570	8	60	10.38	59.5	9.75	1-10
UV-242	242	CARRIER	40UV11250	VERT., FLR.	TOP GR.	BOTT. GR.	NEW WB/GR	1250	370	HS-ECM	1/2	3.0	45	2	46.6	49.3	82.6	-	-	-	-	-	-	-	115/1/60	6.8	8.5	15	21.83	86	30.26	570	8	60	10.38	59.5	9.75	1-10
UV-243	243	CARRIER	40UV11250	VERT., FLR.	TOP GR.	BOTT. GR.	NEW WB/GR	1250	310	HS-ECM	1/2	3.0	40	2	41.5	52.6	82.3	-	-	-	-	-	-	-	115/1/60	6.8	8.5	15	21.83	86	30.26	570	8	60	10.38	59.5	9.75	1-10
UV-244	244	CARRIER	40UV11250	VERT., FLR.	TOP GR.	BOTT. GR.	NEW WB/GR	1250	370	HS-ECM	1/2	3.0	45	2	46.6	49.3	82.6	-	-	-	-	-	-	-	115/1/60	6.8	8.5	15	21.83	86	30.26	570	8	60	10.38	59.5	9.75	1-10
UV-303	303	CARRIER	40UV11500	VERT., FLR.	TOP GR.	BOTT. GR.	NEW WB/GR	1500	420	HS-ECM	1/2	3.5	55	2	57.0	50.4	84.4	-	-	-	-	-	-	-	115/1/60	6.8	8.5	15	21.83	98	30.26	630	8	72	10.38	71.5	9.75	1-10
UV-305	305	CARRIER	40UV11250	VERT., FLR.	TOP GR.	BOTT. GR.	NEW WB/GR	1250	320	HS-ECM	1/2	3.0	44	2	45.6	52.1	84.7	-	-	-	-	-	-	-	115/1/60	6.8	8.5	15	21.83	86	30.26	570	8	60	10.38	59.5	9.75	1-10
REPLACEMENT UNIT VENTILATORS:																																						
UV-209	209	CARRIER	40UV11250	VERT., FLR.	TOP GR.	BOTT. GR.	NEW WB/GR	1250	420	HS-ECM	1/2	3.0	48	2	49.7	46.5	82.0	-	-	-	-	-	-	-	115/1/60	6.8	8.5	15	21.83	86	30.26	570	8	60	10.38	59.5	9.75	1-10
UV-211	211	CARRIER	40UV11250	VERT., FLR.	TOP GR.	BOTT. GR.	NEW WB/GR	1250	360	HS-ECM	1/2	3.0	45	2	46.6	49.8	83.2	-	-	-	-	-	-	-	115/1/60	6.8	8.5	15	21.83	86	30.26	570	8	60	10.38	59.5	9.75	1-10
UV-234	234	CARRIER	40UV11250	VERT., FLR.	TOP GR.	BOTT. GR.	NEW WB/GR	1250	420	HS-ECM	1/2	3.0	-	-	-	-	-	50	5.0	10.0	46.5	83.5	190	170	115/1/60	6.8	8.5	15	21.83	86	30.26	570	8	60	10.38	59.5	9.75	1-10
UV-236	236	CARRIER	40UV11250	VERT., FLR.	TOP GR.	BOTT. GR.	NEW WB/GR	1250	410	HS-ECM	1/2	3.0	-	-	-	-	-	50	5.0	10.0	47.0	84.1	190	170	115/1/60	6.8	8.5	15	21.83	86	30.26	570	8	60	10.38	59.5	9.75	1-10
UV-301	301	CARRIER	40UV11500	VERT., FLR.	TOP GR.	BOTT. GR.	NEW WB/GR	1500	280	HS-ECM	1/2	3.5	44	2	45.6	56.9	84.1	-	-	-	-	-	-	-	115/1/60	6.8	8.5	15	21.83	98	30.26	630	8	72	10.38	71.5	9.75	1-10
UV-304	304	CARRIER	40UV10750	VERT., FLR.	TOP GR.	BOTT. GR.	NEW WB/GR	750	190	HS-ECM	1/2	1.5	26	2	26.9	52.3	84.4	-	-	-	-	-	-	-	115/1/60	6.8	8.5	15	21.83	62	30.26	445	8	36	10.38	35.5	9.75	1-10
UV-306	306	CARRIER	40UV10750	VERT., FLR.	TOP GR.	BOTT. GR.	NEW WB/GR	750	180	HS-ECM	1/2	1.5	24	2	24.9	53.2	82.8	-	-	-	-	-	-	-	115/1/60	6.8	8.5	15	21.83	62	30.26	445	8	36	10.38	35.5	9.75	1-10
UV-311	311	CARRIER	40UV11500	VERT., FLR.	TOP GR.	BOTT. GR.	NEW WB/GR	1500	430	HS-ECM	1/2	3.5	57	2	59.1	49.9	85.1	-	-	-	-	-	-	-	115/1/60	6.8	8.5	15	21.83	98	30.26	630	8	72	10.38	71.5	9.75	1-10
UV-313	313	CARRIER	40UV11250	VERT., FLR.	TOP GR.	BOTT. GR.	NEW WB/GR	1250	370	HS-ECM	1/2	3.0	54	2	56.0	49.3	89.3	-	-	-	-	-	-	-	115/1/60	6.8	8.5	15	21.83	86	30.26	570	8	60	10.38	59.5	9.75	1-10
UV-314	314	CARRIER	40UV11250	VERT., FLR.	TOP GR.	BOTT. GR.	NEW WB/GR	1250	320	HS-ECM	1/2	3.0	47	2	48.7	52.1	86.9	-	-	-	-	-	-	-	115/1/60	6.8	8.5	15	21.83	86	30.26	570	8	60	10.38	59.5	9.75	1-10
UV-315	315	CARRIER	40UV11250	VERT., FLR.	TOP GR.	BOTT. GR.	NEW WB/GR	1250	400	HS-ECM	1/2	3.0	50	2	51.8	47.6	84.6	-	-	-	-	-	-	-	115/1/60	6.8	8.5	15	21.83	86	30.26	570	8	60	10.38	59.5	9.75	1-10
UV-316	316	CARRIER	40UV11500	VERT., FLR.	TOP GR.	BOTT. GR.	NEW WB/GR	1500	470	HS-ECM	1/2	3.5	63	2	65.3	48.1	87.0	-	-	-	-	-	-	-	115/1/60	6.8	8.5	15	21.83	98	30.26	630	8	72	10.38	71.5	9.75	1-10
UV-317	317	CARRIER	40UV11250	VERT., FLR.	TOP GR.	BOTT. GR.	NEW WB/GR	1250	260	HS-ECM	1/2	3.0	39	2	40.4	55.4	84.3	-	-	-	-	-	-	-	115/1/60	6.8	8.5	15	21.83	86	30.26	570	8	60	10.38	59.5	9.75	1-10

NOTES:

1. PROVIDE UNITS WITH DISCONNECT SWITCHES.
2. PROVIDE FLOOR UNITS WITH 6" FALSE BACK (REAR OA & OPEN PIPE TUNNEL) FOR WALL BOX/LOUVER ALIGNMENTS.
3. UNIT COLOR TO BE SELECTED BY THE ARCHITECT. PROVIDE COLOR CHART. COORDINATE FIN TUBE OR PIPING ENCLOSURE COLOR WITH UV COLOR.
4. PROVIDE UV MANUFACTURER'S "DDC READY CONTROLS." INCLUDES FAN RELAY, 24V CONTROL CIRCUIT TRANSFORMER, SENSORS (OA, RA, SA), TERMINAL STRIP. BAS VENDOR FIELD SUPPLIES THE BACNET-COMPATIBLE CONTROLLER. SEE UV CONTROL SCHEMATIC FOR POINTS LIST.
5. PROVIDE MERV 13 FILTERS AND HIGH STATIC ECM MOTORS (WITH 3-SPEED SWITCH).
6. APPROVED UV CONTROLLER TO BE FURNISHED, FIELD INSTALLED, AND WIRED BY ATC/DDC CONTRACTOR. ATC/DDC CONTROL SYSTEM VENDOR SHALL COORDINATE CONTROL INTERFACES WITH THE UV MANUFACTURER.
7. PROVIDE DX COOLING COIL (R-454B REFRIGERANT) FOR FUTURE CONNECTION TO CONDENSING UNIT.
8. PROVIDE MANUFACTURER'S WARRANTY.
9. UVS SHALL BE PROVIDED WITH STANDARD WALL BOX AND OUTSIDE AIR INTAKE LOUVER BY MANUFACTURER.
10. FACTORY-INSTALLED A2L REFRIGERANT LEAK DETECTION SYSTEM WITH REQUIRED DEVICES (FOR FUTURE COOLING/CONDENSING UNIT).

EXHAUST FAN SCHEDULE

TAG	SERVICE	LOCATION	MFG	MODEL	TYPE	DRIVE	AIRFLOW (CFM)	ESP (IN WG)	FAN SPEED (RPM)	SOUND POWER (SONES)	MOTOR DATA V/P/H	MOTOR DATA HP	MOTOR DATA FLA (AMPS)	MOTOR DATA MCA	MOTOR DATA MOP	PHYSICAL DATA DUCT CONN. L (IN)	PHYSICAL DATA DUCT CONN. W (IN)	PHYSICAL DATA FAN DIMENSIONS W (IN)	PHYSICAL DATA FAN DIMENSIONS H (IN)	PHYSICAL DATA ROOF OPENING L (IN)	PHYSICAL DATA ROOF OPENING W (IN)	PHYSICAL DATA WEIGHT W/O ACC. (LBS.)	NOTES
EF-1	1ST FL. ART ROOM	ROOF	GREENHECK	G-120-VG	DOWNBLAST, CENTRIFUGAL	DIRECT	838	0.285	911	5.7	115/60/1	1/4	3.50	4.0	15	12	12	25	40	15.5	15.5	43	1-11
EF-3	1ST FL. TOILETS	ROOF	GREENHECK	CUE-140-VG	UPBLAST, CENTRIFUGAL	DIRECT	800	0.302	736	4.3	115/1/60	1/4	3.50	4.0	15	16	16	29	39	18.5	18.5	64	1-11
EF-4	BASEMENT & 1ST FL. CLASSROOMS	ROOF	GREENHECK	CUE-300HP-VG	UPBLAST, CENTRIFUGAL	DIRECT	6,700	0.403	681	15.9	208/60/3	3.0	9.10	11.0	25	34	34	50	48	36.5	36.5	247	1-11
EF-6	BASEMENT MUSIC ROOM	ROOF	GREENHECK	G-098-VG	DOWNBLAST, CENTRIFUGAL	DIRECT	300	0.289	943	4.0	115/1/60	1/4	2.85	4.0	15	12	12	25	36	15.5	15.5	36	1-11
EF-8	1ST & 2ND FL TOILETS	ROOF	GREENHECK	G-080-VG	DOWNBLAST, CENTRIFUGAL	DIRECT	240	0.459	1507	7.2	115/1/60	1/10	1.38	2.0	15	10	10	22	27	13.5	13.5	24	1-11
EF-9	1ST & 2ND FL TOILETS	ROOF	GREENHECK	G-080-VG	DOWNBLAST, CENTRIFUGAL	DIRECT	240	0.459	1507	7.2	115/1/60	1/10	1.38	2.0	15	10	10	22	27	13.5	13.5	24	1-11
EF-10	BASEMENT, 1ST, & 2ND FL.	ROOF	GREENHECK	G-200-VG	DOWNBLAST, CENTRIFUGAL	DIRECT	2,500	0.535	718	8.1	208/60/3	1.0	3.60	5.0	15	24	24	36	40	26.5	26.5	105	1-11
EF-11	BASEMENT, 1ST, & 2ND FL.	ROOF	GREENHECK	G-200-VG	DOWNBLAST, CENTRIFUGAL	DIRECT	2,500	0.535	718	8.1	208/60/3	1.0	3.60	5.0	15	24	24	36	40	26.5	26.5	105	1-11
EF-12	BASEMENT, 1ST, & 2ND FL.	ROOF	GREENHECK	G-200-VG	DOWNBLAST, CENTRIFUGAL	DIRECT	2,500	0.535	718	8.1	208/60/3	1.0	3.60	5.0	15	24	24	36	40	26.5	26.5	105	1-11
EF-13	BASEMENT, 1ST, & 2ND FL.	ROOF	GREENHECK	G-200-VG	DOWNBLAST, CENTRIFUGAL	DIRECT	2,500	0.535	718	8.1	208/60/3	1.0	3.60	5.0	15	24	24	36	40	26.5	26.5	105	1-11
EF-105	SCIENCE CLASSROOM 105	ROOF	GREENHECK	CUE-140-VG	UPBLAST, CENTRIFUGAL	DIRECT	1,650	0.58	1,200	10.9	115/1/60	1/2	6.60	8.2	15	16	16	29	39	18.5	18.5	85	1-11
EF-107	SCIENCE CLASSROOM 107	ROOF	GREENHECK	CUE-140-VG	UPBLAST, CENTRIFUGAL	DIRECT	1,500	0.58	1,142	10.4	115/1/60	1/2	6.60	8.2	15	16	16	29	39	18.5	18.5	85	1-11
EF-315	SCIENCE CLASSROOM 315	ROOF	GREENHECK	CUE-140-VG	UPBLAST, CENTRIFUGAL	DIRECT	1,200	0.57	1,042	8.9	115/1/60	1/2	6.60	8.2	15	16	16	29	39	18.5	18.5	85	1-11
EF-316	SCIENCE CLASSROOM 316	ROOF	GREENHECK	CUE-140-VG	UPBLAST, CENTRIFUGAL	DIRECT	1,500	0.58	1,142	10.4	115/1/60	1/2	6.60	8.2	15	16	16	29	39	18.5	18.5	85	1-11

NOTES:

1. EXHAUST FANS SHALL BE INTERLOCKED WITH EXISTING BUILDING MANAGEMENT SYSTEM. PROVIDE MANUAL OVERRIDE SWITCH.
2. PROVIDE VARI-GREEN EC MOTOR WITH DIAL-ON-MOTOR FOR BALANCING.
3. FAN SHALL BE UL-705 LISTED, AMCA CERTIFIED.
4. PROVIDE FAN WITH HIGH-WIND RATED ROOF CURB (12 INCHES HIGH).
5. PROVIDE FIELD-APPLIED FOAMED CURB SEAL.
6. PROVIDE NEMA-3R TOGGLE DISCONNECT SWITCH.
7. JUNCTION BOX SHALL BE MOUNTED & WIRED IN WEATHER-PROTECTED MOTOR COMPARTMENT.
8. PROVIDE ALUMINUM BIRDSCREEN, GALVANIZED, 84% FREE AREA.
9. ALUMINUM WHEEL MATERIAL.
10. PROVDE WITH GRAVITY BACKDRAFT DAMPER.
11. PROVIDE WITH THE MANUFACTURER'S STANDARD WARRANTY.

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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:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202
SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT M
MECHANICAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

MECHANICAL SCHEDULES

DRAWING No.

MS-M 601.00

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VRF INDOOR UNIT SCHEDULE

TAG	AREA SERVED	MANUFACTURER	MODEL NO.	TYPE	ASSOCIATED OUTDOOR UNIT	SUPPLY FAN DATA AIRFLOW SA CFM	AIRFLOW OA CFM	ESP RANGE (IN WG)	HEAT PUMP HTG DATA NOM. HTG (MBH)	EAT DB DEG F	DX COOLING DATA NOM. CLG TONS	NOM. TOTAL MBH	CLG SENS. MBH	EAT DB/WB DEG F	REFRIG.	ELECTRICAL DATA V/PH/HZ	MCA (AMPS)	MOCP (AMPS)	PHYSICAL DATA WIDTH (IN)	HEIGHT (IN)	DEPTH (IN)	WEIGHT (LBS)	NOTES
IDU-201	MAIN OFF 201/PRINC ASST 201B	TOSHIBA CARRIER	MMD-UB0241BHP-UL	DUCTED CONCEALED	ODU-1	705	ERV	0.6-0.8	27.0	70	2.0	24.0	18.0	80/67	R-454B	208-1-60	2.23	15	55-1/8	10-7/8	29-1/2	93	1-9
IDU-201A	PRINCIPAL OFFICE 201A	TOSHIBA CARRIER	MMD-UB0151BHP-UL	DUCTED CONCEALED	ODU-1	590	ERV	0.6-0.8	17.0	70	1.28	15.4	11.6	80/67	R-454B	208-1-60	1.91	15	39-3/8	10-7/8	29-1/2	73	1-9
IDU-201G	RECEPT 201C/SECR 201G	TOSHIBA CARRIER	MMD-UB0211BHP-UL	DUCTED CONCEALED	ODU-1	705	ERV	0.6-0.8	24.0	70	1.75	21.0	15.8	80/67	R-454B	208-1-60	2.23	15	55-1/8	10-7/8	29-1/2	93	1-9
IDU-201D	SUPERINTENDENT 201D	TOSHIBA CARRIER	MMD-UB0361BHP-UL	DUCTED CONCEALED	ODU-1	1,130	ERV	0.6-0.8	40.0	70	3.0	36.0	27.0	80/67	R-454B	208-1-60	3.39	15	55-1/8	10-7/8	29-1/2	93	1-9
IDU-203	OFFICE 203/FILING 203D	TOSHIBA CARRIER	MMD-UB0241BHP-UL	DUCTED CONCEALED	ODU-2	705	ERV	0.6-0.8	27.0	70	2.0	24.0	18.0	80/67	R-454B	208-1-60	2.23	15	55-1/8	10-7/8	29-1/2	93	1-9
IDU-203A	OFFICE 203A	TOSHIBA CARRIER	MMU-UB0241HP-UL	4-WAY CASSETTE	ODU-2	670	ERV	N/A	27.0	70	2.0	24.0	16.5	80/67	R-454B	208-1-60	1.09	15	33-1/8	10-1/8	33-1/8	51	1-9
IDU-203C	OFFICE 203C	TOSHIBA CARRIER	MMU-UB0091MHP-UL	COMP 4-WAY CASSETTE	ODU-2	340	ERV	N/A	10.5	70	0.79	9.5	9.1	80/67	R-454B	208-1-60	0.43	15	22-5/8	10-1/8	22-5/8	35	1-9
IDU-205	OFFICE 205/FAC LOUNGE 205C	TOSHIBA CARRIER	MMD-UB0211BHP-UL	DUCTED CONCEALED	ODU-2	705	ERV	0.6-0.8	24.0	70	1.75	21.0	15.8	80/67	R-454B	208-1-60	2.23	15	55-1/8	10-7/8	29-1/2	93	1-9
IDU-205A	OFFICE 205A	TOSHIBA CARRIER	MMU-UB0121MHP-UL	COMP 4-WAY CASSETTE	ODU-2	350	ERV	N/A	13.5	70	1.00	12.0	11.3	80/67	R-454B	208-1-60	0.44	15	22-5/8	10-1/8	22-5/8	35	1-9

NOTES:
1. FURNISH, INSTALL, AND SIZE REFRIGERANT PIPING AS PER EQUIPMENT MANUFACTURER'S PUBLISHED INSTALLATION INSTRUCTIONS.
2. FURNISH AND INSTALL EACH IDU WITH A REMOTE, WALL-MOUNTED PROGRAMMABLE CONTROLLER/THERMOSTAT.
3. PROVIDE MANUFACTURER'S WARRANTY.
4. PROVIDE MANUFACTURER'S STANDARD FILTER.
5. STANDARD CONDENSATE PUMP WITH 24.3 INCH LIFT CAPABILITY.
6. PROVIDE BACNET SERVER MODULE FOR INTERFACE TO BMS. SIMILAR TO MODEL BMS-IFBN1281U-UL.
7. SYSTEM COMPONENTS INCLUDE REMOTE CONDENSING UNIT AND BRANCH SELECTOR BOX.
8. PROVIDE TOUCH SCREEN CONTROLLER FOR EACH VRF SYSTEM. SIMILAR TO MODEL BMS-CT2560U-UL.O
9. PROVIDE MFR'S LEAK DETECTION SYSTEM INTERFACED WITH IDUs, ODU, BSB, SHUT-OFF VALVES, ALARMS, MFR'S CONTROL SYSTEM, AND ATC/DDC SYSTEM.

VRF OUTDOOR UNIT SCHEDULE

TAG	ZONE	MANUFACTURER	MODEL NO.	DESCRIPTION	NOMINAL COOLING CAP (TONS)	NOMINAL COOLING CAP (MBH)	NOMINAL HEATING CAP (MBH)	MAX CONN INDOOR UNITS	CLG EFF EER / IEER (DUCTED FCUs)	HTG EFF COP @ 47 (DUCTED FCUs)	REFRIG. TYPE	ELECTRICAL DATA V/PH/HZ	MCA (AMPS)	MOCP (AMPS)	PHYSICAL DATA MODULE QTY (EACH)	WIDTH (IN)	HEIGHT (IN)	DEPTH (IN)	WEIGHT (LBS)	NOTES
ODU-1	ADMIN OFFICES	TOSHIBA CARRIER	MMY-MUB0961FT9P-UL	AIR-COOLED HEAT REC.	8	96.0	108.0	17	10.9/21.2	3.88	R-454B	208/3/60	36.6	45	1	39.6	66.5	31.2	553	1-9
ODU-2	SPEC ED OFFICES	TOSHIBA CARRIER	MMY-MUB0961FT9P-UL	AIR-COOLED HEAT REC.	8	96.0	108.0	17	10.9/21.2	3.88	R-454B	208/3/60	36.6	45	1	39.6	66.5	31.2	553	1-9

NOTES:
1. FURNISH AND INSTALL CONDENSING UNITS ON APPROVED WIND-RATED ROOFTOP EQUIPMENT RAIL / ISOLATOR CONNECTIONS (WITH REQUIRED SERVICE/OPERATING CLEARANCES).
2. FURNISH AND INSTALL REFRIGERANT PIPING AS PER EQUIPMENT MANUFACTURER'S PUBLISHED INSTALLATION INSTRUCTIONS.
3. INTEGRATE THE VRF SYSTEM SERVING INDOOR HEAT PUMPS, CONDENSING UNIT, AND BRANCH SELECTOR BOXES INTO THE EXISTING BUILDING ATC/DDC SYSTEM.
4. NOMINAL COOLING CAPACITIES ARE BASED ON INDOOR COIL EAT OF 80/67°F (DB/WB), OUTDOOR OF 95°F (DB).
5. NOMINAL HEATING CAPACITIES ARE BASED ON INDOOR COIL EAT OF 70°F (DB), OUTDOOR OF 43°F (WB).
6. EFFICIENCY VALUES FOR EER, IEER, COP ARE BASED ON AHRI 1230 TEST METHOD FOR MIXTURE OF DUCTED & NON-DUCTED INDOOR UNITS. ALL VALUES SHALL COMPLY WITH NYS ENERGY CODES AND ASHRAE 90.1.
7. ADDED FIELD CHARGE, IN ADDITION TO FACTORY CHARGE, SHALL BE UPDATED BASED UPON FINAL AS-BUILT PIPING LAYOUT (SHOP DRAWING PHASE).
8. ALL COMPRESSORS ARE INVERTER TYPE.
9. PROVIDE MFR'S LEAK DETECTION SYSTEM INTERFACED WITH IDUs (HPs), ODU (CU), BSB, SHUT-OFF VALVES, ALARMS, MFR'S CONTROL SYSTEM, AND ATC/DDC SYSTEM.

VRF BRANCH SELECTOR BOX SCHEDULE

TAG	MANUFACTURER	MODEL NO.	SYSTEM	QUAN. OF PORTS	MAX CAP OF INDOOR UNITS CONNECTED (MBH)	REFRIG. TYPE	ELECTRICAL DATA V/PH/HZ	MCA (AMPS)	MOCP (AMPS)	PHYSICAL DATA WIDTH (IN)	HEIGHT (IN)	DEPTH (IN)	WEIGHT (LBS)	NOTES
BSB-1	TOSHIBA CARRIER	RBM-YB0611FU4P-UL	ADMIN OFF VRF SYSTEM	4	244	R-454B	208/1/60	0.75	15	23.6	11.5	32.7	90	1-6
BSB-2	TOSHIBA CARRIER	RBM-YB0611FU8P-UL	SPEC ED OFF VRF SYSTEM	8	290	R-454B	208/1/60	0.75	15	39.3	11.5	32.7	145	1-6

NOTES:
1. BRANCH SELECTOR BOXES ARE PART OF THE INDICATED VRF HEAT RECOVERY SYSTEM.
2. FURNISH AND INSTALL UNIT & REFRIGERANT PIPING AS PER EQUIPMENT MANUFACTURER'S PUBLISHED INSTALLATION INSTRUCTIONS.
3. INSTALL WITH MANUFACTURER'S RECOMMENDED SERVICE CLEARANCES.
4. PROVIDE MANUFACTURER'S WARRANTY.
5. GALVANIZED STEEL CASING WITH FACTORY-APPLIED THERMAL INSULATION & INTERNAL CONTROL BOX.
6. PROVIDE MFR'S LEAK DETECTION SYSTEM INTERFACED WITH IDUs (HPs), ODU (CU), BSB, SHUT-OFF VALVES, ALARMS, MFR'S CONTROL SYSTEM, AND ATC/DDC SYSTEM.

ENERGY RECOVERY VENTILATOR SCHEDULE

TAG	SERVICE	MANUFACTURER	MODEL NO.	LOCATION	ENERGY RECOVERY HEAT EXCHANGER DATA TYPE	SUMMER OA (DB)	SUMMER OA (WB)	SUMMER OA (GR/LB)	SUMMER SA (DB)	SUMMER SA (WB)	SUMMER SA (GR/LB)	SUMMER RA (DB)	SUMMER RA (WB)	SUMMER RA (GR/LB)	WINTER OA (DB)	WINTER OA (WB)	WINTER OA (GR/LB)	WINTER SA (DB)	WINTER SA (WB)	WINTER SA (GR/LB)	WINTER RA (DB)	WINTER RA (WB)	WINTER RA (GR/LB)	PERFORMANCE EFFECT. SENS (%)	SUMMER TTL (%)	WINTER TTL (%)	SUPPLY & EXHAUST FAN DATA SA/OA FLOW (CFM)	ESP (IN WG)	MOTOR (HP)	VFD	FLA EACH (AMPS)	ELECTRICAL DATA POWER (V/PH/HZ)	MCA (AMPS)	MOPD (AMPS)	PHYSICAL DATA UNIT CASE L (IN)	W (IN)	H (IN)	WEIGHT (LBS)	NOTES
ERV-1	ADMINISTRATION OFFICES	RENEWAIRE	HE07RTV	ROOF	STATIC PLATE	93.4	75.1	101.8	80.7	69.5	90.1	75.0	62.5	64.7	0.0	0.0	5.5	48.4	39.1	20.4	70.0	51.5	27.1	69.2	48.1	69.1	525	0.5	(2)-0.48	NO	2.76	208/1/60	6.2	15	43-5/8	15-7/8	55-1/4	276	1-14
ERV-2	SPECIAL EDUCATION OFFICES	RENEWAIRE	HE07RTH	ROOF	STATIC PLATE	93.4	75.1	101.8	80.9	69.7	91.1	75.0	62.5	64.7	0.0	0.0	5.5	47.4	38.4	20.1	70.0	51.5	27.1	67.8	46.0	67.7	575	0.5	(2)-0.44	NO	1.55	208/1/60	3.5	15	43-5/8	15-7/8	55-1/4	288	1-14

NOTES:
1. OUTDOOR AIR FILTERS: 2" PLEATED MERV 13. RETURN AIR FILTERS: 2" THICK PLEATED MERV 8.
2. DIGITAL TIMECLOCK, WALL MOUNT, MODEL TC7D-W.
3. PROVIDE UNITS WITH STANDARD WIND-RATED ROOF CURB.
4. ERV-1 SHALL HAVE DOWNFLOW DUCT CONFIGURATION (HE07RTV). ERV-2 SHALL HAVE HORIZONTAL DUCT CONFIGURATION (HE07RTH).
5. ADVANCED EC DIRECT-DRIVE MOTORIZED IMPELLERS - OUTSIDE AIR & EXHAUST AIR FAN MOTORS.
6. FLOW CONTROL: ENTHALPIC, EXTERNAL BYPASS, MOTORIZED DAMPERS, BOTH AIRSTREAMS.
7. UNIT CONTROLS: TERMINAL STRIP FOR EC MOTORS.
8. NON-FUSED DISCONNECT SWITCH.
9. CONTROL OPTION: TRANSFORMER WITH ISOLATION RELAY.
10. AHRI 1060 CERTIFIED, UL LISTED.
11. ENERGY RECOVERY ENTHALPY CORE.
12. PROVIDE MANUFACTURER'S WARRANTY.
13. INTERFACE ERV WITH THE EXISTING BUILDING ATC/DDC SYSTEM.
14. INTERLOCK ERV WITH ELECTRIC DUCT HEATERS AND VRF HEAT RECOVERY SYSTEMS AS INDICATED ON THE DRAWINGS.

CEILING CABINET UNIT HEATER SCHEDULE

TAG	ZONE SERVED	MANUFACTURER	MODEL NO.	MOUNTING TYPE	SA CONFIG.	RA CONFIG.	OA CONFIG.	FAN DATA SA (CFM)	OA (CFM)	ESP (IN. WC)	ECM MOTOR HP	ECM MOTOR RPM (HIGH SPD)	HOT WATER HEATING DATA CAP. (MBH)	EAT (F)	LAT (F)	EWT (F)	LWT (F)	FLOW (GPM)	ROWS	WPD MAX. (FT HD)	ELECTRICAL DATA POWER V/PH/HZ	FAN MOTOR (HP)	MCA (AMPS)	MOP (AMPS)	PHYSICAL DATA L (IN)	W (IN)	H (IN)	WEIGHT (LBS)	NOTES
CUH-1-1	CORR. HW-1A	TRANE	FFEB-040	HORIZONTAL, RECESSED	BOTT. GR.	BOTT. GR.	TOP/BACK DUCT	400	150	N/A	0.13	1319	33.0	43.8	120.0	190	150	1.6	2	5	115/1/60	0.13	2.44	15	38	30	11	88	1 TO 12
CUH-1-2	CORR. HW-1B	TRANE	FFEB-040	HORIZONTAL, RECESSED	BOTT. GR.	BOTT. GR.	TOP/BACK DUCT	400	60	N/A	0.13	1319	28.6	59.5	125.8	190	150	1.4	2	5	115/1/60	0.13	2.44	15	38	30	11	88	1 TO 12
CUH-1-3	CORR. HW-1C	TRANE	FFEB-040	HORIZONTAL, RECESSED	BOTT. GR.	BOTT. GR.	TOP/BACK DUCT	400	70	N/A	0.13	1319	29.1	57.8	125.1	190	150	1.5	2	5	115/1/60	0.13	2.44	15	38	30	11	88	1 TO 12
CUH-1-4	CORR. HW-1D	TRANE	FFEB-040	HORIZONTAL, RECESSED	BOTT. GR.	BOTT. GR.	TOP/BACK DUCT	400	70	N/A	0.13	1319	29.1	57.8	125.1	190	150	1.5	2	5	115/1/60	0.13	2.44	15	38	30	11	88	1 TO 12
CUH-2-1	CORR./LOBBY L-2	TRANE	FFEB-040	HORIZONTAL, RECESSED	BOTT. GR.	BOTT. GR.	TOP/BACK DUCT	400	200	N/A	0.13	1319	35.4	35.0	116.9	190	150	1.8	2	5	115/1/60	0.13	2.44	15	38	30	11	88	1 TO 12
CUH-2-2	CORR. HW-2D	TRANE	FFEB-040	HORIZONTAL, RECESSED	BOTT. GR.	BOTT. GR.	TOP/BACK DUCT	400	120	N/A	0.13	1319	31.5	49.0	122.0	190	150	1.6	2	5	115/1/60	0.13	2.44	15	38	30	11	88	1 TO 12
CUH-2-3	CORR. HW-2E	TRANE	FFEB-040	HORIZONTAL, RECESSED	BOTT. GR.	BOTT. GR.	TOP/BACK DUCT	400	70	N/A	0.13	1319	29.1	57.8	125.1	190	150	1.5	2	5	115/1/60	0.13	2.44	15	38	30	11	88	1 TO 12
CUH-3-1	CORR. HW-3A	TRANE	FFEB-040	HORIZONTAL, RECESSED	BOTT. GR.	BOTT. GR.	TOP/BACK DUCT	400	130	N/A	0.13	1319	32.0	47.3	121.3	190	150	1.6	2	5	115/1/60	0.13	2.44	15	38	30	11	88	1 TO 12
CUH-3-2	CORR. HW-3B	TRANE	FFEB-040	HORIZONTAL, RECESSED	BOTT. GR.	BOTT. GR.	TOP/BACK DUCT	400	110	N/A	0.13	1319	31.0	50.8	122.6	190	150	1.6	2	5	115/1/60	0.13	2.44	15	38	30	11	88	1 TO 12
CUH-220I	220I B. TOILET	TRANE	FFEB-040	HORIZONTAL, RECESSED	BOTT. GR.	BOTT. GR.	N/A	400	0	N/A	0.13	1319	20.0	70.0	116.3	190	150	1.0	2	5	115/1/60	0.13	2.44	15	38	30	11	88	1 TO 12
CUH-220G	220G G. TOILET	TRANE	FFEB-040	HORIZONTAL, RECESSED	BOTT. GR.	BOTT. GR.	N/A	400	0	N/A	0.13	1319	20.0	70.0	116.3	190	150	1.0	2	5	115/1/60	0.13	2.44	15	38	30	11	88	1 TO 12

NOTES:
1. ECM FAN MOTOR SIZED FOR ESP INDICATED.
2. CONTRACTOR SHALL FIELD-COORDINATE LEFT-HAND OR RIGHT-HAND PIPING CONNECTIONS.
3. 1" MERV 13 FILTER.
4. DISCONNECT SWITCH.
5. COORDINATE ALL CONTROLS WITH THE EXISTING ATC/DDC SYSTEM, INCLUDING THERMOSTATS, LOW LIMIT SENSOR, CONTROL VALVES, DAMPERS, AND OTHER ITEMS/INTERFACES.
6. WHERE SHOWN ON THE DRAWINGS, CABINET HEATERS HAVE A REMOTE OUTSIDE AIR DAMPER. (COORDINATE WITH THE CABINET HEATER CONTROLS).
7. INSTALL AS PER MANUFACTURER'S RECOMMENDATIONS AND INSTALLATION INSTRUCTIONS.
8. FOR CEILING UNITS, PROVIDE RECESSING FLANGE AS REQUIRED.
9. SINGLE POINT POWER CONNECTION.
10. COLOR SHALL BE SELECTED BY THE ARCHITECT. PROVIDE COLOR CHART.
11. PROVIDE MANUFACTURER'S WARRANTY.
12. WHERE APPLICABLE, PROVIDE OPTIONAL PIPING PACKAGES THAT MATCH THE DRAWING COIL PIPING DETAILS (SHUTOFF VALVES, BALANCING VALVES, AIR VENTS, ETC.).

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

PROJECT No: SMSD2507 | DATE: JULY 2026 | SCALE: AS SHOWN

CLIENT
SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202
SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT
CONTRACT M MECHANICAL CONSTRUCTION

STATUS
SED SUBMISSION

SHEET TITLE
MECHANICAL SCHEDULES

DRAWING No.
MS-M 602.00

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DIFFUSER, REGISTER, & GRILLE SCHEDULE

TAG	TYPE	MANUFACTURER	MODEL	MOUNT TYPE	MODULE SIZE (INCH)	NECK SIZE (INCH)	AIRFLOW RANGE (CFM)	MAX NC RATING	MAX PRESS LOSS (IN WG)	NOTES
CD-1	CEILING DIFFUSER	TITUS	OMNI	LAY-IN	24x24	8" DIA	0-250	20	0.05	1,4-6
CD-2	CEILING DIFFUSER	TITUS	OMNI	LAY-IN	24x24	10" DIA	251-399	20	0.05	1,4-6
CD-3	CEILING DIFFUSER	TITUS	OMNI	LAY-IN	24x24	12" DIA	400-600	20	0.05	1,4-6
CD-4	CEILING DIFFUSER	TITUS	OMNI	LAY-IN	12x12	6" DIA	0-100	20	0.05	1,4-6
CD-5	CEILING DIFFUSER	TITUS	OMNI	LAY-IN	12x12	8" DIA	101-250	20	0.05	1,4-6
CD-6	CEILING DIFFUSER	TITUS	OMNI	LAY-IN	12x12	10" DIA	251-399	20	0.05	1,4-6
RD-1	RETURN DIFFUSER	TITUS	PAR	LAY-IN	24x24	12x12	0-500	20	0.05	2,4-6
RD-2	RETURN DIFFUSER	TITUS	PAR	LAY-IN	24x24	15x15	501-750	20	0.05	2,4-6
RD-3	RETURN DIFFUSER	TITUS	PAR	LAY-IN	24x24	22x22	750-1000	20	0.05	2,4-6
RD-4	RETURN DIFFUSER	TITUS	PAR	LAY-IN	12x12	10x10	0-250	20	0.05	2,4-6
RG-1	RETURN GRILLE	TITUS	355RL	SURFACE/LAY-IN	NECK + 2"	6x6	0-75	20	0.05	3-6
RG-2	RETURN GRILLE	TITUS	355RL	SURFACE/LAY-IN	NECK + 2"	8x8	76-150	20	0.05	3-6
RG-3	RETURN GRILLE	TITUS	355RL	SURFACE/LAY-IN	NECK + 2"	10x10	151-250	20	0.05	3-6

NOTES:
1. CEILING DIFFUSERS SHALL BE STEEL CONSTRUCTION WITH SINGLE-FACE PANEL PROJECTING NO MORE THAN 1/4" FROM CEILING.
2. RETURN DIFFUSERS SHALL BE STEEL CONSTRUCTION WITH PERFORATED FACE.
3. RETURN GRILLES SHALL BE STEEL CONSTRUCTION WITH 35-DEGREE FIXED OR ANGLED BLADES SPACED AT 1/2".
4. PROVIDE DEVICE WITH OPPOSED BLADE DAMPER IF VOLUME DAMPER SHOWN ON DRAWING IS NOT POSSIBLE / ACCESSIBLE.
5. PROVIDE MOUNTING KITS TO MATCH CEILING TYPE.
6. COLOR SELECTION BY ARCHITECT / OWNER.

LOUVER SCHEDULE

TAG	SERVICE	MANUFACTURER	MODEL NO.	TYPE	STYLE	AIRFLOW (CFM)	PRESS. DROP (IN WG)	FREE AREA (SQ FT)	AIR VELOCITY (FPM)	DIMENSIONS WIDTH (IN)	DIMENSIONS HEIGHT (IN)	DIMENSIONS DEPTH (IN)	NOTES
LV-1	CUH-1-1	GREENHECK	ESD-435	STATIONARY, DRAINABLE	INTAKE	150	0.10	0.30	500	12	12	4	1-6
LV-2	CUH-1-2	GREENHECK	ESD-435	STATIONARY, DRAINABLE	INTAKE	60	0.10	0.30	200	12	12	4	1-6
LV-3	CUH-1-3	GREENHECK	ESD-435	STATIONARY, DRAINABLE	INTAKE	70	0.10	0.30	233	12	12	4	1-6
LV-4	CUH-1-4	GREENHECK	ESD-435	STATIONARY, DRAINABLE	INTAKE	70	0.10	0.30	233	12	12	4	1-6
LV-5	CUH-2-1	GREENHECK	ESD-435	STATIONARY, DRAINABLE	INTAKE	200	0.10	0.30	667	12	12	4	1-6
LV-6	CUH-2-2	GREENHECK	ESD-435	STATIONARY, DRAINABLE	INTAKE	120	0.10	0.30	400	12	12	4	1-6
LV-7	CUH-2-3	GREENHECK	ESD-435	STATIONARY, DRAINABLE	INTAKE	70	0.10	0.30	233	12	12	4	1-6
LV-8	CUH-3-1	GREENHECK	ESD-435	STATIONARY, DRAINABLE	INTAKE	130	0.10	0.30	433	12	12	4	1-6
LV-9	CUH-3-2	GREENHECK	ESD-435	STATIONARY, DRAINABLE	INTAKE	110	0.10	0.30	367	12	12	4	1-6

NOTES:
1. PROVIDE 2-COAT 70% KYNAR / 100% FLUOROPOLYMER COATING (COORDINATE COLOR WITH OWNER).
2. PROVIDE ALUMINUM BIRD SCREEN.
3. PROVIDE 1 YEAR PRODUCT WARRANTY & 10 YEAR FINISH WARRANTY.
4. PROVIDE ACMA CERTIFICATION.
5. PROVIDE DUCT PLENUM BOX BEHIND LOUVER AS REQUIRED FOR OUTSIDE AIR OR EXHAUST AIR DUCT CONNECTION / TRANSITION.
6. ASSOCIATED CABINET HEATERS HAVE INTEGRAL OUTSIDE AIR DAMPERS.

ELECTRIC DUCT HEATING COIL SCHEDULE

TAG	SERVICE	MANUFACTURER	MODEL	TYPE	DIMENSIONS W (IN)	DIMENSIONS H (IN)	AIRFLOW (CFM)	VEL. (FPM)	STATIC PRESS DROP (IN WG)	HEAT CAP (KW)	EAT (F)	LAT (F)	POWER (V-PH-HZ)	CAP. CONTROL	NOTES
EHC-1	ERV-1	INDEECO	QUA	OPEN COIL	10	10	525	756	0.05	5.0	48.1	78.2	208/3/60	SCR	1-8
EHC-2	ERV-2	INDEECO	QUA	OPEN COIL	12	10	575	690	0.05	5.0	46.0	73.5	208/3/60	SCR	1-8

NOTES:
1. PROVIDE PROPORTIONAL CONTROL USING A SCR PROPORTIONAL POWER CONTROLLER (PREFERRED) OR MAXIMUM MULTIPLE STAGES.
2. PROVIDE AUTOMATIC & MANUAL RESET THERMAL CUTOUTS, AIRFLOW SWITCH, AND MAGNETIC CONTACTORS.
3. PROVIDE CONTROL TRANSFORMER.
4. PROVIDE BUILT-IN, SNAP-ACTING DISCONNECT SWITCH WITH DOOR INTERLOCK.
5. COORDINATE CONTROLS INTERFACE WITH THE ERV SYSTEM (DISCHARGE AIR MAINTAIN MINIMUM 70 DEG F TO ERV INLET).
6. PROVIDE FUSES FOR HEATERS GREATER THAN 48 AMPS.
7. INSTALL HEATERS IN DUCTWORK ACCORDING TO MANUFACTURER'S RECOMMENDATIONS & MINIMUM CLEARANCES.
8. ELBOWS OR TURNS MUST BE LOCATED AT LEAST 4 FEET FROM THE HEATER INLET AND 2 FEET FROM THE HEATER OUTLET.

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CONSULTANTS:

MARK	DATE	DESCRIPTION

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

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:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202
SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT M
MECHANICAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

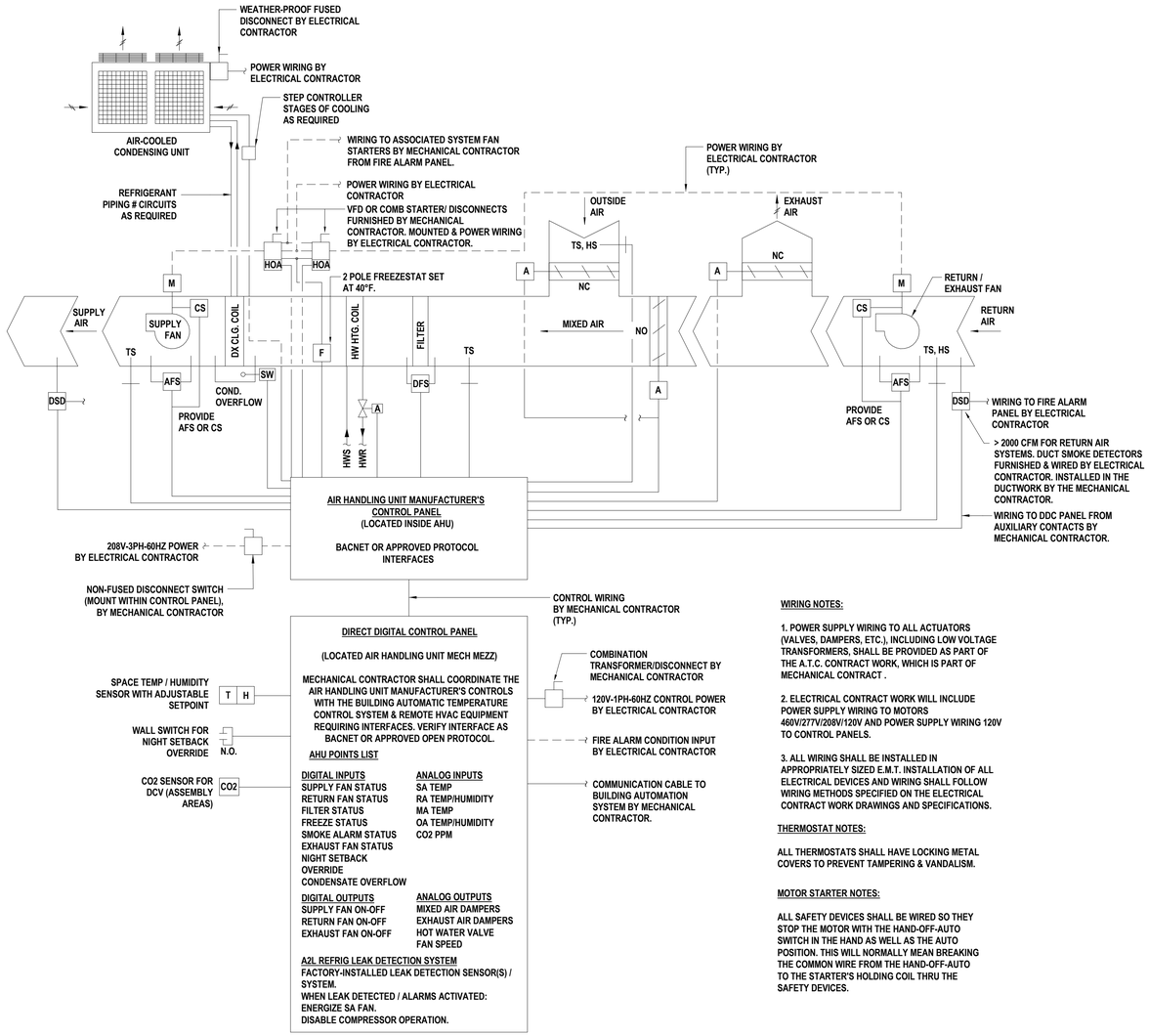
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MS-M 603.00

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WIRING NOTES:

1. POWER SUPPLY WIRING TO ALL ACTUATORS (VALVES, DAMPERS, ETC.), INCLUDING LOW VOLTAGE TRANSFORMERS, SHALL BE PROVIDED AS PART OF THE A.T.C. CONTRACT WORK, WHICH IS PART OF MECHANICAL CONTRACT .

2. ELECTRICAL CONTRACT WORK WILL INCLUDE POWER SUPPLY WIRING TO MOTORS 460V/277V/208V/120V AND POWER SUPPLY WIRING 120V TO CONTROL PANELS.

3. ALL WIRING SHALL BE INSTALLED IN APPROPRIATELY SIZED E.M.T. INSTALLATION OF ALL ELECTRICAL DEVICES AND WIRING SHALL FOLLOW WIRING METHODS SPECIFIED ON THE ELECTRICAL CONTRACT WORK DRAWINGS AND SPECIFICATIONS.

THERMOSTAT NOTES:

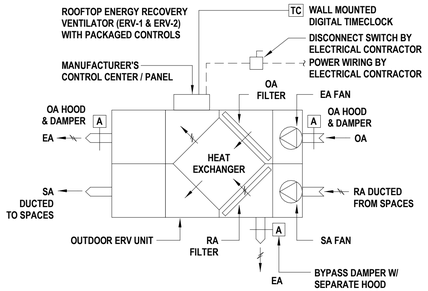
ALL THERMOSTATS SHALL HAVE LOCKING METAL COVERS TO PREVENT TAMPERING & VANDALISM.

MOTOR STARTER NOTES:

ALL SAFETY DEVICES SHALL BE WIRED SO THEY STOP THE MOTOR WITH THE HAND-OFF-AUTO SWITCH IN THE HAND AS WELL AS THE AUTO POSITION. THIS WILL NORMALLY MEAN BREAKING THE COMMON WIRE FROM THE HAND-OFF-AUTO TO THE STARTER'S HOLDING COIL THRU THE SAFETY DEVICES.

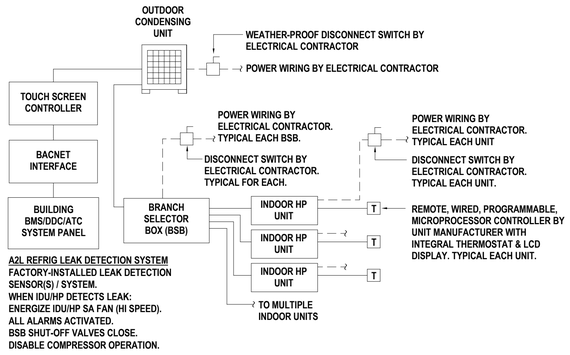
1 AUDITORIUM AIR HANDLING UNIT (AC-1, AC-2A, AC-2B) & SPLIT CONDENSING UNIT (CU-1, CU-2A, CU-2B) CONTROL DIAGRAM

SCALE:NTS



2 ENERGY RECOVERY VENTILATOR (ERV) CONTROL DIAGRAM

SCALE:NTS



A2L REFRIG LEAK DETECTION SYSTEM
FACTORY-INSTALLED LEAK DETECTION SENSOR(S) / SYSTEM.
WHEN IDU/HP DETECTS LEAK:
ENERGIZE IDU/HP SA FAN (HI SPEED).
ALL ALARMS ACTIVATED.
BSB SHUT-OFF VALVES CLOSE.
DISABLE COMPRESSOR OPERATION.

3 VRF HEAT RECOVERY SYSTEM CONTROL DIAGRAM

SCALE:NTS

CONTROLS LEGEND, SYMBOLS AND ABBREVIATIONS

A	ACTUATOR
AFS	AIRFLOW SWITCH
AFMS	AIRFLOW MONITORING STATION
AHU	AIR HANDLING UNIT
ATC	AUTOMATIC TEMPERATURE CONTROLS
BAS	BUILDING AUTOMATION SYSTEM
BDD	BACKDRAFT DAMPER
BSB	BRANCH SELECTOR BOX
CO2	CARBON DIOXIDE
CS	CURRENT SENSOR
CU	CONDENSING UNIT
DDC	DIRECT DIGITAL CONTROLS
DFS	DIRTY FILTER SWITCH
DSD	DUCT SMOKE DETECTOR
DX	DIRECT EXPANSION
EA	EXHAUST AIR
ECM	ELECTRONICALLY COMMUTATED MOTOR
EF	EXHAUST FAN
ERV	ENERGY RECOVERY VENTILATOR
ES	END SWITCH
F	FREEZESTAT
HOA	HAND-OFF-AUTOMATIC
HP	HEAT PUMP
HS	HUMIDITY SENSOR
KEF	KITCHEN EXHAUST FAN
M	MOTOR
MA	MIXED AIR
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
OA	OUTSIDE AIR
OCC	OCCUPANCY SENSOR
PTHP	PACKAGED TERMINAL HEAT PUMP
R	RELAY
RA	RETURN AIR
RH	RELATIVE HUMIDITY
RTU	ROOFTOP UNIT
SA	SUPPLY AIR
SC	SPEED CONTROLLER
SF	SUPPLY FAN
SP	STATIC PRESSURE SENSOR
SW	SWITCH
T	THERMOSTAT
TEMP	TEMPERATURE
TS	TEMPERATURE SENSOR
UV	UNIT VENTILATOR
VFD	VARIABLE FREQUENCY DRIVE
VRF	VARIABLE REFRIGERANT FLOW

GENERAL NOTES:

1. ALL POWER WIRING ABOVE 120V TO BE PROVIDED AND INSTALLED BY THE ELECTRICAL CONTRACTOR, INCLUDING POWER WIRING FOR ALL CONTROL PANELS.
2. ALL WIRING SHALL BE INSTALLED IN APPROPRIATELY SIZED E.M.T. INSTALLATION FOR ALL ELECTRICAL DEVICES. WIRING SHALL FOLLOW WIRING METHODS SPECIFIED ON THE CONTRACT "E" DRAWINGS AND SPECIFICATIONS.
3. LOW VOLTAGE "CONTROL" WIRING, SHALL BE PROVIDED AND INSTALLED BY THE MECHANICAL CONTRACTOR, EXCEPT AS NOTED.
4. REFER TO SPECIFICATIONS FOR SEQUENCE OF OPERATIONS. SEE SPECIFICATIONS FOR ADDITIONAL DETAILS.
5. 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.

THERMOSTAT NOTES:

1. ALL THERMOSTATS SHALL HAVE LOCKING COVERS TO PREVENT TAMPERING AND VANDALISM.

MOTOR STARTER NOTES:

1. ALL SAFETY DEVICES SHALL BE WIRED SO THEY STOP THE MOTOR WITH THE HAND-OFF-AUTO SWITCH IN THE HAND AS WELL AS THE AUTO POSITION. THIS WILL NORMALLY MEAN BREAKING THE COMMON WIRE FROM THE HAND-OFF-AUTO TO THE STARTER'S HOLDING COIL THRU THE SAFETY DEVICES.

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CONSULTANTS:

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05/31/2028
Exp. Date

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

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202
SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT M MECHANICAL CONSTRUCTION

STATUS

SED SUBMISSION

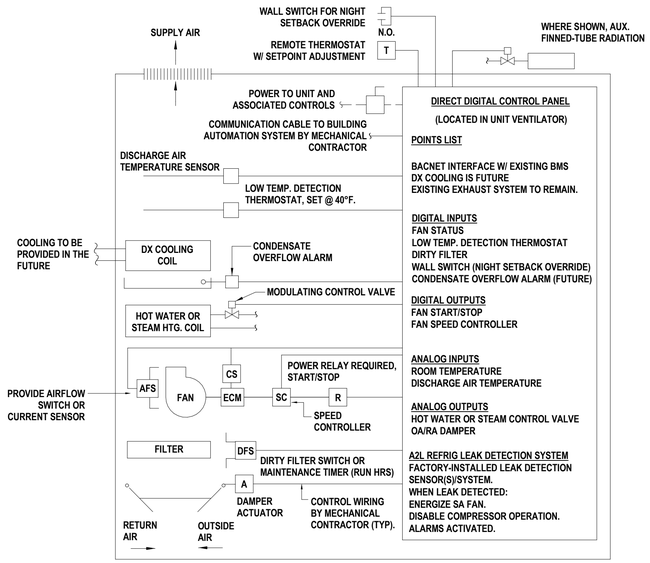
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MECHANICAL CONTROL DIAGRAMS

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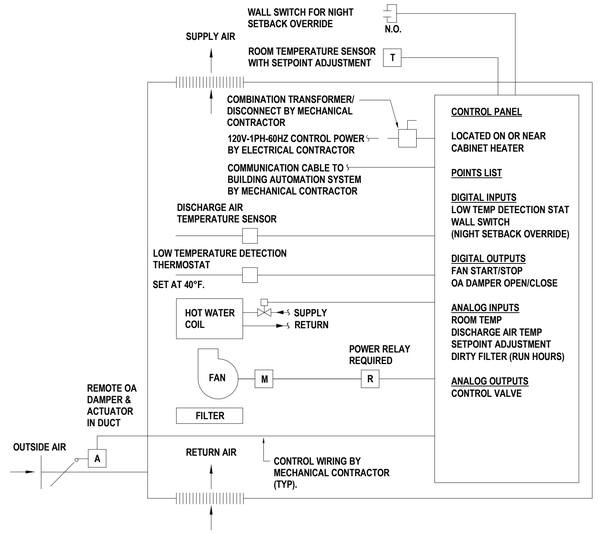
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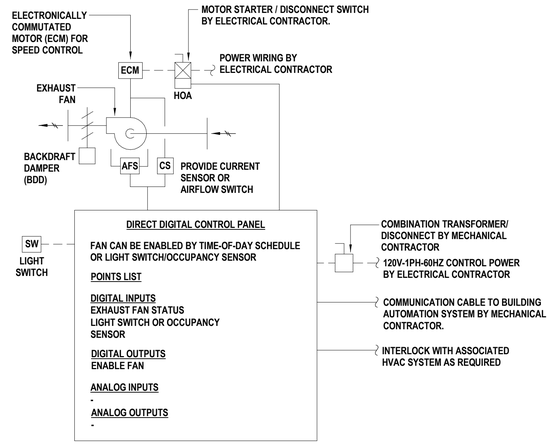
1 UNIT VENTILATOR (UV) CONTROL DIAGRAM

SCALE:NTS



2 HOT WATER CABINET HEATER CONTROL DIAGRAM

SCALE:NTS



3 EXHAUST FAN (EF) CONTROL DIAGRAM

SCALE:NTS

NOTES:

1. APPLICATION: HEATING FOR ENERGY RECOVERY VENTILATOR (ERV).
2. MECHANICAL CONTRACTOR SHALL PROVIDE WIRING DIAGRAM BY ELECTRIC DUCT HEATING COIL MANUFACTURER FOR COORDINATION WITH EXISTING AUTOMATIC TEMPERATURE CONTROL SYSTEM.

4 ELECTRIC DUCT HEATING COIL CONTROL DIAGRAM

SCALE:NTS

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SHEET TITLE

MECHANICAL CONTROL DIAGRAMS

DRAWING No.

MS-M 651.00

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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	
IIIII	5 #12 AWG + #12 AWG GND IN 3/4" E.C. CONCEALED IN WALL OR CEILING	
III	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	
M_{S1}	MAGNETIC STARTER "S1"; SEE STARTER SCHEDULE	
$DS1$	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 5	
FVR 5	FULL VOLTAGE ELECTRICALLY INTERLOCKED 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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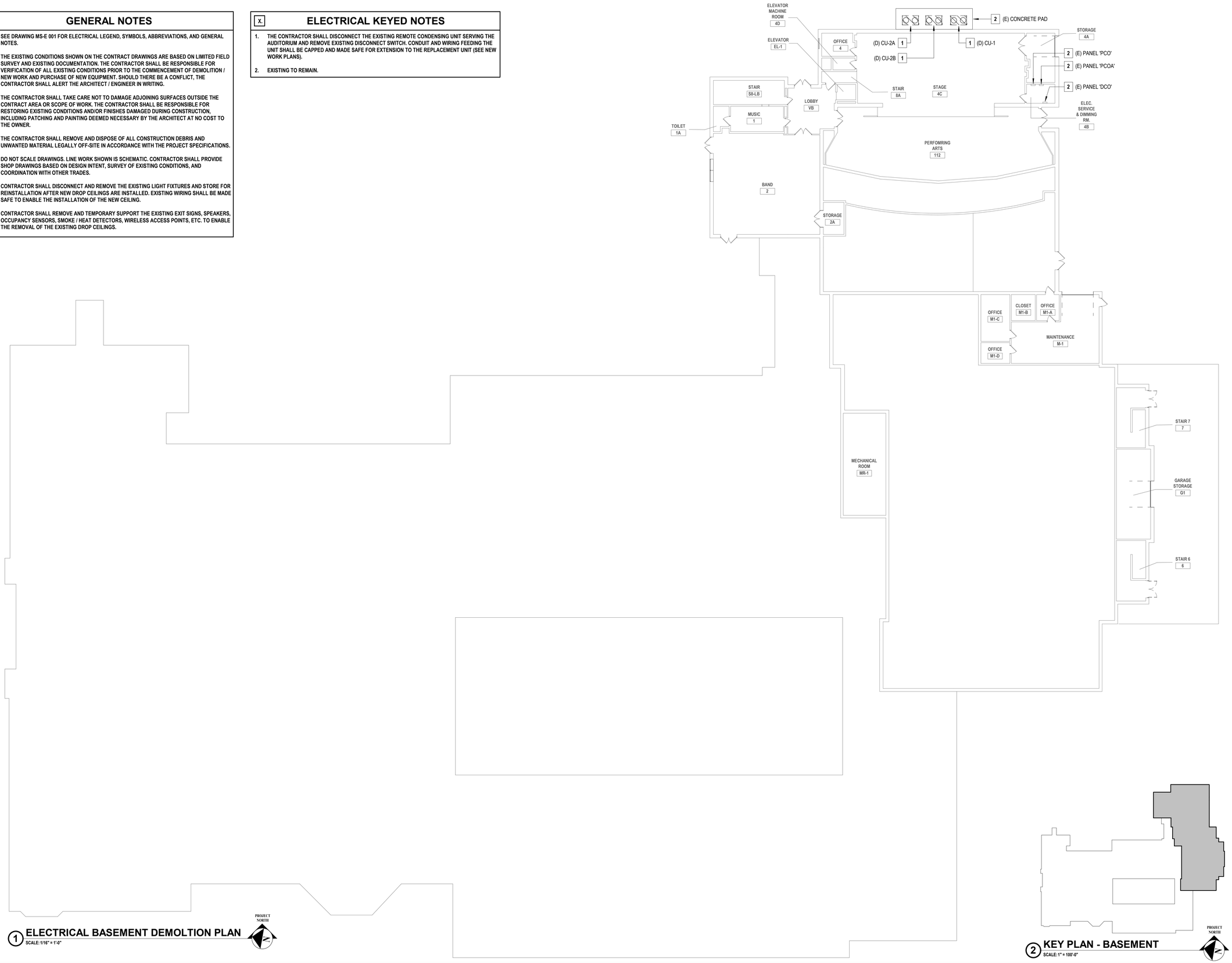
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GENERAL NOTES

1. SEE DRAWING MS-E 001 FOR ELECTRICAL LEGEND, SYMBOLS, ABBREVIATIONS, AND GENERAL NOTES.
2. 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.
3. 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.
4. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL CONSTRUCTION DEBRIS AND UNWANTED MATERIAL LEGALLY OFF-SITE IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS.
5. DO NOT SCALE DRAWINGS. LINE WORK SHOWN IS SCHEMATIC. CONTRACTOR SHALL PROVIDE SHOP DRAWINGS BASED ON DESIGN INTENT, SURVEY OF EXISTING CONDITIONS, AND COORDINATION WITH OTHER TRADES.
6. 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.
7. 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 KEYED NOTES

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



1 ELECTRICAL BASEMENT DEMOLTION PLAN
SCALE: 1/16" = 1'-0"

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

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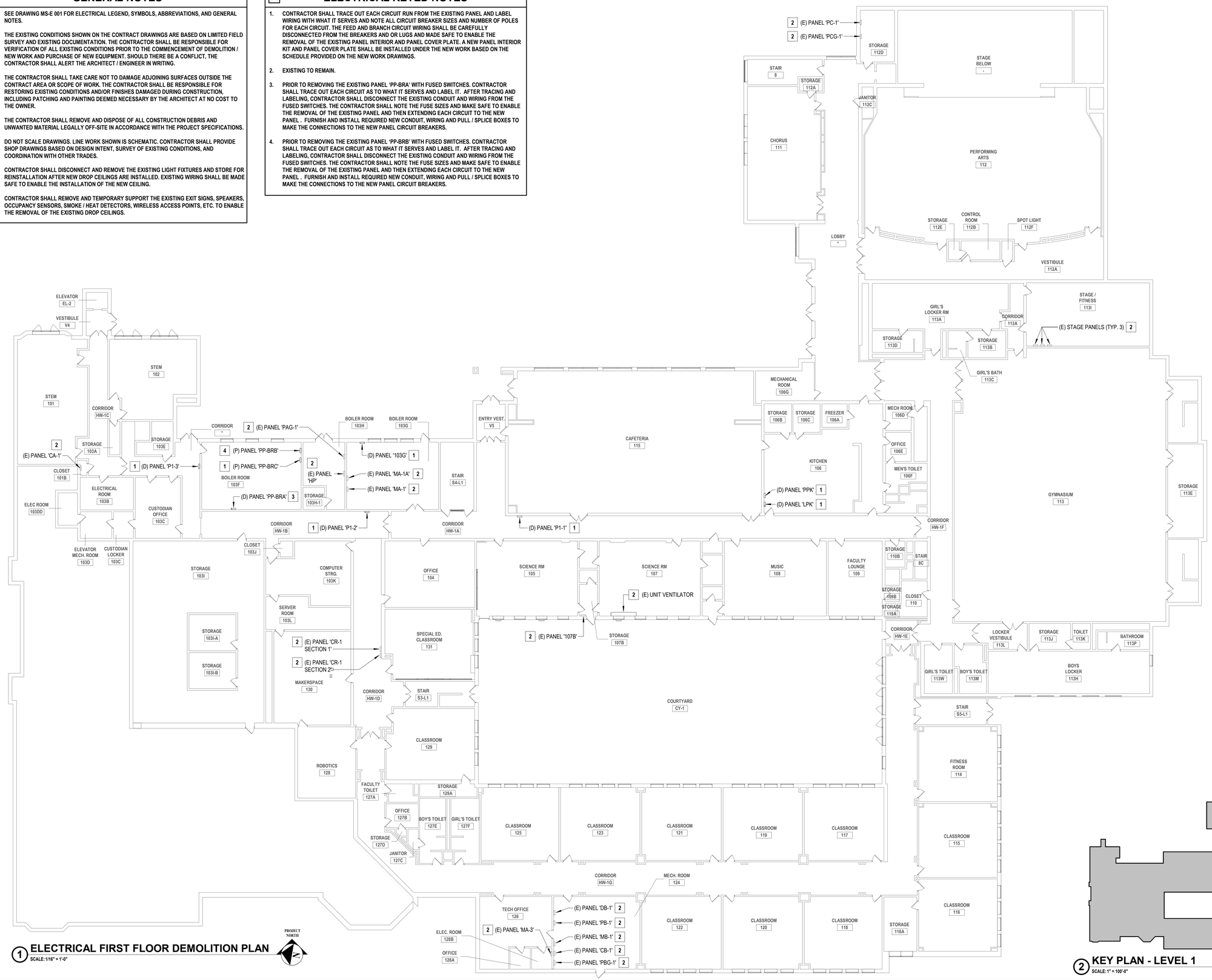
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7. CONTRACTOR SHALL REMOVE AND TEMPORARY SUPPORT THE EXISTING EXIT SIGNS, SPEAKERS, OCCUPANCY SENSORS, SMOKE / HEAT DETECTORS, WIRELESS ACCESS POINTS, ETC. TO ENABLE THE REMOVAL OF THE EXISTING DROP CEILINGS.

X. ELECTRICAL KEYED NOTES

1. CONTRACTOR SHALL TRACE OUT EACH CIRCUIT RUN FROM THE EXISTING PANEL AND LABEL WIRING WITH WHAT IT SERVES AND NOTE ALL CIRCUIT BREAKER SIZES AND NUMBER OF POLES FOR EACH CIRCUIT. THE FEED AND BRANCH CIRCUIT WIRING SHALL BE CAREFULLY DISCONNECTED FROM THE BREAKERS AND OR LUGS AND MADE SAFE TO ENABLE THE REMOVAL OF THE EXISTING PANEL INTERIOR AND PANEL COVER PLATE. A NEW PANEL INTERIOR KIT AND PANEL COVER PLATE SHALL BE INSTALLED UNDER THE NEW WORK BASED ON THE SCHEDULE PROVIDED ON THE NEW WORK DRAWINGS.
2. EXISTING TO REMAIN.
3. PRIOR TO REMOVING THE EXISTING PANEL 'PP-BRA' WITH FUSED SWITCHES. CONTRACTOR SHALL TRACE OUT EACH CIRCUIT AS TO WHAT IT SERVES AND LABEL IT. AFTER TRACING AND LABELING, CONTRACTOR SHALL DISCONNECT THE EXISTING CONDUIT AND WIRING FROM THE FUSED SWITCHES. THE CONTRACTOR SHALL NOTE THE FUSE SIZES AND MAKE SAFE TO ENABLE THE REMOVAL OF THE EXISTING PANEL AND THEN EXTENDING EACH CIRCUIT TO THE NEW PANEL . FURNISH AND INSTALL REQUIRED NEW CONDUIT, WIRING AND PULL / SPLICE BOXES TO MAKE THE CONNECTIONS TO THE NEW PANEL CIRCUIT BREAKERS.
4. PRIOR TO REMOVING THE EXISTING PANEL 'PP-BRB' WITH FUSED SWITCHES. CONTRACTOR SHALL TRACE OUT EACH CIRCUIT AS TO WHAT IT SERVES AND LABEL IT. AFTER TRACING AND LABELING, CONTRACTOR SHALL DISCONNECT THE EXISTING CONDUIT AND WIRING FROM THE FUSED SWITCHES. THE CONTRACTOR SHALL NOTE THE FUSE SIZES AND MAKE SAFE TO ENABLE THE REMOVAL OF THE EXISTING PANEL AND THEN EXTENDING EACH CIRCUIT TO THE NEW PANEL . FURNISH AND INSTALL REQUIRED NEW CONDUIT, WIRING AND PULL / SPLICE BOXES TO MAKE THE CONNECTIONS TO THE NEW PANEL CIRCUIT BREAKERS.



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

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

H 2 M architects + engineers

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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

5.31.2026
J. CHRIS MORRIS III, P.E. — Exp. Date
NY PROFESSIONAL ENGINEER Lic. No. 101154

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

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202
SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT E
ELECTRICAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

ELECTRICAL FIRST FLOOR DEMOLITION PLAN

DRAWING No.

MS-ED 101.00

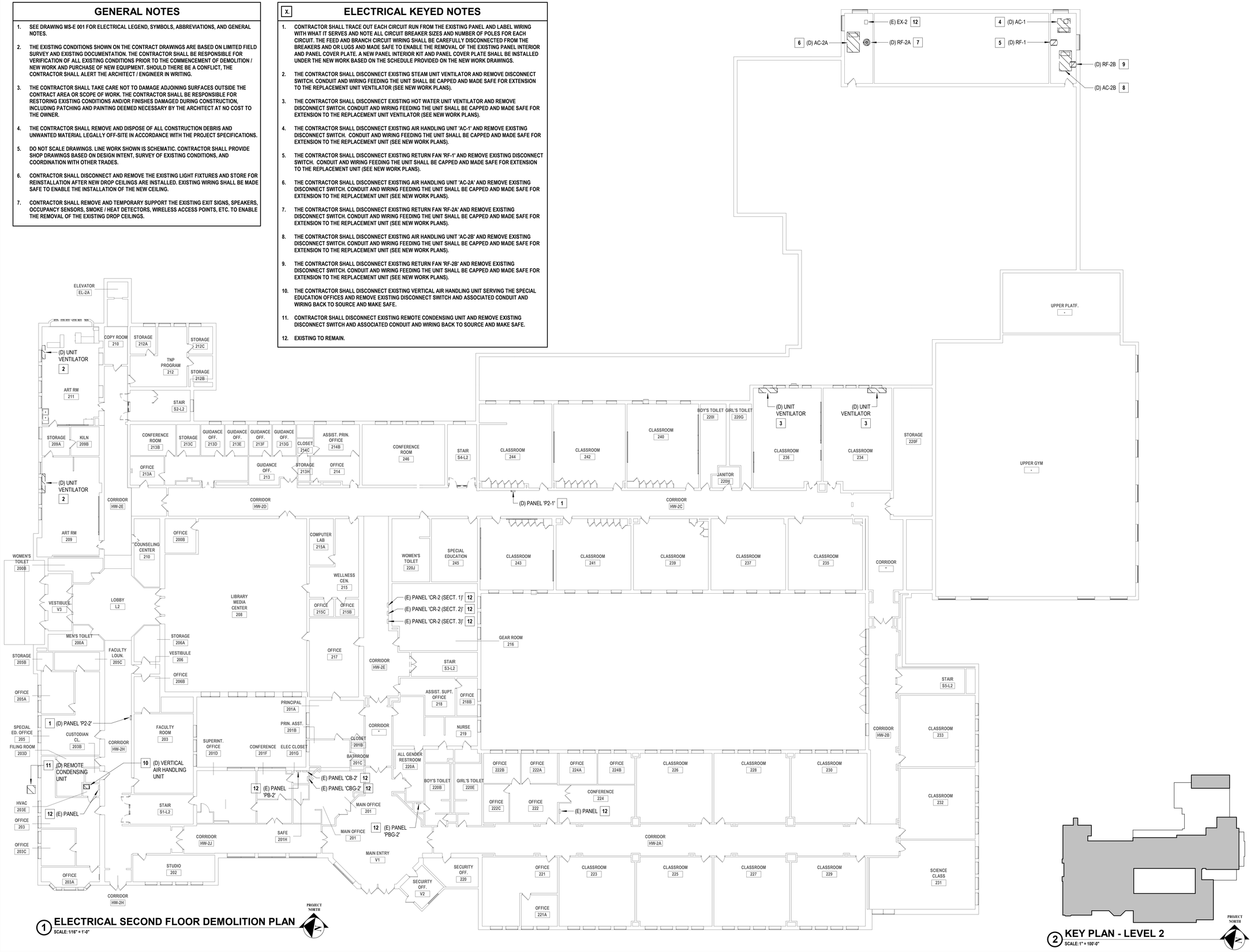
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7/14/2026 3:00:06 PM

GENERAL NOTES

1. SEE DRAWING MS-E 001 FOR ELECTRICAL LEGEND, SYMBOLS, ABBREVIATIONS, AND GENERAL NOTES.
2. 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.
3. 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.
4. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL CONSTRUCTION DEBRIS AND UNWANTED MATERIAL LEGALLY OFF-SITE IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS.
5. DO NOT SCALE DRAWINGS. LINE WORK SHOWN IS SCHEMATIC. CONTRACTOR SHALL PROVIDE SHOP DRAWINGS BASED ON DESIGN INTENT, SURVEY OF EXISTING CONDITIONS, AND COORDINATION WITH OTHER TRADES.
6. 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.
7. 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 KEYED NOTES

1. CONTRACTOR SHALL TRACE OUT EACH CIRCUIT RUN FROM THE EXISTING PANEL AND LABEL WIRING WITH WHAT IT SERVES AND NOTE ALL CIRCUIT BREAKER SIZES AND NUMBER OF POLES FOR EACH CIRCUIT. THE FEED AND BRANCH CIRCUIT WIRING SHALL BE CAREFULLY DISCONNECTED FROM THE BREAKERS AND OR LUGS AND MADE SAFE TO ENABLE THE REMOVAL OF THE EXISTING PANEL INTERIOR AND PANEL COVER PLATE. A NEW PANEL INTERIOR KIT AND PANEL COVER PLATE SHALL BE INSTALLED UNDER THE NEW WORK BASED ON THE SCHEDULE PROVIDED ON THE NEW WORK DRAWINGS.
2. THE CONTRACTOR SHALL DISCONNECT EXISTING STEAM UNIT VENTILATOR AND REMOVE DISCONNECT SWITCH. CONDUIT AND WIRING FEEDING THE UNIT SHALL BE CAPPED AND MADE SAFE FOR EXTENSION TO THE REPLACEMENT UNIT VENTILATOR (SEE NEW WORK PLANS).
3. THE CONTRACTOR SHALL DISCONNECT EXISTING HOT WATER UNIT VENTILATOR AND REMOVE DISCONNECT SWITCH. CONDUIT AND WIRING FEEDING THE UNIT SHALL BE CAPPED AND MADE SAFE FOR EXTENSION TO THE REPLACEMENT UNIT VENTILATOR (SEE NEW WORK PLANS).
4. THE CONTRACTOR SHALL DISCONNECT EXISTING AIR HANDLING UNIT 'AC-1' AND REMOVE EXISTING DISCONNECT SWITCH. CONDUIT AND WIRING FEEDING THE UNIT SHALL BE CAPPED AND MADE SAFE FOR EXTENSION TO THE REPLACEMENT UNIT (SEE NEW WORK PLANS).
5. THE CONTRACTOR SHALL DISCONNECT EXISTING RETURN FAN 'RF-1' AND REMOVE EXISTING DISCONNECT SWITCH. CONDUIT AND WIRING FEEDING THE UNIT SHALL BE CAPPED AND MADE SAFE FOR EXTENSION TO THE REPLACEMENT UNIT (SEE NEW WORK PLANS).
6. THE CONTRACTOR SHALL DISCONNECT EXISTING AIR HANDLING UNIT 'AC-2A' AND REMOVE EXISTING DISCONNECT SWITCH. CONDUIT AND WIRING FEEDING THE UNIT SHALL BE CAPPED AND MADE SAFE FOR EXTENSION TO THE REPLACEMENT UNIT (SEE NEW WORK PLANS).
7. THE CONTRACTOR SHALL DISCONNECT EXISTING RETURN FAN 'RF-2A' AND REMOVE EXISTING DISCONNECT SWITCH. CONDUIT AND WIRING FEEDING THE UNIT SHALL BE CAPPED AND MADE SAFE FOR EXTENSION TO THE REPLACEMENT UNIT (SEE NEW WORK PLANS).
8. THE CONTRACTOR SHALL DISCONNECT EXISTING AIR HANDLING UNIT 'AC-2B' AND REMOVE EXISTING DISCONNECT SWITCH. CONDUIT AND WIRING FEEDING THE UNIT SHALL BE CAPPED AND MADE SAFE FOR EXTENSION TO THE REPLACEMENT UNIT (SEE NEW WORK PLANS).
9. THE CONTRACTOR SHALL DISCONNECT EXISTING RETURN FAN 'RF-2B' AND REMOVE EXISTING DISCONNECT SWITCH. CONDUIT AND WIRING FEEDING THE UNIT SHALL BE CAPPED AND MADE SAFE FOR EXTENSION TO THE REPLACEMENT UNIT (SEE NEW WORK PLANS).
10. THE CONTRACTOR SHALL DISCONNECT EXISTING VERTICAL AIR HANDLING UNIT SERVING THE SPECIAL EDUCATION OFFICES AND REMOVE EXISTING DISCONNECT SWITCH AND ASSOCIATED CONDUIT AND WIRING BACK TO SOURCE AND MAKE SAFE.
11. CONTRACTOR SHALL DISCONNECT EXISTING REMOTE CONDENSING UNIT AND REMOVE EXISTING DISCONNECT SWITCH AND ASSOCIATED CONDUIT AND WIRING BACK TO SOURCE AND MAKE SAFE.
12. EXISTING TO REMAIN.



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

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

H 2 M architects + engineers

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White Plains, NY 10605
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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
J. CHRIS MORRIS III, P.E.
Exp. Date
NY PROFESSIONAL ENGINEER Lic. No. 101554

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

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202
SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT E
ELECTRICAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

ELECTRICAL SECOND FLOOR DEMOLITION PLAN

DRAWING No.

MS-ED 102.00

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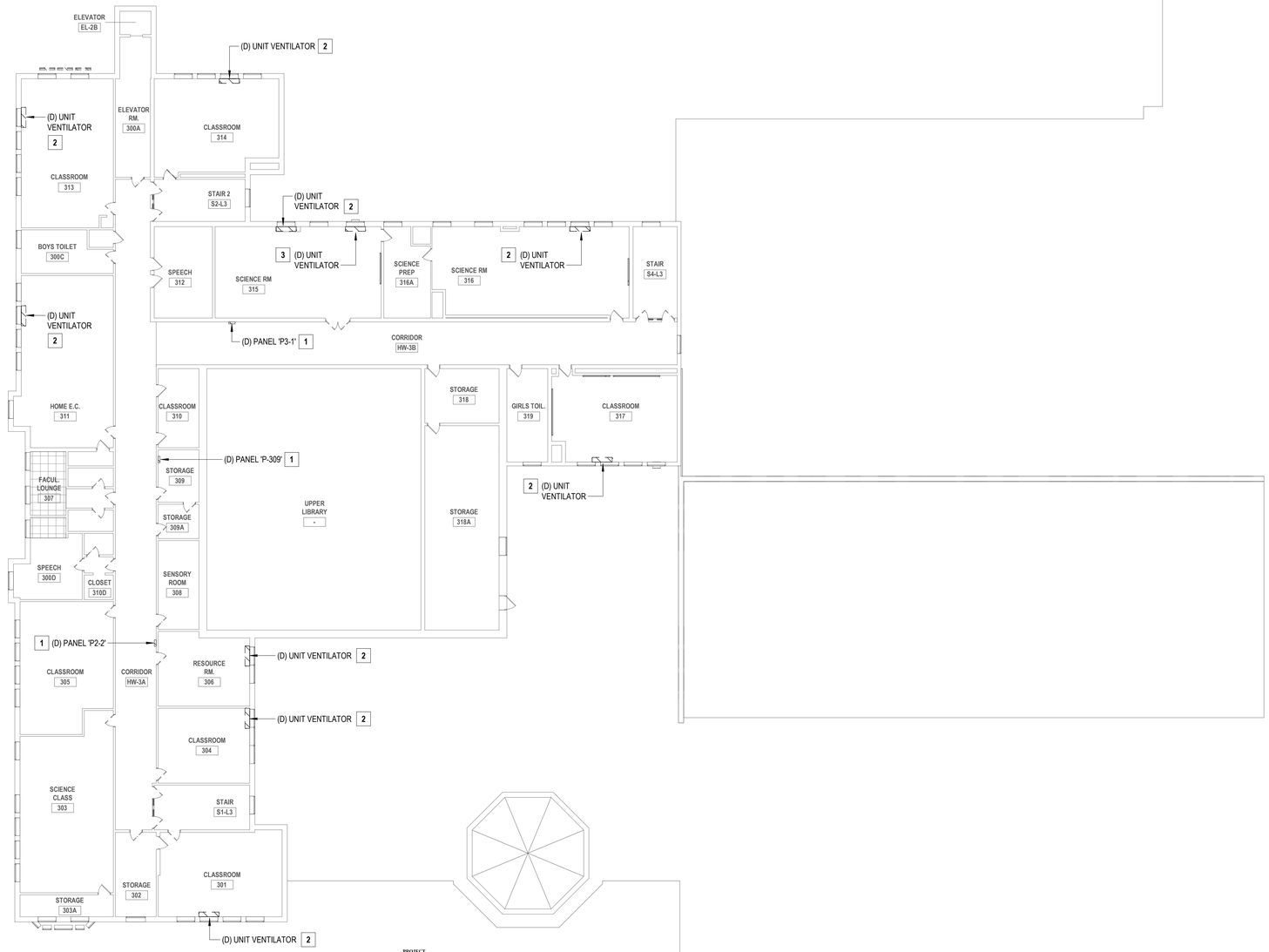
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GENERAL NOTES

1. SEE DRAWING MS-E 001 FOR ELECTRICAL LEGEND, SYMBOLS, ABBREVIATIONS, AND GENERAL NOTES.
2. 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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6. 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.
7. 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.

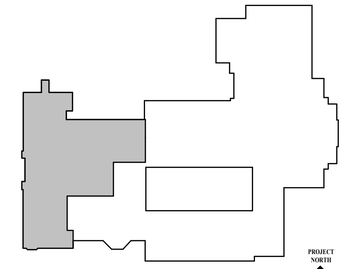
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2. THE CONTRACTOR SHALL DISCONNECT EXISTING STEAM UNIT VENTILATOR AND REMOVE DISCONNECT SWITCH. CONDUIT AND WIRING FEEDING THE UNIT SHALL BE CAPPED AND MADE SAFE FOR EXTENSION TO THE REPLACEMENT UNIT VENTILATOR (SEE NEW WORK PLANS).
3. THE CONTRACTOR SHALL DISCONNECT THE EXISTING STEAM UNIT VENTILATOR AND REMOVE DISCONNECT SWITCH. CONDUIT AND WIRING FEEDING THE UNIT SHALL BE ABANDONED IN PLACE AND MADE SAFE.



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

PROJECT NORTH



2 **KEY PLAN - LEVEL 3**
SCALE: 1" = 100'-0"

PROJECT NORTH

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White Plains, NY 10605
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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.
NY PROFESSIONAL ENGINEER Lic. No. 097554

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

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202
SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT E
ELECTRICAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

ELECTRICAL THIRD FLOOR DEMOLITION PLAN

DRAWING No.

MS-ED 103.00

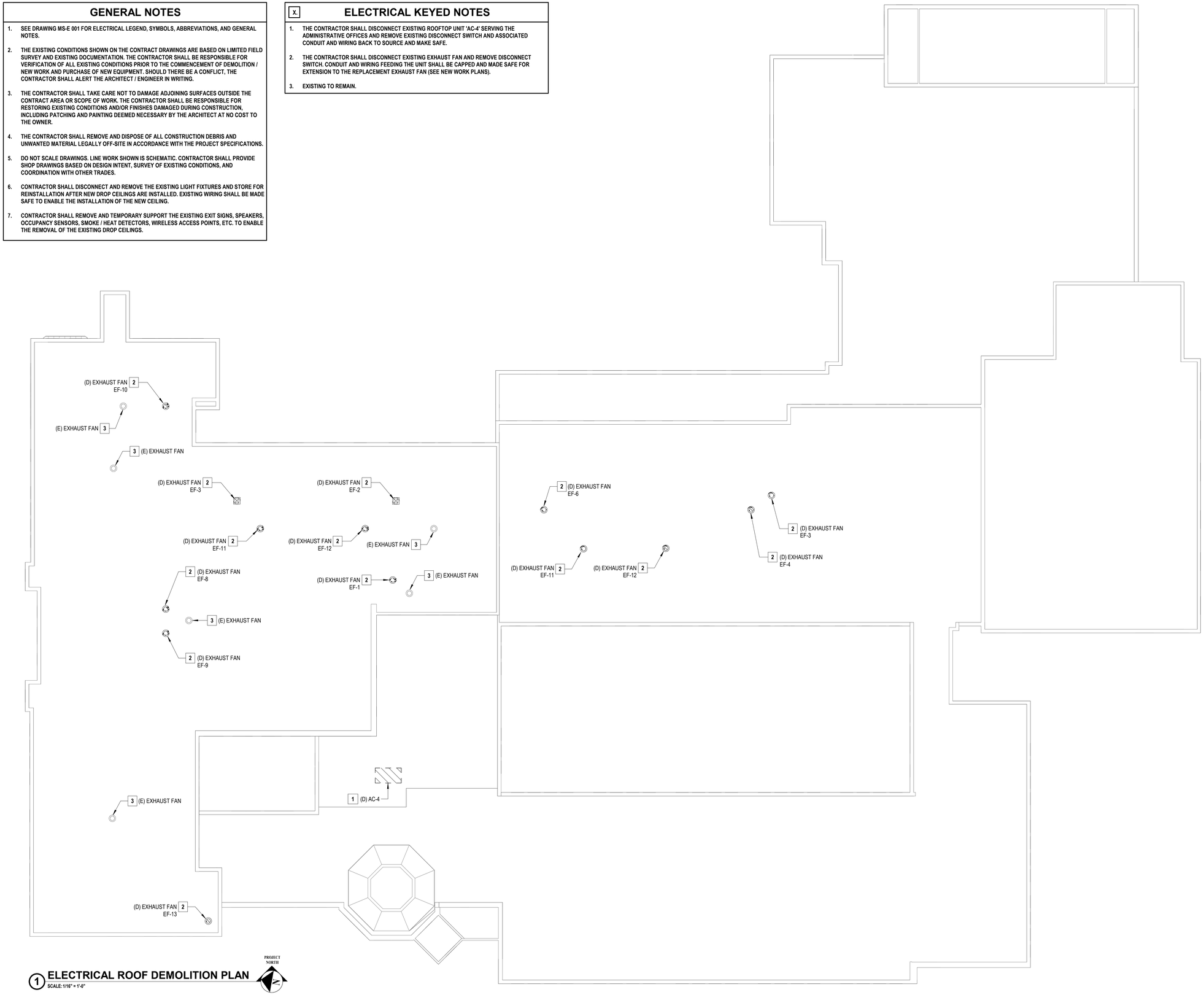
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GENERAL NOTES

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3. 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.
4. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL CONSTRUCTION DEBRIS AND UNWANTED MATERIAL LEGALLY OFF-SITE IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS.
5. DO NOT SCALE DRAWINGS. LINE WORK SHOWN IS SCHEMATIC. CONTRACTOR SHALL PROVIDE SHOP DRAWINGS BASED ON DESIGN INTENT, SURVEY OF EXISTING CONDITIONS, AND COORDINATION WITH OTHER TRADES.
6. 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.
7. 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 KEYED NOTES

1. THE CONTRACTOR SHALL DISCONNECT EXISTING ROOFTOP UNIT 'AC-4' SERVING THE ADMINISTRATIVE OFFICES AND REMOVE EXISTING DISCONNECT SWITCH AND ASSOCIATED CONDUIT AND WIRING BACK TO SOURCE AND MAKE SAFE.
2. 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).
3. EXISTING TO REMAIN.



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

H 2 M architects + engineers

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White Plains, NY 10605
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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.
NY PROFESSIONAL ENGINEER Lic. No. 097564

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

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202
SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT E
ELECTRICAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

ELECTRICAL ROOF DEMOLITION PLAN

DRAWING No.

MS-ED 104.00

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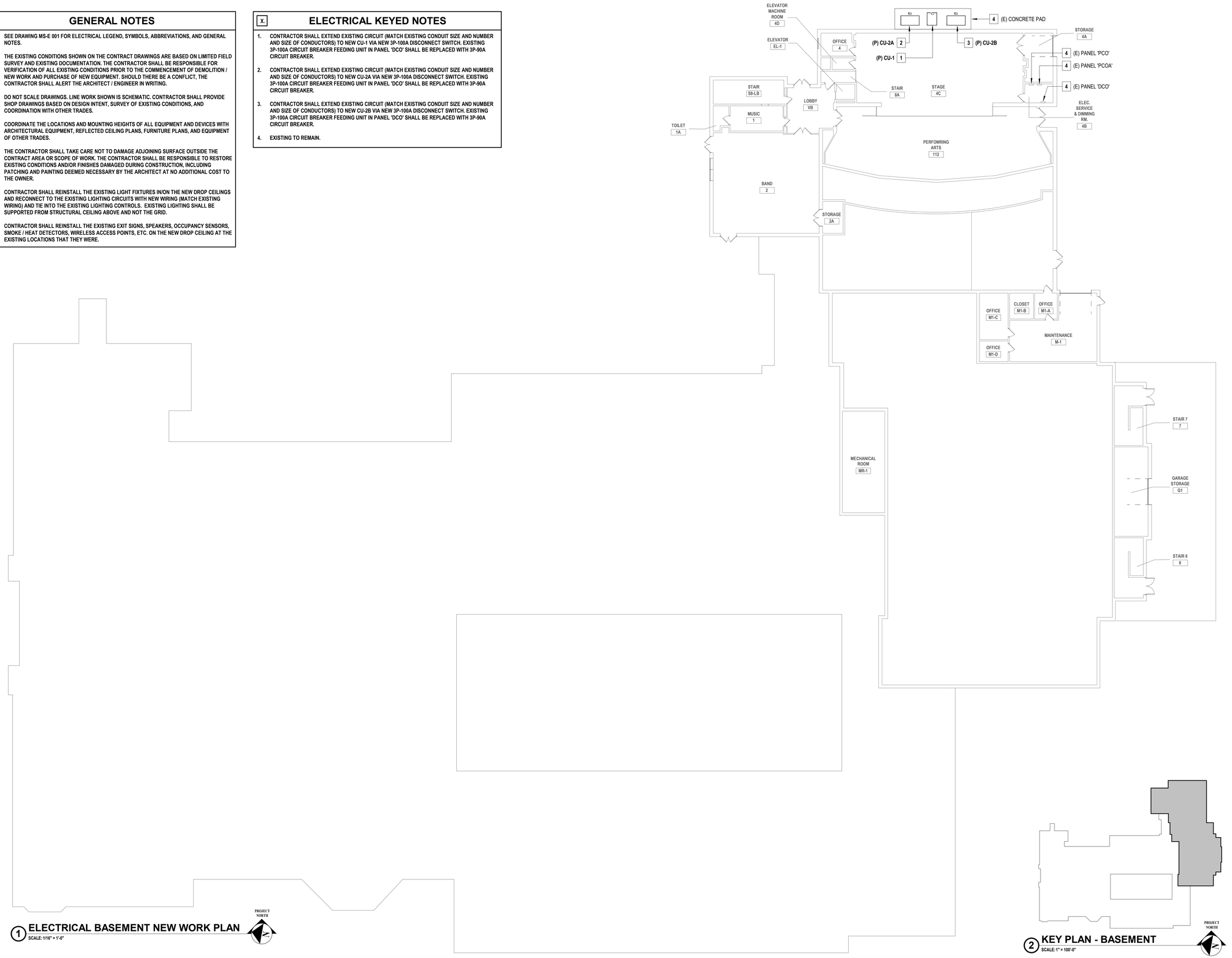
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GENERAL NOTES

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3. DO NOT SCALE DRAWINGS. LINE WORK SHOWN IS SCHEMATIC. CONTRACTOR SHALL PROVIDE SHOP DRAWINGS BASED ON DESIGN INTENT, SURVEY OF EXISTING CONDITIONS, AND COORDINATION WITH OTHER TRADES.
4. COORDINATE THE LOCATIONS AND MOUNTING HEIGHTS OF ALL EQUIPMENT AND DEVICES WITH ARCHITECTURAL EQUIPMENT, REFLECTED CEILING PLANS, FURNITURE PLANS, AND EQUIPMENT OF OTHER TRADES.
5. 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.
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 KEYED NOTES

1. CONTRACTOR SHALL EXTEND EXISTING CIRCUIT (MATCH EXISTING CONDUIT SIZE AND NUMBER AND SIZE OF CONDUCTORS) TO NEW CU-1 VIA NEW 3P-100A DISCONNECT SWITCH. EXISTING 3P-100A CIRCUIT BREAKER FEEDING UNIT IN PANEL 'DCO' SHALL BE REPLACED WITH 3P-90A CIRCUIT BREAKER.
2. CONTRACTOR SHALL EXTEND EXISTING CIRCUIT (MATCH EXISTING CONDUIT SIZE AND NUMBER AND SIZE OF CONDUCTORS) TO NEW CU-2A VIA NEW 3P-100A DISCONNECT SWITCH. EXISTING 3P-100A CIRCUIT BREAKER FEEDING UNIT IN PANEL 'DCO' SHALL BE REPLACED WITH 3P-90A CIRCUIT BREAKER.
3. CONTRACTOR SHALL EXTEND EXISTING CIRCUIT (MATCH EXISTING CONDUIT SIZE AND NUMBER AND SIZE OF CONDUCTORS) TO NEW CU-2B VIA NEW 3P-100A DISCONNECT SWITCH. EXISTING 3P-100A CIRCUIT BREAKER FEEDING UNIT IN PANEL 'DCO' SHALL BE REPLACED WITH 3P-90A CIRCUIT BREAKER.
4. EXISTING TO REMAIN.



1 ELECTRICAL BASEMENT NEW WORK PLAN
SCALE: 1/16" = 1'-0"

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

H 2 M architects + engineers

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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

5.31.2028
Exp. Date

J. CHRIS MORRIS III, P.E.
NY PROFESSIONAL ENGINEER Lic. No. 101764

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

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202
SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT E
ELECTRICAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

ELECTRICAL BASEMENT NEW WORK PLAN

DRAWING No.

MS-E 100.00

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GENERAL NOTES

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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 KEYED NOTES

1. CONTRACTOR SHALL FURNISH AND INSTALL NEW CIRCUIT BREAKER RETROFIT INTERIOR KIT AND NEW PANEL COVER WHERE EXISTING PANEL INTERIORS AND COVERS WERE REMOVED. RETROFIT INTERIOR KIT AND NUMBER AND SIZES OF NEW CIRCUIT BREAKERS SHALL BE BASED THE SCHEDULE SHOWN ON DRAWING MS-E 600. EXISTING FEEDER SHALL BE CONNECTED TO THE NEW MAIN CIRCUIT BREAKER AND/OR LUGS AND BRANCH CIRCUIT WIRING CONNECTED TO THE NEW BRANCH CIRCUIT BREAKERS.
2. THE CONTRACTOR SHALL RUN NEW CIRCUIT (2 #12, 1 #12 G., 3/4" C.) FROM NEW 1P-15 AMP CIRCUIT BREAKER TO SERVE NEW FLOOR MOUNTED UNIT VENTILATOR (UV). CIRCUIT BREAKER TO BE INSTALLED IN SPACE INDICATED ON DRAWING.
3. EXISTING TO REMAIN.
4. CONTRACTOR SHALL EXTEND ALL EXISTING CIRCUITS (MATCH NUMBER AND SIZE OF CONDUCTORS AND CONDUIT) FROM EXISTING FUSED PANEL (THAT HAS BEEN REMOVED AS SHOWN ON THE DEMOLITION PLAN) TO NEW ASSOCIATED CIRCUIT BREAKERS IN NEW PANEL 'PP-BRA'.

   THE EXISTING 120/208 VOLT, 3 PHASE, 4 WIRE, 200 AMP PANEL 'PP-BRA' HAS THE FOLLOWING FUSED SWITCHES:

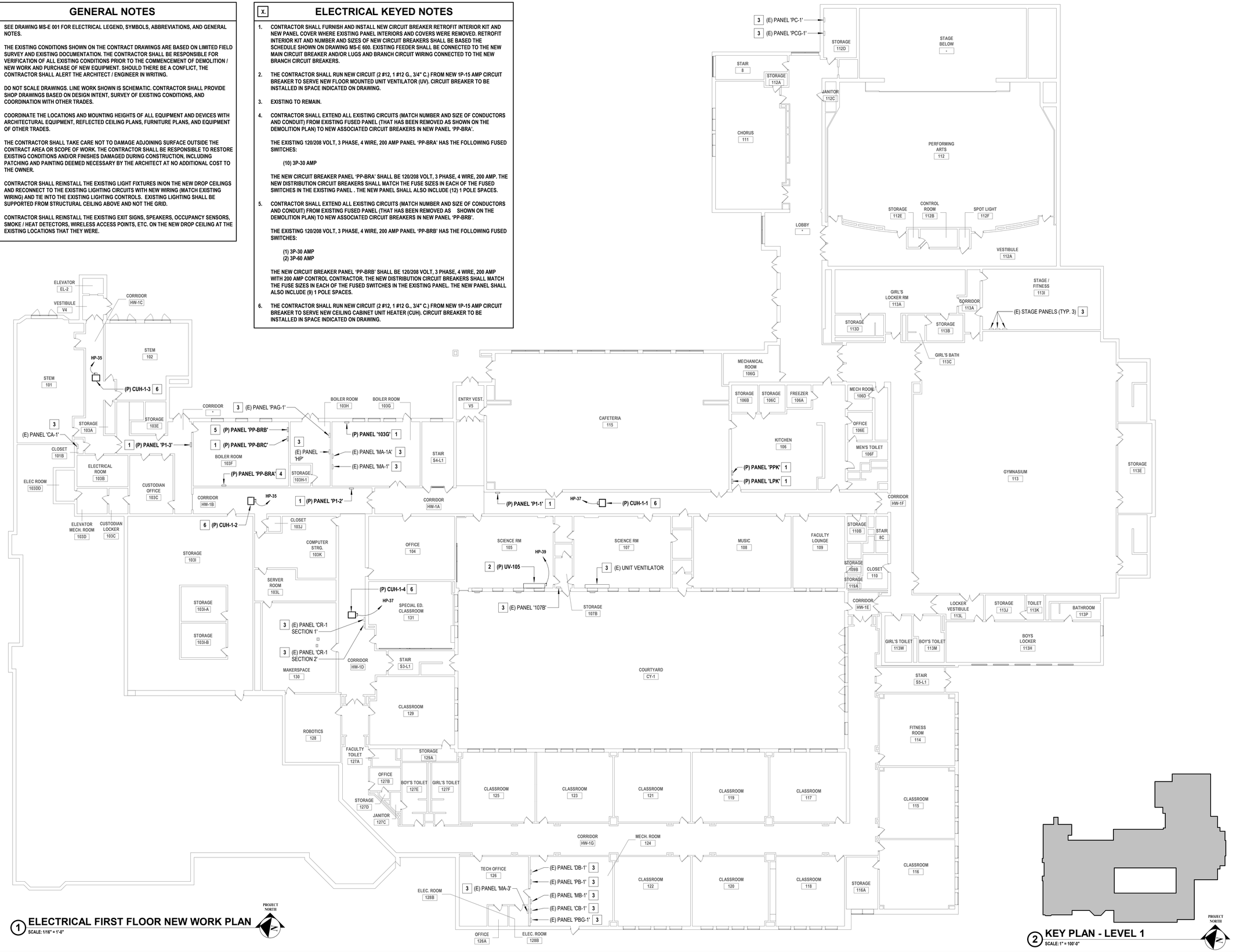
   (10) 3P-30 AMP

   THE NEW CIRCUIT BREAKER PANEL 'PP-BRA' SHALL BE 120/208 VOLT, 3 PHASE, 4 WIRE, 200 AMP. THE NEW DISTRIBUTION CIRCUIT BREAKERS SHALL MATCH THE FUSE SIZES IN EACH OF THE FUSED SWITCHES IN THE EXISTING PANEL . THE NEW PANEL SHALL ALSO INCLUDE (12) 1 POLE SPACES.
5. CONTRACTOR SHALL EXTEND ALL EXISTING CIRCUITS (MATCH NUMBER AND SIZE OF CONDUCTORS AND CONDUIT) FROM EXISTING FUSED PANEL (THAT HAS BEEN REMOVED AS SHOWN ON THE DEMOLITION PLAN) TO NEW ASSOCIATED CIRCUIT BREAKERS IN NEW PANEL 'PP-BRB'.

   THE EXISTING 120/208 VOLT, 3 PHASE, 4 WIRE, 200 AMP PANEL 'PP-BRB' HAS THE FOLLOWING FUSED SWITCHES:

   (1) 3P-30 AMP
   (2) 3P-60 AMP

   THE NEW CIRCUIT BREAKER PANEL 'PP-BRB' SHALL BE 120/208 VOLT, 3 PHASE, 4 WIRE, 200 AMP WITH 200 AMP CONTROL CONTRACTOR. THE NEW DISTRIBUTION CIRCUIT BREAKERS SHALL MATCH THE FUSE SIZES IN EACH OF THE FUSED SWITCHES IN THE EXISTING PANEL. THE NEW PANEL SHALL ALSO INCLUDE (9) 1 POLE SPACES.
6. THE CONTRACTOR SHALL RUN NEW CIRCUIT (2 #12, 1 #12 G., 3/4" C.) FROM NEW 1P-15 AMP CIRCUIT BREAKER TO SERVE NEW CEILING CABINET UNIT HEATER (CUH). CIRCUIT BREAKER TO BE INSTALLED IN SPACE INDICATED ON DRAWING.



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

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

H 2 M 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

5.31.2028
Exp. Date

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

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

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202
SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT E
ELECTRICAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

ELECTRICAL
FIRST FLOOR NEW WORK PLAN

DRAWING No.

MS-E 101.00

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7/14/2026 3:00:09 PM

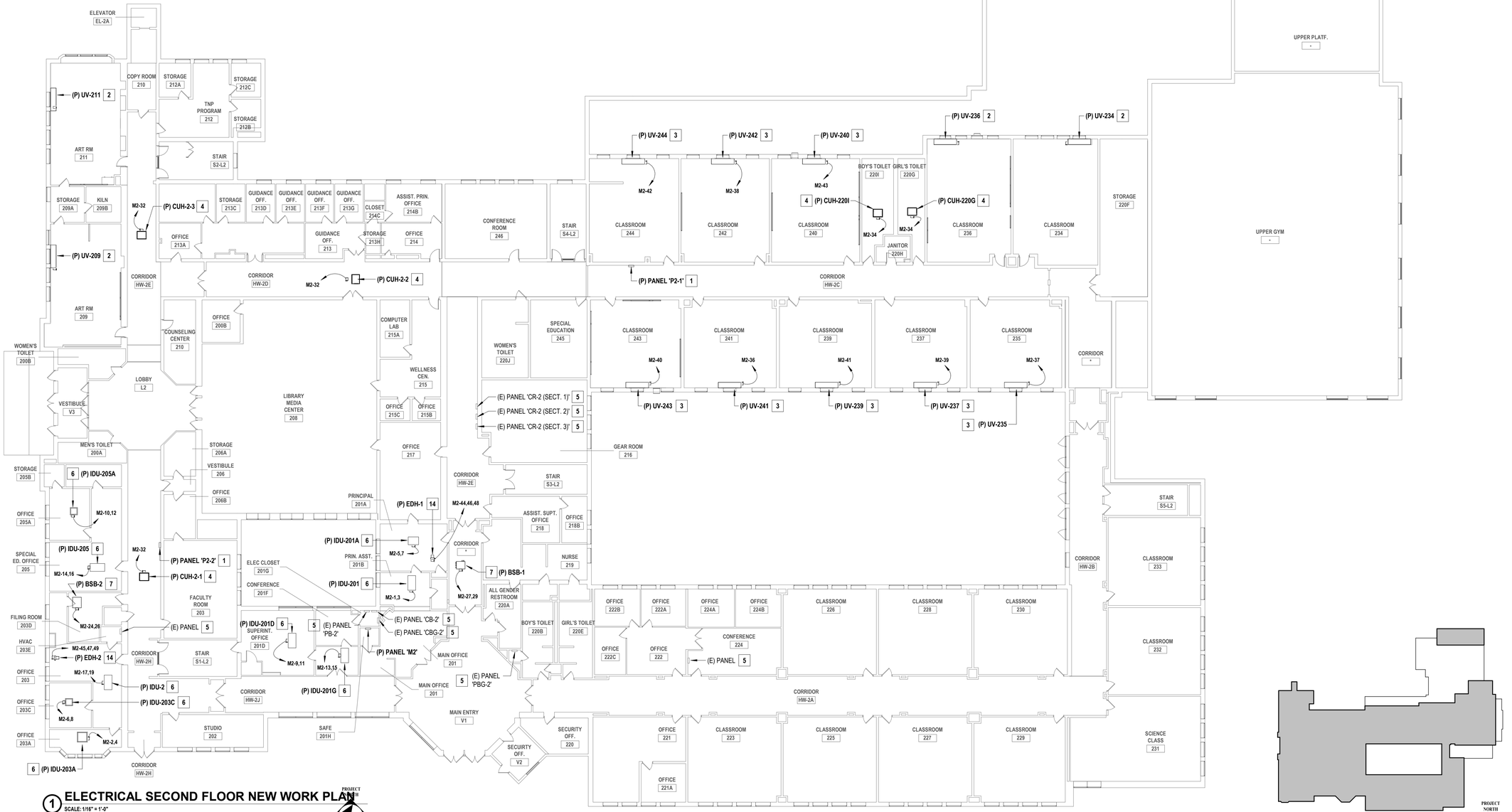
GENERAL NOTES

1. SEE DRAWING MS-E 001 FOR ELECTRICAL LEGEND, SYMBOLS, ABBREVIATIONS, AND GENERAL NOTES.
2. 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.
3. DO NOT SCALE DRAWINGS. LINE WORK SHOWN IS SCHEMATIC. CONTRACTOR SHALL PROVIDE SHOP DRAWINGS BASED ON DESIGN INTENT, SURVEY OF EXISTING CONDITIONS, AND COORDINATION WITH OTHER TRADES.
4. COORDINATE THE LOCATIONS AND MOUNTING HEIGHTS OF ALL EQUIPMENT AND DEVICES WITH ARCHITECTURAL EQUIPMENT, REFLECTED CEILING PLANS, FURNITURE PLANS, AND EQUIPMENT OF OTHER TRADES.
5. 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.
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.

ELECTRICAL KEYED NOTES

X.

1. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW CIRCUIT BREAKER RETROFIT INTERIOR KIT AND NEW PANEL COVER WHERE EXISTING PANEL INTERIORS AND COVERS WERE REMOVED. RETROFIT INTERIOR KIT AND NUMBER AND SIZES OF NEW CIRCUIT BREAKERS SHALL BE BASED THE SCHEDULE SHOWN ON DRAWING MS-E 600. EXISTING FEEDER SHALL BE CONNECTED TO THE NEW MAIN CIRCUIT BREAKER AND/OR LUGS AND BRANCH CIRCUIT WIRING CONNECTED TO THE NEW BRANCH CIRCUIT BREAKERS.
2. THE CONTRACTOR SHALL MODIFY/EXTEND EXISTING ELECTRICAL WIRING/RACEWAY THAT FED EXISTING FLOOR MOUNTED UNIT VENTILATOR SAFED OFF DURING THE DEMOLITION PHASE ON THIS PROJECT AND CONNECT TO THE NEW FLOOR MOUNTED UNIT VENTILATOR 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.
3. THE CONTRACTOR SHALL RUN NEW CIRCUIT (2 #12, 1 #12 G., 3/4" C.) FROM NEW 1P-15 AMP CIRCUIT BREAKER TO SERVE NEW FLOOR MOUNTED UNIT VENTILATOR (UV). CIRCUIT BREAKER TO BE INSTALLED IN SPACE INDICATED ON DRAWING.
4. THE CONTRACTOR SHALL RUN NEW CIRCUIT (2 #12, 1 #12 G., 3/4" C.) FROM NEW 1P-15 AMP CIRCUIT BREAKER TO SERVE NEW CEILING CABINET UNIT HEATER (CUH). CIRCUIT BREAKER TO BE INSTALLED IN SPACE INDICATED ON DRAWING.
5. EXISTING TO REMAIN.
6. THE CONTRACTOR SHALL RUN NEW CIRCUIT (2 #12, 1 #12 G., 3/4" C.) FROM NEW 1P-15 AMP CIRCUIT BREAKER TO SERVE NEW VRF INDOOR UNIT (IDU). CIRCUIT BREAKER TO BE INSTALLED IN SPACE INDICATED ON DRAWING.
7. THE CONTRACTOR SHALL RUN NEW CIRCUIT (2 #12, 1 #12 G., 3/4" C.) FROM NEW 1P-15 AMP CIRCUIT BREAKER TO SERVE NEW VRF BRANCH SELECTOR BOX (BSB). CIRCUIT BREAKER TO BE INSTALLED IN SPACE INDICATED ON DRAWING.
8. THE CONTRACTOR SHALL EXTEND EXISTING CIRCUIT (MATCH EXISTING CONDUIT SIZE AND NUMBER AND SIZE OF CONDUCTORS) TO NEW AC-2A VIA NEW 3P-30A DISCONNECT SWITCH. EXISTING 3P-45A CIRCUIT BREAKER FEEDING UNIT IN PANEL 'PC-1' SPACE #2, 4, 6 SHALL BE REPLACED WITH 3P-30A CIRCUIT BREAKER.
9. THE CONTRACTOR SHALL EXTEND EXISTING CIRCUIT (MATCH EXISTING CONDUIT SIZE AND NUMBER AND SIZE OF CONDUCTORS) TO NEW RF-2A VIA NEW 3P-30A DISCONNECT SWITCH. EXISTING 3P-15A CIRCUIT BREAKER IN PANEL 'PC-1' SHALL BE REUSED FOR RETURN FAN RF-2A.
10. CONTRACTOR SHALL EXTEND EXISTING CIRCUIT (MATCH EXISTING CONDUIT SIZE AND NUMBER AND SIZE OF CONDUCTORS) TO NEW AC-1 VIA NEW 3P-60A DISCONNECT SWITCH. EXISTING 3P-45A CIRCUIT BREAKER FEEDING UNIT IN PANEL 'DCO' SHALL BE REPLACED WITH 3P-30A CIRCUIT BREAKER.
11. CONTRACTOR SHALL EXTEND EXISTING CIRCUIT (MATCH EXISTING CONDUIT SIZE AND NUMBER AND SIZE OF CONDUCTORS) TO NEW RF-1 VIA NEW 3P-30A DISCONNECT SWITCH. EXISTING 3P-20A CIRCUIT BREAKER IN PANEL 'PCO' SHALL BE REUSED FOR RETURN FAN RF-1.
12. CONTRACTOR SHALL EXTEND EXISTING CIRCUIT (MATCH EXISTING CONDUIT SIZE AND NUMBER AND SIZE OF CONDUCTORS) TO NEW AC-2B VIA NEW 3P-30A DISCONNECT SWITCH. EXISTING 3P-30A CIRCUIT BREAKER IN PANEL 'DCO' SHALL BE REUSED FOR INDOOR AHU AC-2B.
13. CONTRACTOR SHALL EXTEND EXISTING CIRCUIT (MATCH EXISTING CONDUIT SIZE AND NUMBER AND SIZE OF CONDUCTORS) TO NEW RF-2B VIA NEW 3P-30A DISCONNECT SWITCH. EXISTING 3P-15A IN SPACE 13,15,17 IN PANEL 'PCO' SHALL BE REUSED FOR RETURN FAN RF-2B.
14. THE CONTRACTOR SHALL RUN NEW CIRCUIT (3 #12, 1 #12 G., 3/4" C.) FROM NEW 1P-20 AMP CIRCUIT BREAKER TO SERVE NEW ELECTRIC DUCT HEATER (CUH). CIRCUIT BREAKER TO BE INSTALLED IN SPACE INDICATED ON DRAWING.



1 ELECTRICAL SECOND FLOOR NEW WORK PLAN
SCALE: 1/16" = 1'-0"

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

PROJECT NORTH

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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

5.31.2028
J. CHRIS MORRIS III, P.E.
Exp. Date
NY PROFESSIONAL ENGINEER Lic. No. 101554
"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:
S. FREEMAN	W. TESTA	S. SOUSSOU	C. MORRIS

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT
SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202
SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT
CONTRACT E
ELECTRICAL CONSTRUCTION

STATUS
SED SUBMISSION

SHEET TITLE
ELECTRICAL
SECOND FLOOR NEW WORK PLAN

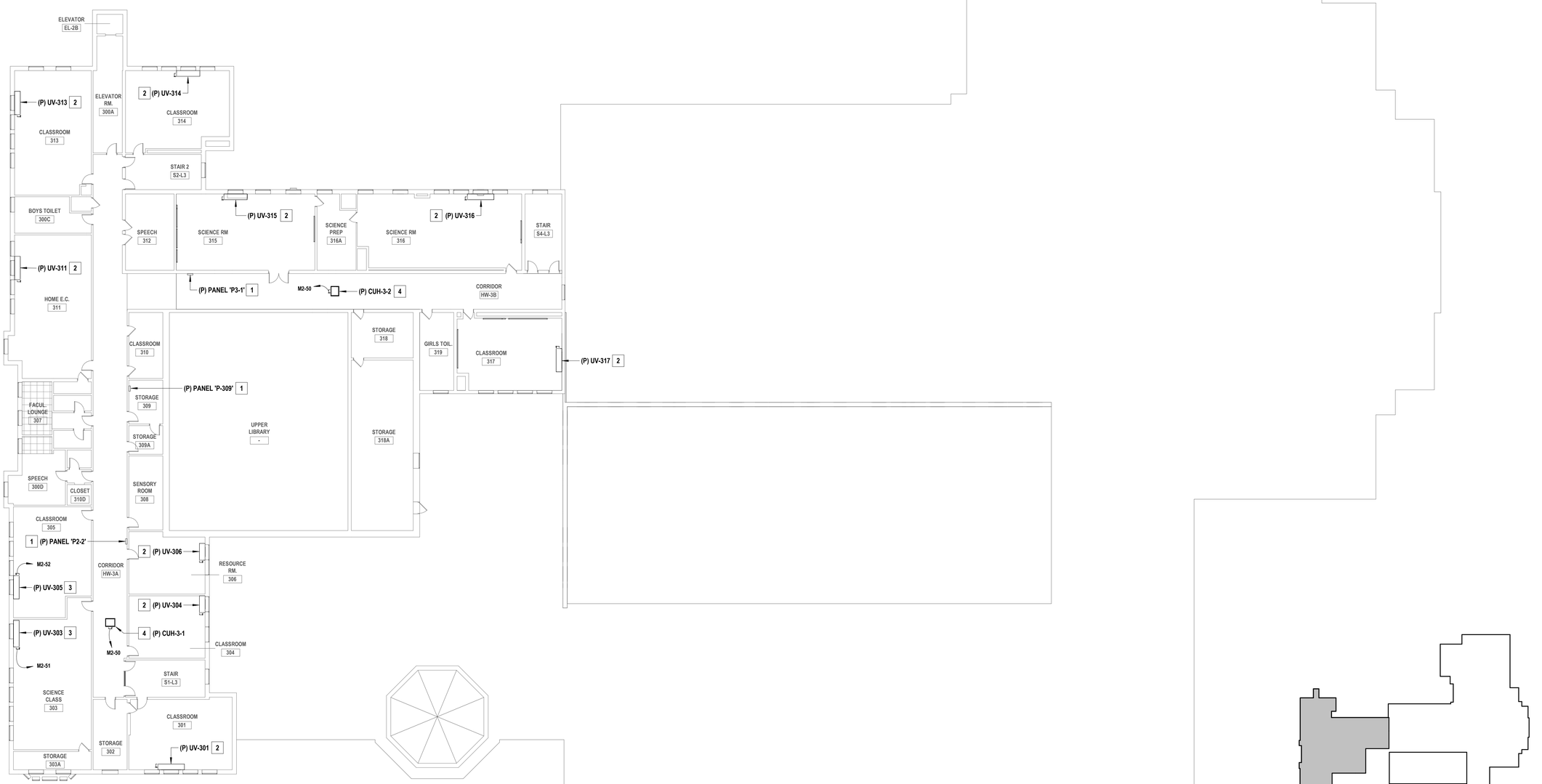
DRAWING No.
MS-E 102.00

GENERAL NOTES

1. SEE DRAWING MS-E 001 FOR ELECTRICAL LEGEND, SYMBOLS, ABBREVIATIONS, AND GENERAL NOTES.
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2. CONTRACTOR SHALL MODIFY/EXTEND EXISTING ELECTRICAL WIRING/RACEWAY THAT FED EXISTING FLOOR MOUNTED UNIT VENTILATOR SAFED OFF DURING THE DEMOLITION PHASE ON THIS PROJECT AND CONNECT TO THE NEW FLOOR MOUNTED UNIT VENTILATOR 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.
3. THE CONTRACTOR SHALL RUN NEW CIRCUIT (2 #12, 1 #12 G., 3/4" C.) FROM NEW 1P-15 AMP CIRCUIT BREAKER TO SERVE NEW FLOOR MOUNTED UNIT VENTILATOR (UV). CIRCUIT BREAKER TO BE INSTALLED IN SPACE INDICATED ON THE DRAWING.
4. THE CONTRACTOR SHALL RUN NEW CIRCUIT (2 #12, 1 #12 G., 3/4" C.) FROM NEW 1P-15 AMP CIRCUIT BREAKER TO SERVE NEW CEILING CABINET UNIT HEATER (CUH). CIRCUIT BREAKER TO BE INSTALLED IN SPACE INDICATED ON THE DRAWING.



1 **ELECTRICAL THIRD FLOOR NEW WORK PLAN**
SCALE: 1/16" = 1'-0"

PROJECT NORTH

2 **KEY PLAN - LEVEL 3**
SCALE: 1" = 100'-0"

PROJECT NORTH

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

CONSULTANTS:

MARK	DATE	DESCRIPTION

5.31.2028
Exp. Date

J. CHRIS MORRIS III, P.E.
NY PROFESSIONAL ENGINEER Lic. No. 097554

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

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT
SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202
SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT
CONTRACT E
ELECTRICAL CONSTRUCTION

STATUS
SED SUBMISSION

SHEET TITLE
ELECTRICAL
THIRD FLOOR NEW WORK PLAN

DRAWING No.
MS-E 103.00

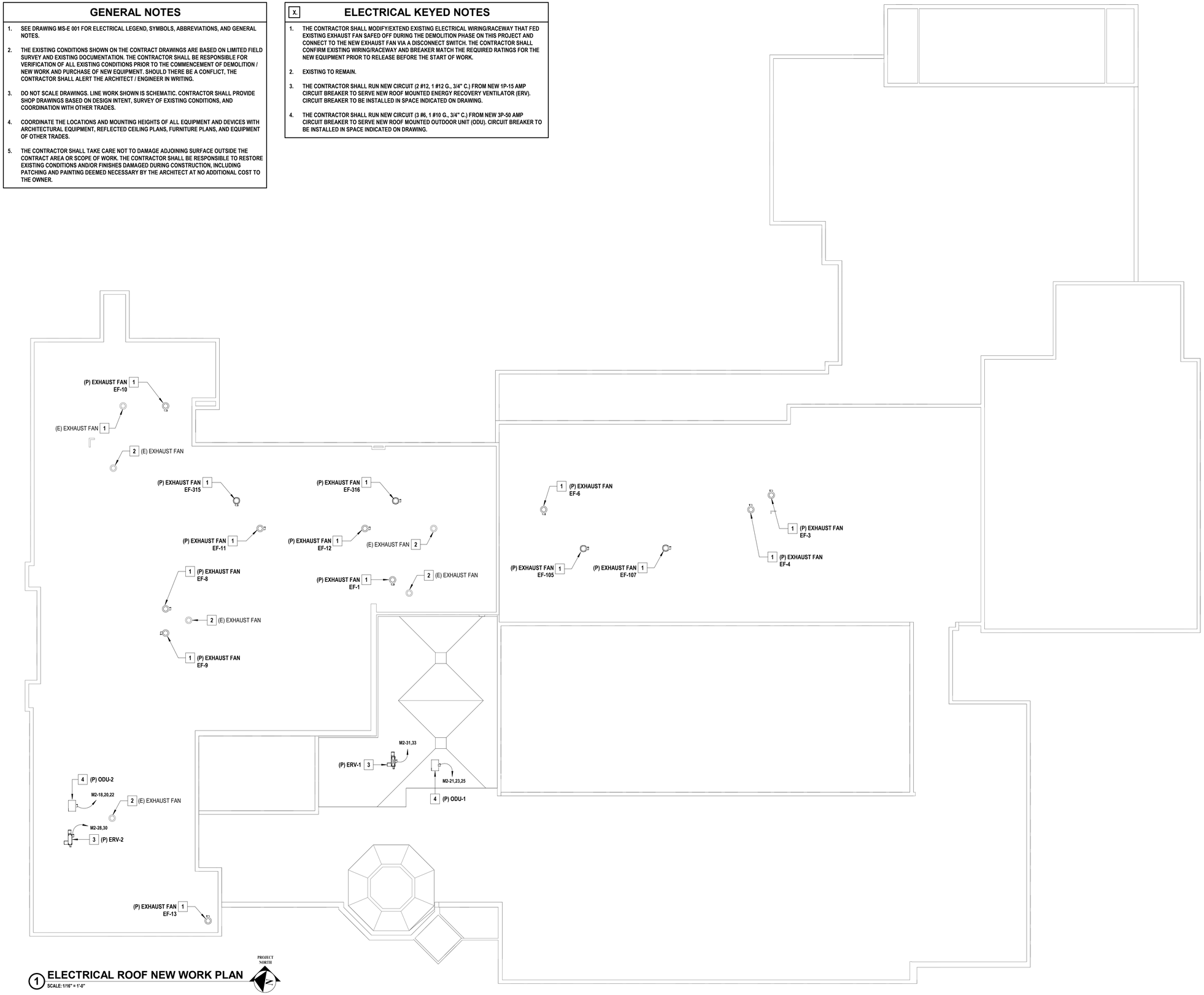
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GENERAL NOTES

1. SEE DRAWING MS-E 001 FOR ELECTRICAL LEGEND, SYMBOLS, ABBREVIATIONS, AND GENERAL NOTES.
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3. DO NOT SCALE DRAWINGS. LINE WORK SHOWN IS SCHEMATIC. CONTRACTOR SHALL PROVIDE SHOP DRAWINGS BASED ON DESIGN INTENT, SURVEY OF EXISTING CONDITIONS, AND COORDINATION WITH OTHER TRADES.
4. COORDINATE THE LOCATIONS AND MOUNTING HEIGHTS OF ALL EQUIPMENT AND DEVICES WITH ARCHITECTURAL EQUIPMENT, REFLECTED CEILING PLANS, FURNITURE PLANS, AND EQUIPMENT OF OTHER TRADES.
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X. ELECTRICAL KEYED NOTES

1. THE CONTRACTOR SHALL MODIFY/EXTEND EXISTING ELECTRICAL WIRING/RACEWAY THAT FED EXISTING EXHAUST FAN SAFED OFF DURING THE DEMOLITION PHASE ON THIS PROJECT AND CONNECT TO THE NEW EXHAUST FAN 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.
2. EXISTING TO REMAIN.
3. THE CONTRACTOR SHALL RUN NEW CIRCUIT (2 #12, 1 #12 G., 3/4" C.) FROM NEW 1P-15 AMP CIRCUIT BREAKER TO SERVE NEW ROOF MOUNTED ENERGY RECOVERY VENTILATOR (ERV). CIRCUIT BREAKER TO BE INSTALLED IN SPACE INDICATED ON DRAWING.
4. THE CONTRACTOR SHALL RUN NEW CIRCUIT (3 #6, 1 #10 G., 3/4" C.) FROM NEW 3P-50 AMP CIRCUIT BREAKER TO SERVE NEW ROOF MOUNTED OUTDOOR UNIT (ODU). CIRCUIT BREAKER TO BE INSTALLED IN SPACE INDICATED ON DRAWING.



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

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CONSULTANTS:

MARK	DATE	DESCRIPTION

5.31.2028
Exp. Date

J. CHRIS MORRIS III, P.E.
NY PROFESSIONAL ENGINEER Lic. No. 097564

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

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202
SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT E
ELECTRICAL CONSTRUCTION

STATUS

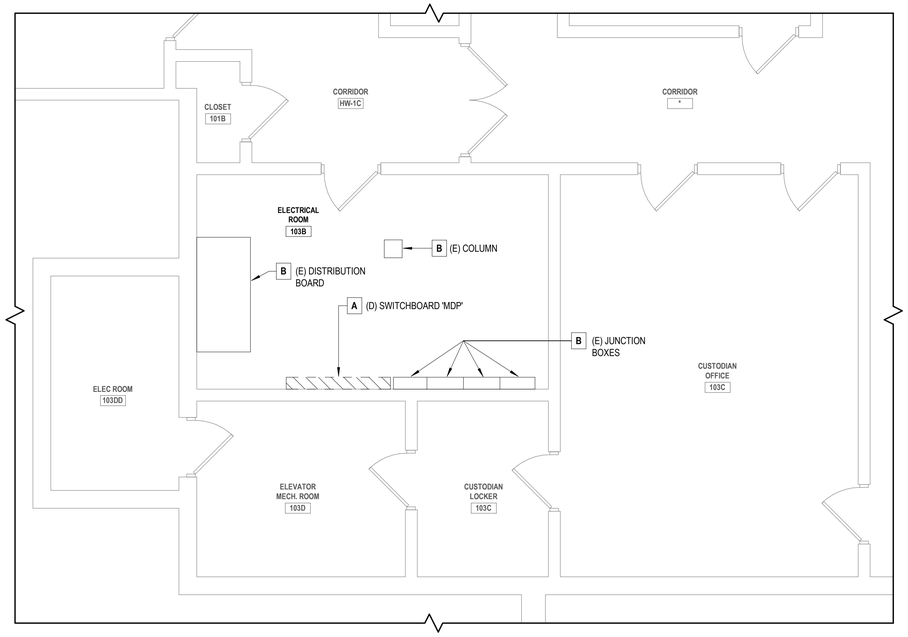
SED SUBMISSION

SHEET TITLE

ELECTRICAL ROOF NEW WORK PLAN

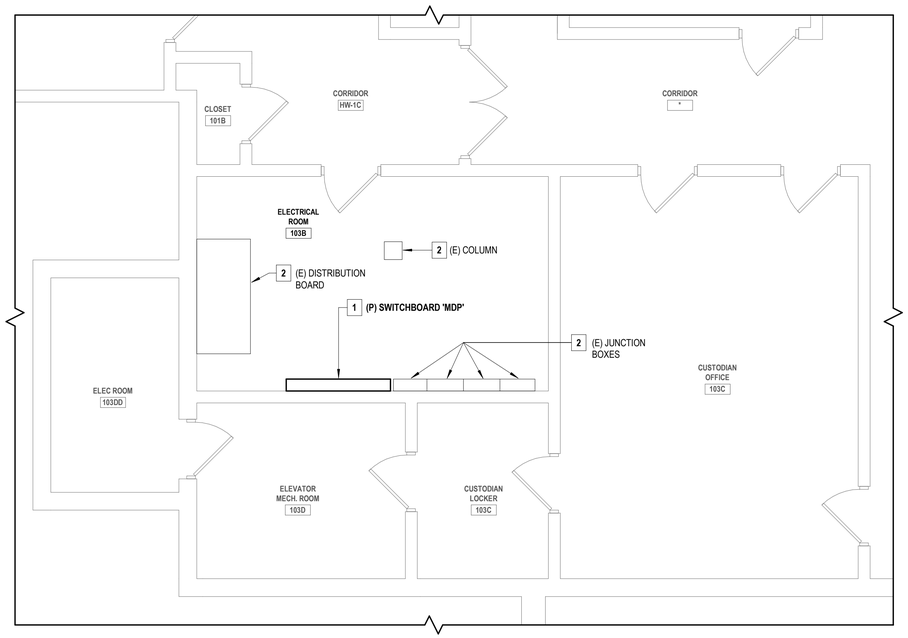
DRAWING No.

MS-E 104.00



1 ELECTRICAL FIRST FLOOR PARTIAL DEMOLITION PLAN

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



2 ELECTRICAL FIRST FLOOR PARTIAL NEW WORK PLAN

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

GENERAL NOTES

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6. 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.
7. 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.
8. 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.
9. 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 DEMOLITION KEYED NOTES

A. PRIOR TO REMOVING THE EXISTING SWITCHBOARD 'MDP' WITH FUSED SWITCHES CONTRACTOR SHALL TRACE OUT EACH CIRCUIT AS TO WHAT IT SERVES AND LABEL IT. AFTER TRACING AND LABELING, CONTRACTOR SHALL DISCONNECT THE EXISTING CONDUIT AND WIRING FROM THE FUSED SWITCHES THE CONTRACTOR SHALL NOTE THE FUSE SIZES AND MAKE SAFE TO ENABLE THE REMOVAL OF THE EXISTING MAIN SWITCHBOARD AND THEN EXTENDING EACH CIRCUIT TO THE NEW SWITCHBOARD. FURNISH AND INSTALL REQUIRED NEW CONDUIT, WIRING AND PULL / SPLICE BOXES TO MAKE THE CONNECTIONS TO THE NEW SWITCHBOARD CIRCUIT BREAKERS.

B. EXISTING TO REMAIN.

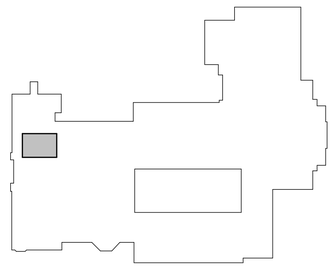
X. ELECTRICAL NEW WORK KEYED NOTES

1. CONTRACTOR SHALL EXTEND ALL EXISTING CIRCUITS (MATCH NUMBER AND SIZE OF CONDUCTORS AND CONDUIT) FROM EXISTING FUSED SWITCHBOARD (THAT HAVE BEEN REMOVED AS SHOWN ON THE DEMOLITION PLAN) TO NEW ASSOCIATED CIRCUIT BREAKERS IN NEW SWITCHBOARD 'MDP'.

   THE EXISTING 120/208 VOLT, 3 PHASE, 4 WIRE, 800 AMP SWITCHBOARD 'MDP' HAS THE FOLLOWING FUSED SWITCHES:

   (2) 3P-30 AMP
   (10) 3P-60 AMP
   (10) 3P-100 AMP
   (4) 3P-200 AMP

   THE NEW CIRCUIT BREAKER SWITCHBOARD 'MDP' SHALL BE 120/208 VOLT, 3 PHASE, 4 WIRE, 1,000 AMP WITH MAIN LUGS ONLY. THE NEW DISTRIBUTION CIRCUIT BREAKERS SHALL MATCH THE FUSE SIZES IN EACH OF THE FUSED SWITCHES IN THE EXISTING SWITCHBOARD. THE NEW SWITCHBOARD SHALL ALSO INCLUDE (4) 100 3-POLE SPACES.
2. EXISTING TO REMAIN.



3 KEY PLAN - LEVEL 1 - ELECTRICAL ROOM 103D

SCALE: 1" = 100'-0"

H2M architects + engineers
1133 Westchester Avenue, Suite N-210
White Plains, NY 10605
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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.
NY PROFESSIONAL ENGINEER Lic. No. 101354

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

PROJECT No:	DATE:	SCALE:
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SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202
SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

CONTRACT E
ELECTRICAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

ELECTRICAL
ENLARGED ELECTRICAL ROOM PLANS

DRAWING No.

MS-E 105.00

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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

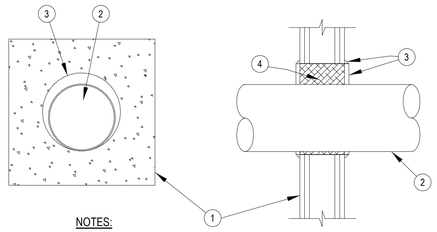
WIRE DERATING

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"

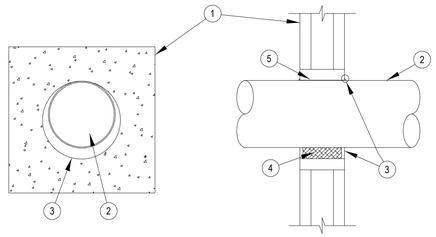


NOTES:

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

H 2 M architects + engineers

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White Plains, NY 10605
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NY Architecture & Landscape Architecture: No Certificate Required
NY Engineering Certificate of Authorization No.: 0018178

CONSULTANTS:

MARK	DATE	DESCRIPTION

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Exp. Date

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

PROJECT No:	DATE:	SCALE:
SMSD2507	JULY 2026	AS SHOWN

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SOMERS CENTRAL SCHOOL DISTRICT

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250 US-202
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SED#: 66-21-01-06-0-001-021

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ELECTRICAL DETAILS

DRAWING No.

MS-E 500.00

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PANEL INFORMATION						ELECTRICAL DATA						BREAKER SIZES																		PANEL DIMENSIONS			
PANEL NAME	PANEL LOCATION			EXISTING MANUFACTURER	MOUNTING	VOLTAGE	PHASE	AMPS	MLO / MCB	MCB (IF APPLICABLE)	SPACES	1 POLE						2 POLE						3 POLE							WIDTH (IN.)	HEIGHT (IN.)	DEPTH (IN.)	NOTES
	FLOOR	ROOM NAME	ROOM NUMBER									15A	20A	15A TANDEM	15/20A TANDEM	20A TANDEM	SPACE	15A	20A	30A	50A	60A	15A	20A	30A	50A	60A	100A	SPACE				
PANEL 'P1-1'	1	CORRIDOR	HW-1A	SQUARE D	FLUSH	120/208	1	200A	MLO	-	20	-	7	9	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	16	30	-	EXISTING PANEL INCLUDES TANDEM BREAKERS. NEW PANEL SHALL HAVE 30 SPACES WITH NO TANDEM BREAKERS.
PANEL 'P1-2'	1	CORRIDOR	HW-1B	GENERAL ELECTRIC	FLUSH	120/208	1	100A	MLO	-	12	-	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22	24	-	
PANEL 'P1-3'	1	CORRIDOR	-	GENERAL ELECTRIC	FLUSH	120/208	1	100A	MLO	-	12	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22	24	-	
PANEL 'LPK'	1	KITCHEN	106	SQUARE D	FLUSH	120/208	1	100A	MLO	-	24	9	14	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	20	26	-	EXISTING PANEL INCLUDES TANDEM BREAKERS. NEW PANEL SHALL HAVE 30 SPACES WITH NO TANDEM BREAKERS.
PANEL 'PPK'	1	KITCHEN	106	SQUARE D	FLUSH	120/208	3	N/A	MLO	-	30	1	6	-	-	-	5	2	1	-	-	-	1	2	-	-	1	-	-	25	32	-	
PANEL '103G'	1	BOILER ROOM	103G	GENERAL ELECTRIC	FLUSH	120/208	3	200A	MLO	-	30	-	-	-	-	-	-	-	-	-	-	-	5	3	1	-	-	-	1	30	64	-	TOP SECTION CONTROLLED BY 200 AMP INTERGRAL CONTACTOR
						120/240	1	100A	MLO	-	12	-	10	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-				BOTTOM WITH START BUTTON TO CONTROL CONTACTOR
PANEL 'PP-BRC'	1	BOILER ROOM	103F	GENERAL ELECTRIC	SURFACE	120/208	3	125A	MLO	-	12	2	6	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	N/A	N/A	N/A	
PANEL 'P2-2'	2	CORRIDOR	HW-2H	GENERAL ELECTRIC	FLUSH	120/240	1	100A	MLO	-	18	-	16	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	21	24	-	
PANEL 'P2-1'	2	CORRIDOR	HW-2C	SQUARE D	FLUSH	N/A	N/A	100A	MLO	-	30	10	6	2	1	1	11	-	-	-	-	-	-	-	-	-	-	-	-	N/A	N/A	-	EXISTING PANEL INCLUDES TANDEM BREAKERS. NEW PANEL SHALL HAVE 30 SPACES WITH NO TANDEM BREAKERS.
PANEL 'P3-1'	3	CORRIDOR	HW-3B	GENERAL ELECTRIC	FLUSH	120/240	1	100A	MLO	-	30	-	24	-	-	-	-	-	1	-	-	2	-	-	-	-	-	-	-	N/A	N/A	-	TOP SECTION
						120/240	1	100A	MLO	-	30	-	-	-	-	-	-	-	2	1	3	-	-	-	5	1	-	-	-				BOTTOM SECTION
PANEL 'P-309'	3	STORAGE	309	GENERAL ELECTRIC	FLUSH	120/240	1	100A	MLO	-	12	6	4	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	34	26	-	
PANEL 'P3-2'	3	CORRIDOR	HW-3A	GENERAL ELECTRIC	FLUSH	120/240	1	100A	MLO	-	24	-	23	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	21	24	-	

NOTE: CONTRACTOR TO FIELD VERIFY PARAMETERS LISTED AS "N/A"

1 PANEL REPLACEMENT SCHEDULE

SCALE: NONE

SCHEDULE FOR PANEL: M2

SYSTEM: **208Y/120V, 3Ø, 4W** | NUMBER OF POLES: **54** | AREA SERVED: **SECOND FLOOR**

BUS RATING: **225 A** | MINIMUM CB IC: **22kA RMS SYM** | EQUIP GROUND BUS: **YES** | PANEL LOCATION:

MAINS TYPE: **MCB** | MAINS RATING: **225 A** | ISOLATED GND BUS: **NO** | MOUNTING: **SURFACE** | SUPPLIED FROM:

CIR. #	SERVES	LOAD	MINIMUM BRANCH CIRCUIT & CONDUIT SIZE	BREAKER P	BREAKER TRIP	PHASE A	PHASE B	PHASE C	BREAKER TRIP	BREAKER P	MINIMUM BRANCH CIRCUIT & CONDUIT SIZE	LOAD	SERVES	CIR. #
1	IDU-201	232	2#12, #12 G, 3/4" C	2	15	346			15	2	2#12, #12 G, 3/4" C	114	IDU-203A	2
3		232					346					114		4
5	IDU-201A	199	2#12, #12 G, 3/4" C	2	15			244	15	2	2#12, #12 G, 3/4" C	45	IDU-203C	6
7		199				244						45		8
9	IDU-201D	353	2#12, #12 G, 3/4" C	2	15		585		15	2	2#12, #12 G, 3/4" C	232	IDU-205	10
11		353						585				232		12
13	IDU-201G	232	2#12, #12 G, 3/4" C	2	15	278			15	2	2#12, #12 G, 3/4" C	46	IDU-205A	14
15		232					278					46		16
17	IDU-203	232	2#12, #12 G, 3/4" C	2	15			4624				4392		18
19		232				4624			50	3	3#6, #10 G, 3/4" C	4392	ODU-2	20
21		4392					8784					4392		22
23	ODU-1	4392	3#6, #10 G, 3/4" C	3	50			4470	15	2	2#12, #12 G, 3/4" C	78	BSB-2	24
25		4392				4470						78		26
27	BSB-1	78	2#12, #12 G, 3/4" C	2	15		442		15	2	2#12, #12 G, 3/4" C	364	ERV-2	28
29		78						442				364		30
31	ERV-1	645	2#12, #12 G, 3/4" C	2	15	1524			15	1	2#12, #12 G, 3/4" C	879	CUH-2-1, CUH-2-2 & CUH-2-3	32
33		645					1231		15	1	2#12, #12 G, 3/4" C	586	CUH-220I & CUH-220G	34
35	RECEPTACLES - ROOF	360	2#12, #12 G, 3/4" C	1	20			1176	15	1	2#12, #12 G, 3/4" C	816	UV-241	36
37	UV-235	816	2#12, #12 G, 3/4" C	1	15	1632			15	1	2#12, #12 G, 3/4" C	816	UV-242	38
39	UV-237	816	2#12, #12 G, 3/4" C	1	15		1632		15	1	2#12, #12 G, 3/4" C	816	UV-243	40
41	UV-239	816	2#12, #12 G, 3/4" C	1	15			1632	15	1	2#12, #12 G, 3/4" C	816	UV-244	42
43	UV-240	816	2#12, #12 G, 3/4" C	1	15	2483						1667		44
45		1667					3334		20	3	3#12, #12 G, 3/4" C	1667	EDH-1	46
47	EDH-2	1667	3#12, #12 G, 3/4" C	3	20			3334				1667		48
49		1667				2253			15	1	2#12, #12 G, 3/4" C	586	CUH-3-1 & CUH-3-2	50
51	UV-303	816	2#12, #12 G, 3/4" C	1	15		1632		15	1	2#12, #12 G, 3/4" C	816	UV-305	52
53								0						54
						17854	18264	16507	VA PER PHASE					
	TOTAL CONNECTED LOAD (VA)	52624				149	152	138	AMPS PER PHASE			146	TOTAL CONNECTED LOAD (AMPS)	

NOTES:
1.

2 NEW PANEL 'M2' SCHEDULE

SCALE: NONE

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White Plains, NY 10605
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CONSULTANTS:

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SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS MIDDLE SCHOOL

250 US-202
SOMERS, NY 10589

SED#: 66-21-01-06-0-001-021

CONTRACT

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ELECTRICAL CONSTRUCTION

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SED SUBMISSION

SHEET TITLE

ELECTRICAL SCHEDULES

DRAWING No.

MS-E 600.00

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Demolition and removal of selected portions of building or structure.
   2. Demolition and removal of selected site elements.
   3. Salvage of existing items to be reused or recycled.
   4. Recovery of Refrigerant materials.

B. Related Requirements:
   1. Section 011100 - SUMMARY OF WORK for restrictions on the use of the premises, Owner-occupancy requirements, and phasing requirements.

1.03 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.04 MATERIALS OWNERSHIP

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

1.05 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site.
   1. Inspect and discuss condition of construction to be selectively demolished.
   2. Review structural load limitations of existing structure.
   3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
   4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
   5. Review areas where existing construction is to remain and requires protection.
   6. Review procedures for turning over salvaged materials to the Owner and protected off-site storage of materials to be reused in the work of the project.

1.06 INFORMATIONAL SUBMITTALS

A. Qualification Data: For refrigerant recovery technician.

B. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting the public, pedestrian access and circulation areas and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.

C. Schedule of Selective Demolition Activities: Indicate the following:
   1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
   2. Interruption of utility services. Indicate how long utility services will be interrupted.
   3. Coordination for shutoff, capping, and continuation of utility services.

4. Use of elevator and stairs.
5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

D. Inventory: Submit a list of items to be removed, salvaged and delivered to Owner prior to start of demolition.

E. Pre-demolition Photographs and/or Video: Show existing conditions of adjoining existing construction and site conditions, including finish surfaces that could potentially be construed as having been damaged by Demolition activities. Submit two copies prior to commencing Demolition work.

F. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

G. Warranties: Documentation indicated that existing warranties are still in effect after completion of selective demolition.

1.07 CLOSEOUT SUBMITTALS

A. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.08 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.09 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: Hazardous materials are present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use and is included in this Division of the specifications. Examine report and / or the appropriate specification section to become aware of locations where hazardous materials are present.
1. Hazardous material remediation is specified elsewhere in the Contract Documents.
2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
3. Owner will provide material safety data sheets for suspected hazardous materials that are known to be present in buildings and structures to be selectively demolished because of building operations or processes performed there.

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

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
1. Maintain fire-protection facilities in service during selective demolition operations.
2. Provide a Fire Watch or other method acceptable to the authority having jurisdiction should the existing fire protection facilities have to be shut down during the work.
3. Do not disable or disrupt building fire or life safety systems without five (5) days prior written notice to Architect.

1.10 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties. Notify warrantor before proceeding.

B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.

C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

E. Engage a professional engineer to perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
   1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

F. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.
   1. Inventory and record the condition of items to be removed and salvaged. Provide photographs of conditions that might be misconstrued as damage caused by salvage operations.
   2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.02 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
   1. Comply with requirements for existing services/systems interruptions specified in Section 011100 - SUMMARY OF WORK.

B. Existing Services/Systems to be removed, relocated, or abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
   1. Arrange to shut off indicated utilities with utility companies. Provide 5 days notice to the Architect prior to any utility shut-downs.
   2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.

3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.
    a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap, plug or reconnect remaining piping with same or compatible piping material.
    b. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    c. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug or reconnect remaining ducts with same or compatible ductwork material.

C. Refrigerant: Remove refrigerant from mechanical equipment to be selectively demolished according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.03 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
1. Comply with requirements for access and protection specified in Section 015000 - TEMPORARY FACILITIES AND CONTROLS.

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building. Maintain existing required widths of egress pathways throughout.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 - TEMPORARY FACILITIES AND CONTROLS.

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
1. Strengthen or add new supports when required during progress of selective demolition.

3.04 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
5. Maintain adequate ventilation when using cutting torches.

6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly.

B. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.05 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 1 inch (25 mm) at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.

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

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

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

3.06 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.07 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

3.08 SELECTIVE DEMOLITION SCHEDULE

A. Remove, store, relocate, salvage and protect the following materials and equipment:
1. Existing Items to Be Removed: Items indicated on contract drawings and items listed in technical specifications sections.
2. Existing Items to Be Removed, relocated and/or Salvaged: Items required to be removed, relocated salvaged and/or stored to complete the work as indicated or called for in these construction documents.

B. Existing Items to Remain: to complete and conform to the work of the project shall be as indicated on the contract drawings and items listed in the technical specification sections.

END OF SECTION

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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

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

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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 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

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; 2018.

B. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.

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. This Section includes but is no limited to the following:
   1. Loose bearing and leveling plates.
   2. Loose steel lintels.
   3. Steel pipe sleeves.
   4. Steel framing at new roof penetrations for mechanical equipment
   5. Steel framing and supports for mechanical and electrical equipment.
   6. Steel framing and supports for applications where framing is not specified in other Sections.
   7. Aluminum framing and supports for applications where framing is not specified in other Sections.
   8. Slotted Channel Framing (Unistrut).
   9. Steel and galvanized steel pipe bollards.
   10. Loose steel angles and steel angles bolted to concrete or masonry.
   11. Metal roof deck for awning roof replacement.
   12. Roof deck infill at roof openings.

1.03 SUBMITTALS

A. Pursuant to Section 013300 - Submittal Procedures.

B. Pursuant to Section 016100 - Basic Product Requirements.

C. Fabricator Qualifications: A firm experienced in producing metal fabrications like those indicated for this Project and with a record of successful in-service performance, as well as enough production capacity to produce required units.

D. Product Data:
   1. Slotted Channel (Unistrut).
   2. Roof deck (Awning).

E. Shop Drawings: Detail fabrication and erection of each metal fabrication indicated or required. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Indicate welded connections using standard AWS A2.0 welding symbols. Indicate net weld lengths. Indicate finishes.
   1. Shop Drawings are required for the following:
      a. Lintels, bearing plates, and leveling plates.
      b. Frames to support roof deck at new openings in roof deck for mechanical equipment and/or to support mechanical equipment.
      c. Any other fabricated items.

F. Templates:
   1. Provide templates for anchors and bolts specified for installation under other Sections.

G. Welding Certificates: Copies of AWS certificates for welding procedures and personnel.

H. Manufacturer’s Mill Certificates: Certify that Products meet or exceed specified requirements.

1.04 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to the following:
   1. AWS D1.1/D1.1M, "Structural Welding Code-Steel".
   2. AWS D1.3/D1.3M, "Structural Welding Code-Sheet Steel".
   3. AWS D1.2/D1.2M, “Structural Welding Code-Aluminum”.
   4. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

B. Powder-Coating Applicator Qualifications: A firm experienced in successfully applying powder coatings of type indicated to metals of types indicated and that employs competent control personnel to conduct continuing, effective quality-control programs to ensure compliance with requirements.

1.05 PROJECT CONDITIONS

A. Field Measurements: Where metal fabrications are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

B. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions. Allow for trimming and fitting.

1.06 COORDINATION

A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
   1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by a Qualified Professional Engineer responsible for their preparation.

B. Coordinate installation of steel weld plates (bearing plates) and angles for casting into concrete and/or bond beams that are specified in this Section but required for work of another Section. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.01 METALS, GENERAL

A. Metal Surfaces, General: For metal fabrications exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, blemishes, or roughness.

B. Thermal Movements: Provide exterior metal fabrications that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, failure of connections, overstressing members and any other detrimental effect. Engineering calculations shall be based on surface temperatures of materials based on local maximum/minimum temperatures due to solar heat gain and nighttime heat loss.

C. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

2.02 FERROUS METALS

A. Steel, Shapes and Bars: ASTM A 36/A 36M.

B. W-Shapes: ASTM A 992, Gr. 50.

C. Steel Plates, Shapes, and Bars: ASTM A36/A 36M.

D. Plates: ASTM A 283; gage to match existing where not indicated on Drawings.

E. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.
   1. Galvanized where called for on the Contract Drawings.

F. Steel Tubing: ASTM A500, cold-formed steel tubing.

G. Stainless-Steel Sheet, Strip and Plate: ASTM A 240/A 240M or ASTM A 366, Type 304.

H. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.

I. Bolts, Nuts, and Washers: ASTM A 325.

J. Cast-in-Place Anchors in Concrete: Anchors of type indicated below, fabricated from corrosion-resistant materials capable of sustaining, without failure, the load imposed within a safety factor of 4, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
   1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47 (ASTM A 47M) malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.

K. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

2.03 ALUMINUM

A. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability
   1. Recycled Content: Give preference to aluminum with the highest recycled content feasible.

B. Extruded Structural Pipe: ASTM B 429/B 429M, Alloy 6063-T6.
   1. Provide Standard Weight (Schedule 40) pipe, unless otherwise indicated.

C. Extruded Aluminum: ASTM B221, Alloy 6063-T6

D. Drawn Seamless Tubing: ASTM B 210, Alloy 6063-T832.

E. Plate and Sheet: ASTM B 209, Alloy 6061-T6.

F. Die and Hand Forgings: ASTM B 247, Alloy 6061-T6.

G. Castings: ASTM B 26/B 26M, Alloy A356.0-T6.

H. Anchors and Fasteners for Aluminum: Stainless Steel.

2.04 PAINT

A. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664; selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.

B. Galvanizing Repair Paint: High-zinc-dust-content paint for re-galvanizing welds in steel, complying with SSPC-Paint 20.

C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187.

2.05 FASTENERS

A. Select and provide fasteners for fastening steel components to base materials, of type and size required to support loads, anchor components to substrates indicated, and develop proper friction, keying, and bonding.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts; ASTM A563; and, where indicated, flat and/or lock washers.
   1. Provide countersunk heads where indicated on Contract Drawings.

C. Stainless Steel fasteners; Type 304 or Type 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5 at exterior walls unless noted otherwise.
   1. Provide countersunk heads where indicated on Contract Drawings.

D. Plain Washers: Round, carbon steel, ASME B18.22.1 (ASME B18.22M). Use stainless-steel washers with stainless-steel fasteners.

E. Expansion anchors with countersunk heads as shown on Contract Drawings.

F. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated, with nuts, ASTM A563; and where indicated, flat washers.
   1. Hot-dip galvanize where item being fastened is indicated to be galvanized.

G. Cast-in-Place Anchors in Concrete or Grouted Masonry: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.

2.06 FABRICATION, GENERAL

A. Shop Assembly
   1. Preassemble items in shop to greatest extent possible to minimize field splicing and assembly.
   2. Disassemble units only as necessary for shipping and handling limitations.
   3. Use connections that maintain structural value of joined pieces.
   4. Clearly mark units for reassembly and coordinated installation.
   5. Fabricate steel members in accordance with AISC Code of Standard Practice.

B. Material
   1. Use material as specified. Use material of commercial quality and suitable for intended purpose for material that is not named or its standard of quality not specified.
   2. Use material free of defects which could affect the appearance or service ability of the finished product.

C. Size:
   1. Size and thickness of members as shown.
   2. When size and thickness is not specified or shown for an individual item, use size and thickness not less than that used for the same component on similar standard commercial items or in accordance with established shop methods.

D. Cut, shear, drill and punch metals cleanly and accurately. Remove burrs and ease edges to radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

E. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

F. Weld corners and seams continuously to comply with the following:
   1. Size and shape welds to develop the full design strength of the parts connected by welds and to transmit imposed stresses without permanent deformation or failure when subject to service loadings.
   2. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   3. Obtain fusion without undercut or overlap.
   4. Remove welding flux immediately.
   5. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

G. Provide for anchorage of type indicated or required; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads. Anchor heads exposed to view shall be laid out in even, symmetrical spacing.

H. Cut, reinforce, drill, countersink, and tap metal fabrications as indicated or required to receive finish hardware, screws, and similar items.

I. Fabricate joints that will be exposed to weather in a manner to exclude water or provide weep holes where water may accumulate.

J. Form exposed work true to line and level with accurate angles and surfaces, with straight, sharp edges.

K. Remove sharp or rough areas on exposed traffic surfaces.

L. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Locate joints where least conspicuous.

M. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

N. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6” embedment and 2” hook, not less than 8” from ends and corners of units and 24” o.c., unless otherwise indicated.

O. Galvanize and prime items as indicated herein and/or as shown on Contract Drawings. If not indicated all items shall be prime painted.

2.07 LOOSE STEEL LINTELS

A. Fabricate loose structural-steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated.

B. Weld adjoining members together to form a single unit where indicated.

C. Size loose lintels to provide bearing length at each side of openings equal to one-twelfth of clear span, but not less than 8 inches (200 mm), unless otherwise indicated.

D. Galvanize all surfaces of loose steel lintels located in exterior walls.

2.08 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction.
   1. Drill plates scheduled to receive anchor bolts.
   2. Provide headed embedment studs where indicated.
   3. Plates scheduled to be galvanized shall be galvanized after fabrication.
   4. Weld adjoining lintel members together to form a single unit where indicated.

2.09 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports that are not a part of structural-steel framework as necessary to complete the Work.

B. Fabricate units from structural-steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.

C. Galvanize miscellaneous framing and supports where indicated. All other miscellaneous framing and supports shall be prime painted.

2.10 PIPE BOLLARDS

A. Fabricate pipe bollards from Schedule 40 galvanized steel pipe. Provide galvanized steel domed caps for field welding.

2.11 METAL ROOF DECK AT AWNING ROOF REPLACEMENT

A. 1.0" RD x 22 gauge, grade 80 galvanized steel roof deck.

B. Manufacturers:
   1. CSM Roof Deck
   2. NUCOR/Vulcraft
   3. Architect approved equivalent

2.12 METAL ROOF DECK

A. At roof deck openings that are being abandoned, provide metal roof deck of equal profile and gauge as existing. Patching roof deck should be 8" larger in all directions.

2.13 FINISHES, GENERAL

A. Comply with NAAMM's “Metal Finishes Manual” for recommendations for applying and designating finishes.

B. Finish metal fabrications after assembly.

C. Aluminum: Clear Anodic Finish; AAMA 611, Class 1, AA-M12C22A41

2.14 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:
   1. ASTM A 123/A 123M, for galvanizing steel and iron products.
   2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.

B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed metal fabrications:
   1. Exteriors (SSPC Zone 1B): SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
   2. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."

C. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for shop painting.

2.15 SLOTTED CHANNEL FRAMING

A. Slotted Framing Channels: Cold-formed metal channels with continuous slot complying with MFMA-4.
   1. Acceptable Manufacturers:
      a. Flex-Strut Inc.
      b. Powerstrut.
      c. Unistrut.
   2. Material: Steel complying with ASTM A1011 Grade 33; or ASTM A1008/A1008M, commercial steel, Type B structural steel, Grade 33.
   3. Size of channels: As required by structural analysis or as shown on Contract Drawings, but not less than 1-5/8" by 1-5/8", 12 gauge.
   4. Finish: Hot Dip Galvanized unless indicated otherwise.

B. Slotted Framing Accessories:
   1. Provide manufacturer's accessories and fittings as required for a complete installation, including channel nuts, insets, end caps, swivel and swing fittings, supports, joiners, brackets and other accessories as required.
   2. Accessories Finish: Match slotted framing channel finish.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal fabrications to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations.

Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

E. Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, methods used in correcting welding work, and the following requirements:
   1. Clean and strip primed steel items to bare metal where field welding is required.
   2. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   3. Obtain fusion without undercut or overlap.
   4. Remove welding flux immediately.
   5. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place masonry and/or concrete construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag bolts screws, and other connectors. Provide countersunk heads on fasteners where exposed in finish work.

G. Corrosion Protection: Coat concealed surfaces of aluminum that will come in contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

3.02 SETTING BEARING AND LEVELING PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
   1. Use nonshrink nonmetallic grout.
   2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.03 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings, if any.

B. Support steel on solid grouted masonry or concrete. Secure steel with anchor bolts embedded in grouted masonry or concrete.
   1. Where grout space under bearing plates is indicated at steel supported on concrete or masonry, install as specified above for setting and grouting bearing and leveling plates.

C. Roof Deck Framing:
   1. Provide angle framing around new roof deck openings larger than 8" x 8" and for support under new rooftop mechanical equipment.
   2. Angle framing reinforcement shall consist of the following:
      a. Angle 4" x 4" x 1/4" minimum, where distance between supports is 10' or less.
      b. Top of angles shall be flush with bottom of deck.
      c. New support angles shall run from beam to beam, joist to joist, or beam to joist.
      d. Provide angle 4" x 4" x 1/4" x 0'-6" clip angles tight to top face of joist or beam.
      e. At joist framing, clip angles to be located at top chord panel points or provide two (2) angles1-1/2" x 1-1/2" x 3/16" from bearing point of support frame to bottom chord panel point of joist. Field weld in place.
   3. Do not cut deck opening until reinforcement framing is installed.

3.04 INSTALLING SLOTTED CHANNEL FRAMING

A. Install framing to comply with requirements of items being supported, including manufacturer's written instructions and requirements indicated on Shop Drawings.

B. Install shop or field fabricated, slotted channel framing and securely anchor to supporting structure, solid wood blocking or masonry construction with grouted cores.
   1. When attaching thru ceiling GWB to roof truss construction, slotted channel must connect to a minimum two roof trusses when truss spacing exceeds four (4) feet and to three (3) roof trusses when truss spacing is less than four feet. Coordinate with roof truss manufacturer for proper style and length of embedment of fastener.
   2. Install slotted channel framing and accessories plumb, square and true to line, and with connections securely fastened.

3.05 INSTALLING GALVANIZED PIPE BOLLARDS

A. Anchor bollards in place as shown on Contract Drawings. Support and brace bollards in position in footing excavations until concrete has been placed and cured.

B. Fill bollards solidly with concrete.

C. Field weld galvanized dome caps. Grind welds smooth. Fill any gaps with Bondo and finish smooth.

D. Repair all damaged galvanizing.

3.06 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
   1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

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. Pre-assembled steel stairs with concrete-filled treads.
   2. Steel tube railings attached to metal stairs.
   3. Steel tube handrails attached to walls adjacent to metal stairs.
   4. Wood blocking for anchoring railings.

1.03 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design metal stairs, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance of Stairs: Metal stairs shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.
   1. Uniform Load: 100 lbf/sq. ft (4.79 kN/sq. m).
   2. Concentrated Load: 300 lbf (1.33 kN) applied on an area of 4 sq. in (2580 sq. mm).
   3. Uniform and concentrated loads need not be assumed to act concurrently.
   4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
   5. Limit deflection of treads, platforms, and framing members to L/360 or 1/4 inch (6.4 mm), whichever is less.

C. Structural Performance of Handrails and Railings: Handrails and railings shall withstand the structural loads required by ASCE 7 without exceeding the allowable design working stress of the materials for handrails, railings anchors and connections. Gravity loads and the following loads and stresses within the limits and under the conditions indicated:
   1. Handrails and Top Rails of Guards:
      a. Uniform load of 50 lbf/ ft. (0.73 kN/m) applied in any direction.
      b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
      c. Uniform and concentrated loads need not be assumed to act concurrently.
   2. Infill of Guards:
      a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).

D. Seismic Performance: Metal stairs shall withstand the effects of earthquake motions determined according to ASCE/SEI 7, Minimum Design Loads for Buildings and Other Structures": Section 9 "Earthquake Loads".
   1. Component Importance Factor is 1.15.

1.04 ACTION SUBMITTALS

A. Product Data: For metal stairs and the following:
   1. Refilled metal-pan stair treads.
   2. Abrasive nosings.
   3. Paint products.
   4. Grout.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
   1. Provide templates for anchors and bolts specified for installation under other sections.

1.05 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified professional engineer.

B. Welding certificates. Certified welder employed on the work shall have AWS Certification within the previous 12 months.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for stairs.

E. Special Inspection Requirements:
   1. Where materials, welding procedures and qualifications of welders are verified prior to the start of work, periodic inspections of the work in progress and a visual inspection of all welds are made prior to shipping of shop welding, continuous special inspections of welding will not be required.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

B. Professional Engineer Qualifications: A Professional Engineer who is legally qualified to practice in the state in which the project is located and who is experienced in providing engineering services of the type indicated and required for this section of the work. Engineering services are defined as those performed for installations of Metal Stairs including handrails and railing systems, that are similar to those indicated for this project in material, design and extent.

C. Fabricator Qualifications: A firm experienced in producing Metal Stairs similar to those indicated for this project and with a record of successful in-service performance, as well as sufficient production capability to produce the required units.

D. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," for class of stair designated, unless more stringent requirements are indicated.
   1. Preassembled Stairs: Commercial class.
   2. Ornamental Stairs: Architectural class.

E. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

F. Welding Qualifications: Qualify procedures and personnel according to the following:
   1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
   2. AWS D1.2/D1.2M, "Structural Welding Code--Aluminum".
   3. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

1.07 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for metal stairs. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

C. Coordinate locations of hanger rods and struts with other work so that they will not encroach on required stair width and will be within the fire-resistance-rated stair enclosure.

PART 2 PRODUCTS

2.01 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.02 FERROUS METALS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

C. Steel Tubing: ASTM A500/A500M (cold formed).

D. Uncoated, Cold-Rolled Steel Sheet: ASTM A1008/A1008M, either commercial steel, or structural steel, Grade 25 (Grade 170), unless another grade is required by design loads; exposed.

2.03 ABRASIVE NOSINGS

A. Cast-Metal Units: Cast aluminum, with an integral abrasive, as-cast finish consisting of aluminum oxide, silicon carbide, or a combination of both. Fabricate units in lengths necessary to accurately fit openings or conditions.
   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. American Safety Tread Co., Inc.
      b. Balco Inc.
      c. Barry Pattern & Foundry Co., Inc.
      d. Safe-T-Metal Company, Inc.
      e. Wooster Products Inc.
   2. Configuration: Cross-hatched units, 3 inches (75 mm) wide without lip.

B. Extruded Units: Aluminum units with abrasive filler consisting of aluminum oxide, silicon carbide, or a combination of both, in an epoxy-resin binder. Fabricate units in lengths necessary to accurately fit openings or conditions.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. American Safety Tread Co., Inc.
      b. Balco Inc.
      c. Wooster Products Inc.

C. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.

D. Apply bituminous paint to concealed surfaces of cast-metal units set into concrete.

E. Apply clear lacquer to concealed surfaces of extruded units set into concrete.

2.04 FASTENERS

A. General: Provide zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 12 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required.

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.

C. Machine Screws: ASME B18.6.3 (ASME B18.6.7M).

D. Plain Washers: Round, ASME B18.22.1 (ASME B18.22M).

E. Lock Washers: Helical, spring type, ASME B18.21.1 (ASME B18.21.2M).

F. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E488/E488M, conducted by a qualified independent testing agency.
   1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.
   2. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 2 (A4) stainless-steel bolts, ASTM F593, and nuts, ASTM F594.

2.05 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Shop Primers: Provide primers that comply with Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

C. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, non-gaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

D. Concrete Materials and Properties: Comply with requirements in Section {\id\#1000116} - {\t\#1000116} for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 4000 psi (20 MPa) unless otherwise indicated.

E. Nonslip-Aggregate Concrete Finish: Factory-packaged abrasive aggregate made from fused, aluminum-oxide grits or crushed emery; rustproof and non-glazing; unaffected by freezing, moisture, or cleaning materials.

F. Welded Wire Fabric: ASTM A 185/A 185M, 6 by 6 inches (152 by 152 mm), W1.4 by W1.4, unless otherwise indicated.

2.06 FABRICATION, GENERAL

A. Provide complete stair assemblies, including metal framing, hangers, struts, railings, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
   1. Join components by welding unless otherwise indicated.
   2. Use connections that maintain structural value of joined pieces.

B. Preassembled Stairs: Assemble stairs in shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

E. Form exposed work with accurate angles and surfaces and straight edges.

F. Weld connections to comply with the following:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.
   4. Weld exposed corners and seams continuously unless otherwise indicated.
   5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds: no evidence of a welded joint.

G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated. Locate joints where least conspicuous.

H. Fabricate joints that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

2.07 STEEL-FRAMED STAIRS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Alfab, Inc.
   2. American Stair, Inc.
   3. Sharon Companies Ltd. (The).

B. Stair Framing:
   1. Fabricate stringers of steel plates or channels tubes or a combination of both as indicated.
      a. Provide closures for exposed ends of channel or tube stringers.
   2. Construct platforms of steel tube headers and miscellaneous framing members as indicated.
   3. Weld or bolt stringers to headers; weld or bolt framing members to stringers and headers. If using bolts, fabricate and join so bolts are not exposed on finished surfaces.
   4. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.

C. Metal-Pan Stairs: Form risers, subtread pans, and subplatforms to configurations shown from steel sheet of thickness needed to comply with performance requirements but not less than 0.067 inch (1.7 mm).
   1. Steel Sheet: Galvanized and primed cold-rolled steel sheet.
   2. Directly weld metal pans to stringers; locate welds on top of subtreads where they will be concealed by concrete fill. Do not weld risers to stringers.
   3. Shape metal pans to include nosing integral with riser.
   4. At Contractor's option, provide stair assemblies with metal-pan subtreads filled with reinforced concrete during fabrication.
   5. Provide subplatforms of configuration indicated or, if not indicated, the same as subtreads. Weld subplatforms to platform framing.
      a. Smooth Soffit Construction: Construct subplatforms with flat metal under surfaces to produce smooth soffits.
   6. When indicated, provide Hot-Dip galvanized completed fabrications with a factory primer ready for field painting.

2.08 STAIR RAILINGS

A. Comply with applicable requirements in Section 055213 - {\t\#1000126} or as indicated in this Section.
   1. Rails may be bent at corners, rail returns, and wall returns, instead of using prefabricated fittings.
   2. Connect posts to stair framing by direct welding unless otherwise indicated.

B. Steel Tube Railings: Fabricate railings to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of tube, post spacings, and anchorage, but not less than that needed to withstand indicated loads.
   1. Rails and Posts: 1-1/2-inch round top and bottom rails and 1-1/2-inch round posts.
   2. Picket Infill: 1/2-inch round pickets spaced less than 3 7/8" inches clear.
   3. Intermediate Rails Infill: 1-1/2-inch round intermediate rails spaced less than 21 inches clear or as shown on the drawings.
   4. Gates: Form gates from steel tube of same size and shape as top rails, with infill to match guards. Provide with cam-type, self-closing hinges for fastening to wall and overlapping stop with rubber bumper to prevent gate from opening in direction opposite egress.

C. Welded Connections: Fabricate railings with welded connections. Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
   1. Finish welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds: no evidence of a welded joint.

D. Form changes in direction of railings as follows:
   1. As detailed.
   2. By radius bends of radius indicated or by inserting prefabricated elbow fittings of radius indicated.

E. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

F. Close exposed ends of railing members with prefabricated end fittings.

G. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch (6 mm) or less.

H. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work. Furnish inserts and other anchorage devices for connecting to concrete or masonry work.
   1. Connect posts to stair framing by direct welding unless otherwise indicated.
   2. For non-galvanized railings, provide non-galvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors embedded in exterior masonry and concrete construction.

2.09 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal stairs after assembly.

C. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
   1. Interior Stairs: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

PART 3 EXECUTION

3.01 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.

C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.

D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

E. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

F. Field Welding: Comply with requirements for welding in "Fabrication, General" Article.

G. Place and finish concrete fill for treads and platforms to comply with Section {\id\#1000116} - {\t\#1000116}
   1. Steel trowel concrete to a smooth finish, free of trowel marks and uniform in texture and appearance. allow concrete to cure for three days. Do not allow traffic on concrete.
   2. Install abrasive nosings with anchors fully embedded in concrete. Center nosings on tread width.

3.02 INSTALLING METAL STAIRS WITH GROUTED BASEPLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of baseplates.

B. Set steel stair baseplates on wedges, shims, or leveling nuts. After stairs have been positioned and aligned, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
   1. Use nonmetallic, nonshrink grout unless otherwise indicated.
   2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.03 INSTALLING RAILINGS

A. Adjust railing systems before anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated or, if not indicated, as required by design loads. Plumb posts in each direction. Secure posts and rail ends to building construction as follows:
   1. Anchor posts to steel by welding directly to steel supporting members.
   2. Anchor handrail ends to concrete and masonry with steel round flanges welded to rail ends and anchored with postinstalled anchors and bolts.

B. Attach handrails to wall with wall brackets. Use type of bracket with predrilled hole for exposed bolt anchorage. Provide bracket with 1-1/2-inch (38-mm) clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads. Secure wall brackets to building construction as follows:
   1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
   2. For hollow masonry anchorage, use toggle bolts.
   3. For steel-framed partitions, use toggle bolts installed through flanges of steel framing or through concealed steel reinforcements.

3.04 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
   1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099113 - EXTERIOR PAINTING and Section 099123 - INTERIOR PAINTING

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, the following:
   1. Exterior aluminum roof access ladders and platforms.

1.03 STANDARDS

A. All work of this section shall conform to ICC/ANSI, industry standards and manufacturer's recommendations.

B. ASTM B209/B209M "Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate".

C. ASTM B221 "Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes".

D. American Welding Society (AWS) applicable welding methods and standards.

E. OSHA 29 CFR 1910.27 - Fixed Ladders.

1.04 SUBMITTALS

A. Pursuant to Section 013300 - Submittal Procedures.

B. Submit pursuant to Section 016100 - Basic Product Requirements.

C. Product Data:
   1. Manufacturer's data sheets on each ladder.

D. Shop Drawings:
   1. Detail fabrication and erection of each ladder indicated. Include plans, elevations, sections, and details of metal fabrication and their connections.

E. Manufacturer's Qualifications:
   1. See requirements in Quality Assurance paragraph below.

1.05 QUALITY ASSURANCE

A. Manufacturer's Qualifications: A firm experienced in producing aluminum metal ladders similar to those indicated for this Project.
   1. Record of successful in-service performance.
   2. Sufficient production capacity to produce required units.
   3. Professional engineering competent in design and structural analysis to fabricate ladders in compliance with industry standards and local codes.

B. Installer Qualifications: Competent and experienced firm capable of selecting fasteners and installing ladders to attain designed operational and structural performance.

C. Product Qualifications: Product design shall comply with OSHA 29 CFR 1910.27 minimum standards for ladders and platforms.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Pursuant to manufacturers published instructions.

B. Protect against moisture exposure and damage.

C. Deliver materials to job site in good condition and properly protected against damage to finished surfaces.

D. Storage on site:
   1. Store material in a location and in a manner to avoid damage. Stack to prevent bending.

2. Store aluminum, bronze, and stainless-steel components and materials in clean, dry location, away from uncured concrete and masonry. Cover with waterproof paper, tarpaulin, or polyethylene sheeting and provide for circulation of air inside covering.

E. Keep handling on site to a minimum. Exercise care to avoid damage to finished materials.

1.07 WARRANTY - ALUMINUM LADDERS

A. Manufacturer has responsibility for an extended Corrective Period for work of this Section for a period of 5 years from date of Substantial Completion against all the conditions indicated below, and when notified in writing from Owner, manufacturer shall promptly and without inconvenience and cost to Owner correct said deficiencies.
   1. Defects in materials and workmanship.
   2. Deterioration of material and surface performance below minimum OSHA standards as certified by independent third-party testing laboratory. Ordinary wear and tear, unusual abuse or neglect excepted.
   3. Within the warranty period, the manufacturer shall, at its option, repair, replace, or refund the purchase price of defective ladder.

B. Manufacturer shall be notified immediately of defective products and be given a reasonable opportunity to inspect the goods prior to return. Manufacturer will not assume responsibility, or compensation, for unauthorized repairs or labor.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Kee Safety Inc., 100 Stradtman St., Buffalo, NY 14206. Regional Representative: V. Chikh, Phone: (929) 456-7099. (Basis of Specifications)

B. Tri Tech Fall Protection, 8100 Chancellor Drive, Orlando, FL 32809. Phone: (833) 633-9750.

C. Architect approved equivalent from established roof ladder manufacturer.

2.02 PRE-FABRICATED PARAPET ROOFTOP CROSSOVER PLATFORM

A. Manufacturer: Kee Step® rooftop crossover with non-penetrating rubber base.

B. Width: 24".

C. Risers: Minimum five (5) risers on high side and six (6) risers on low side.

D. Center Landing: 39" long x 24" wide.

E. Continuous OSHA compliant guard and hand rails shall be provided on both sides.

F. Bottom Support: Rubber Kee Guard bases with an additional sheet of 90 mil EPDM, 1" larger, in all directions, than the Kee Guard base.

2.03 TUBULAR RAIL PLATORM ACCESS

A. Manufacturer: Kee Step® rooftop platform with step and non-penetrating rubber base.

B. Platform size: 4' x 5' landing.

C. Risers: Provide minimum one (1) riser from roof to landing, 48" wide.

D. Continuous OSHA compliant guard and hand rails shall be provided on both sides.

E. Bottom Support: Rubber Kee Guard bases with an additional sheet of 90 mil EPDM, 1" larger, in all directions, than the Kee Guard base.

2.04 MISCELLANEOUS MATERIALS

A. Fasteners: Same basic metal as fastened metal. Do not use metals which are corrosive or incompatible with materials joined.
   1. Provide concealed fasteners for interconnection of handrail and railing components and for their attachment to other work except where exposed fasteners are unavoidable or are the standard fastening method for handrail and railing system indicated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until supporting structure is complete and ladder installation will not interfere with supporting structure work.

B. If supporting structure is the responsibility of another installer, notify Architect of unsatisfactory supporting work before proceeding.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions and in proper relationship with adjacent construction.

3.03 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

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PART 1 GENERAL

1.01 SUMMARY

A. This Section includes wood restoration work including repairing existing woodwork by removing damaged or deteriorated material and replacing with new to match existing.

1.02 RELATED SECTIONS

A. Section 011001 - General Requirements for Historic Preservation.

1.03 REFERENCES

A. AWI Quality Standard: Comply with applicable requirements of Architectural Woodwork Standards, published by the Architectural Woodwork Institute (www.AWInet.net), except as otherwise indicated.

1.04 SYSTEM DESCRIPTION

A. Performance Requirements: Submit written program for each phase of restoration process including protection of surrounding materials on building during operations. Describe in detail materials, methods and equipment to be used for each phase of restoration work.

1.05 QUALITY ASSURANCE

A. Mock-Ups: Prior to start of wood restoration work, prepare the following sample panels in building where directed by the Architect or the Owner's Construction Representative. Obtain the Architect or the Owner's Construction Representative's acceptance of visual qualities before proceeding with the work. Retain acceptable panels in undisturbed condition, suitably marked, during construction as a standard for judging completed work.
   1. Wood Repair: Prepare sample panels for each type of woodwork indicated to be patched, resurfaced, modified or replaced. Prepare mock-up panels on existing woodwork to demonstrate quality of materials and workmanship.

1.06 PROJECT/SITE CONDITIONS

A. Existing Conditions:
   1. Installer shall advise Contractor of temperature and humidity requirements for woodwork installation areas. Do not install woodwork until required temperature and relative humidity have been stabilized and will be maintained in installation areas.
   2. Maintain temperature and humidity in installation area as required to maintain moisture content of installed woodwork within a 1.0 percent tolerance of optimum moisture content, from date of installation through remainder of construction period. The fabricator of woodwork shall determine optimum moisture content and required temperature and humidity conditions.
   3. Determine that surfaces to which finishes are to be applied are even, smooth, sound, clean, dry and free from defects affecting proper application. Correct or report defective surfaces to Contracting Officer.

PART 2 PRODUCTS

2.01 MATERIALS

A. New or Replacement Materials:
   1. Wood Moisture Content: Provide kiln-dried lumber with an average moisture content range of 6% to 11% for interior work. Maintain temperature and relative humidity during fabrication, storage and finishing operations so that moisture content values for woodwork at time of installation do not exceed the above range.
   2. Replacement Wood: Match species, grade, grain pattern, and other special characteristics of existing woodwork.

B. Clean, soft cloths

PART 3 EXECUTION

3.01 PREPARATION

A. Surface Preparation:
   1. Condition woodwork to average prevailing humidity conditions in installation areas prior to installing.
   2. Back prime woodwork on all surfaces which will be concealed with one coat of wood primer. Schedule delivery to allow time for application and drying of back prime coat before installation of woodwork.
   3. Remove miscellaneous hardware, nails, etc., from all existing woodwork as required to provide a first class installation of new or replacement woodwork.
   4. Prior to installation of new architectural woodwork, examine shop fabricated work for completion, and complete work as required, including back priming and removal of packing.

3.02 ERECTION, INSTALLATION, APPLICATION

A. Carefully remove at locations indicated any damaged or deteriorated woodwork. Unless indicated otherwise, replace the entire length of the existing damaged piece to the next butt joint.

B. For partial replacement of existing pieces, use a neat, well-fitted level cut with grain aligned in transparent finished wood.

C. Install new pieces as described below:
   1. Install the work plumb, level, true and straight with no distortions. Shim as required using concealed shims.
   2. Cut to fit unless specified to be shop-fabricated or shop-cut to exact size. Where woodwork abuts other finished work, scribe and cut for accurate fit. Before making cutouts, drill pilot holes at corners.
   3. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to the greatest extent possible. Stagger joints in adjacent and related members. Cope at returns, miter at corners, and comply with Quality Standards for joinery.
   4. Anchor woodwork to anchors or blocking built-in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation. Except where prefinished matching fasteners heads are required, use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork, and matching final finish where transparent finish is indicated.

D. Finish replacement woodwork to match adjacent woodwork surfaces.

3.03 ADJUSTING/CLEANING

A. Upon completion of this work, all floors, walls, and other adjacent surfaces that are stained, marred, or otherwise damaged by work under this section shall be cleaned and repaired and all work and the adjacent areas shall be left in a clean and perfect condition.

B. All completed work shall be adequately protected from damage by subsequent building operations and effects of weather. Protection shall be by methods recommended by the manufacturer of installed materials and as approved by the the Architect or designated representative.

C. Repair damaged and defective woodwork wherever possible to eliminate defects functionally and visually; where not possible to repair properly, replace woodwork. Adjust joinery for uniform appearance.

D. Clean woodwork: Dust and damp wipe woodwork with a soft cloth dampened in clean water; dry rub with soft cloth to maintain the polish, rubbing along the grain of the wood.

E. Stain and Spot Removal:
   1. Stains may be cleaned by prompt damp wiping with cloth dampened in clear water or rubbing with cloth dampened in solvent. Dry the wood with a soft cloth.
   2. White spots may be removed by rubbing them with a small amount of linseed oil.

END OF SECTION

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PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Restoration and Refinishing of historic woodwork, including but not limited to:

B. Restoration of ceiling beams and coffers in Marine Dining Room:
   1. Dutchman repairs for losses or cuts in woodwork
   2. Crack repair
   3. Material replication and replacement of missing dentils, rosettes, buttons and other decorative details
   4. Reattachment or replacement of loose or damaged trim
   5. Refinishing of woodwork

C. Restoration of paneling, flooring, cabinetry and doors:
   1. Repair or replacement of damaged wood including decorative moldings in kind.
   2. Dutchman repairs for losses or infill
   3. Removal of abandoned anchors or faceplates
   4. Reattaching loose trim
   5. Repair of warped wood
   6. Repair of cabinetry and doors for operability.
   7. Crack and scratch repair
   8. Finish restoration including selective refinishing and re-varnishing

D. Work of this section shall include but is not limited to the protection and restoration of woodwork as noted on the Contract Drawings.

1.02 REFERENCES

A. ASTM-American Society for Testing and Materials, Current Edition

B. Secretary of the Interior's Standards for Rehabilitation.

1.03 JOB CONDITIONS

A. Quantity and Location: The Contractor and the Architect shall review all of the areas mentioned to confirm quantities and location of interior wood restoration.

B. Contractor shall include in base bid the following quantities of wood trim to be replaced:
   1. Dentil blocks: (50) units.
   2. Rosettes: (30) units.
   3. Coffer moldings: (75) linear feet.

1.04 QUALITY ASSURANCE

A. Skill: The "Restoration Carpenter" (heretofore known as the Contractor) who shall perform the work specified in this section must be regularly engaged in the restoration of architectural woodwork. The Contractor must have a minimum of five (5) years of experience. The Contractor must demonstrate successful completion within the last three (3) years and in a timely fashion at least (3) projects similar in scope and type to the required work in the New York region(s), involving facilities designated as Landmarks by local government, or buildings listed on the National or State Register of Historic Places. For the woodwork restoration, use craftspeople that are completely familiar with the requirements for this work.

B. Mechanics: Contractor shall maintain a steady work crew consisting of skilled craftspeople that are experienced with the materials and methods specified. The Contractor shall confirm that all workers understand the job's requirements.

C. Materials shall conform to the latest edition of reference specifications applicable, specified herein, and to applicable codes and requirements of local authorities having jurisdiction.
   1. Materials shall conform to governing regulations regarding the content of volatile organic compounds (VOC).

2. The Contractor shall confirm that the materials specified perform to the satisfaction of Architect, and do not produce off-gassing or otherwise have a deleterious effect during or after application on either the surface being treated or on adjacent surfaces.
3. The Contractor shall comply with relevant ASTM Standards for all materials.

D. The Quality Standards, latest edition of the Architectural Woodwork Institute (AWI) shall apply to the work of this section. Except as otherwise indicated, provide "Premium Grade" work as defined in the above-referenced standard for all Architectural woodwork.

E. All wood restoration procedures shall be done in accordance with regulations, safety standards and in requirements of all federal, state and local authorities having jurisdiction over the work including but not limited to the applicable standards for protecting the public and control of pollutants and OSHA regulations for the protection of workers and the public.

F. All work shall comply with the Secretary of the Interior’s Standards for the Treatment of Historic Properties, as interpreted by the Architectural Conservator.

G. Whenever possible, use old salvaged wood for replacement rather than new millwork.

H. Wood Moisture Content: If using new wood, provide kiln-dried (KD) lumber with an average content range of 6-11%.

I. Replication wood shall match original existing species and grade, or premium grade whichever is more stringent. New inserts in existing wood shall be selected to match grain, color and pattern.

J. Joinery or ornamental elements shall be fabricated to match existing, or AWI Premium Grade, whichever is more stringent.

1.05 SUBMITTALS

A. Qualification Data: Submit qualification data, specified in "Quality Assurance" Article, that demonstrate the firm's and individual's capabilities and experience. Include a list of at least three (3) wood restoration projects completed in a timely fashion in landmark quality buildings. List project names, addresses, names of Owner’s Representative and Owner, and telephone number of contact person for each project. Submit this information with the bid. Bidders shall visit the site and make themselves familiar with job conditions.

B. Product Literature: Submit copies of manufacturer's latest published technical data including, installation instructions and general recommendations for each specified material and fabricated product. Include test reports and certificates substantiating the product's compliance with the specified requirements. Obtain approval before materials are delivered to the site.

C. Methods of Protection: Prior to commencing the protection and restoration, the Contractor shall submit a written description of proposed materials and methods of protection for preventing damage to any adjacent material or finish during the protection, removal, restoration and installation of the woodwork.

D. Method of Restoration: The Contractor shall submit a written description of proposed method for restoring each area of woodwork.

E. Samples:
1. Submit three (3) samples of wood for repairs with and without restored finish for each area of refinishing as shown on drawings. Provide full range of color to be found in final finished product.
2. Provide three (3) samples of original material of each type of millwork requiring replacement. Sample shall be representative of size and profile of units on site.
3. Wood Putty Repairs: Provide three (3) samples of tinted wood putty for each type of wood finish.

F. Shop Drawings:
1. The Contractor shall submit complete shop drawings of all architectural woodwork to the Architect for approval. The Drawings shall include dimensioned elevations and sections as well as full size details of all typical members and joinery, types of materials, and shall show hardware and methods of securing and fastening members to adjacent work.

2. Shop drawings shall clearly indicate any deviation from designs or details of the existing woodwork.
3. All dimensional information contained in the drawings, whether numerical, tabular, or graphic is provided only for the information of the Contractor, and is not guaranteed. Contractor shall verify all measurements in the field.
4. Drawings shall show location of new blocking required to reinstall woodwork. Drawings shall clearly show proposed modification and alterations of salvaged woodwork to be completed prior to reinstallation.

G. Schedule: The Contractor shall submit a schedule of work to the Architect. The schedule shall show all salvaged woodwork, and include finishes, wood types, locations, dimensions, and types of repair or replacement of each element prior to reinstallation. The schedule shall indicate the time of completion of each task, and shall note accommodation of altered room dimensions.

H. Prepare Mock-ups for approval as specified in Article 1.06"Mock-ups".

I. Samples and mockups submitted which are approved by Architect shall remain as a record at the site until all work is completed and approved by Architect.

1.06 MOCK-UPS

A. Prepare one mockup at area(s) designated by Architect for each repair and replication type indicated in this Section unless otherwise indicated.
   1. New wood inserts (Dutchman repairs): Subsequent to Architect approval of all shop drawings/sketches and samples, the Contractor shall prepare one sample repair using materials and methods specified for one (1) Dutchman repair. Following any revisions requested by Architect, the approved sample shall form a quality standard for all further new work.
   2. Clear Finish Restoration: Prepare one (1) sample using materials and methods specified for each type of clear finish. The new finish shall match the original in color, transparency, and reflectance quality. Following any revisions requested by Architect, the approved sample shall form a quality standard for all further work.

B. All finish mock-ups will be a minimum of 3’-0” x 3’-0” except where specifically approved by the Architect.

C. Mock-ups shall be approved by Architect before the work may proceed. Provide additional sample panels, as may be required by Architect. The approved panels shall not be removed until so directed by Architect.

D. No work will be accepted until it conforms in every respect to the finished sample.

E. Protect mockups for the duration of the job. Samples and mockups submitted which are approved by Architect shall remain as a record at the worksite until the work is completed and approved by the Architect.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver packaged material in original unbroken packages with the manufacturer’s name, brand and material standard indicated plainly thereon.

B. Store and handle all material in a manner as to prevent damage by water or water vapor.

C. Replace all broken, lost and damaged adjacent material resulting from repair, removal, cleaning, and finishing of all woodwork under this section at no expense to the Owner.

D. All Subcontractors are bound by the same requirements as the Contractor. Subcontractors shall not begin work unless approved by the Architect.

E. Store and handle all woodwork in a manner as to prevent damage by water or water vapor. Location shall be climate controlled and bonded for the duration of the project.

F. Store any removed materials on a clean, dry surface or platform as required to protect from deterioration and to prevent inclusion of foreign matter.

G. The Contractor is responsible for the clean, safe and secure storage of all units. Any damage caused as part of the transportation to the storage site, or during storage, shall be restored at no expense to the Owner and the approval of the Architect.

H. Take all necessary precautions to prevent fire and spread of fire.

I. Provide for adequate ventilation at all times during work of this Section.

J. Working fire extinguishers must remain on the worksite at all times.

K. Paint or solvent soaked rags, waste, overalls or other material which might constitute a fire hazard shall be placed in metal containers and be removed from the premises daily in coordination with Construction Manager's / Owner's requirements for waste removal.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Where any manufacturer makes more than one grade of each material specified, the Contractor shall use the highest grade of each type, whether or not the material is mentioned by trade name in these specifications.

B. Follow manufacturer's instructions regarding preparation of surfaces, mixing, applying, drying, etc. In case of conflict with this specification, the more stringent shall govern.

C. Materials shall conform to the following requirements and shall be new of the highest grade, free from defects, and of recent manufacture. Where product names and numbers are indicated and are not available, furnish products, which are equal to original specifications, as approved and at no additional cost to the Owner.

2.02 ARCHITECTURAL WOODWORK MATERIALS

A. The grades of all materials under this section shall be as defined by the rules of the recognized association of lumber manufacturers producing the materials specified. Wood for millwork shall conform to, or exceed, the requirements of "Premium Grade, Class 1 " as established by Quality Standards or the Architectural Woodwork Institute (AWI) and shall be provided in the cuts and figure required to match existing wood. Where conflicts occur between these standards and this Specification, the more stringent requirement shall govern in each case.

B. Lumber and finished woodwork throughout shall be of sound stock, thoroughly seasoned, free from all knots, and if new, kiln-dried to a moisture content not exceeding 6-11% for millwork.

C. Work that is to be finished shall be free from defects or blemishes on surfaces exposed to view that will show after the finish coat of varnish or paint is applied. Any materials which are in any way defective and do not meet specifications for quality and grade, or are otherwise not in proper condition, shall be rejected.

2.03 TOOLS

A. Power saws may not be used during the removal of the woodwork without approval by Architect.

B. Handheld power tools used for the removal of paint or varnish shall be equipped with vacuum attachments that control air-borne lead dust.

2.04 PROTECTION MATERIALS

A. Polyethylene foam that does not off-gas, such as Ethafoam, or approved equal.

B. Cotton batting shall be 100% unbleached cotton.

C. Polyethylene sheeting, 6-8 mil., or approved equal.

2.05 CLEANING MATERIALS

A. Cleaning Pads: Scotch-Guard Red Pads, or approved equal.

B. Cleaning Pads: 0000 steel wool, clean and free of contaminants and corrosion.

C. Clean, lint free cotton rags and cheesecloth.

2.06 PUTTIES, ADHESIVES, AND FASTENERS

A. Fillers for holes and losses in wood: Pigmented oil-based putty formulated specifically for use on wood. Provide "Color Putty." Mix different colors of putty to match color of finished wood.

B. Retouching Crayons: Beeswax sticks impregnated with powdered dry pigments.

C. All glues shall be non-staining waterproof wood glues as manufactured by 3M Company, Pittsburgh Plate Glass Company, Borden Company, or approved equal.

D. Provide all new screws to match existing.

2.07 FINISH MATERIALS

A. Varnishes, waxes and shellacs as approved in the mock-ups.

2.08 FABRICATION OF NEW WOODWORK

A. All work shall comply with AWI Section 1000, Premium Grade for new millwork. Repair existing millwork exactly matching existing joinery, profiles and dimensions, unless otherwise scheduled for modifications.

B. Work shall be fabricated to replicate existing profiles except where specifically indicated otherwise.

C. All new work shall be varnished or painted to match the color, texture and sheen of the original surface finish.

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine all areas scheduled for work to determine whether existing conditions will adversely affect execution of the work of this section.

B. Take all necessary field measurements and verify all installation conditions prior to dismantling, submission of shop drawings/sketches and other submittals, and prior to ordering and fabrication of material.

C. Coordinate work with other trades as required during salvage and restoration operations.

3.02 RESTORATION OF WOODWORK: GENERAL

A. Restore all woodwork, including specific items noted on the Drawings, using methods specified in this section. Restoration work includes all necessary repair work to return wood to an intact and structurally sound condition acceptable to Architect and is not limited to specific items noted on the Drawings.

B. Remove, store, and reinstall existing hardware and fixtures.

C. Remove all extraneous nails, staples, bolts, hooks, etc. from woodwork. Fill resulting holes, gouges and indentations with approved filler material in accordance with Section 3.03 and sand smooth.

D. Remove all dirt and debris from woodwork.

3.03 REPAIR OF DAMAGED COMPONENTS

A. Fill in holes, indentations, gouges, etc. less than 1/4" x 1/4" with wax crayon touch-up stick.

B. Fill in holes, indentations, gouges, etc. between 1/4" x 1/4" and 1” x 1” x 1/2" with tinted wood putty.

C. Repair holes, indentations, gouges, etc. larger than 1" X 1" X 1/2" deep, if approved by Architect, using wood Dutchmen as indicated in Section 3.04 “Dutchman Repairs”.

D. Using clamps and glue, reattach all loose, warped, or displaced trim or woodwork until fully cured and set.

3.04 DUTCHMAN REPAIRS

A. Repair deteriorated, split, or missing wood with Dutchman repairs. Use the following procedure for Dutchman repairs:

1. Neatly cut out defective materials and enough sound wood to bond Dutchman to sound substrate. Form a prismatic void in existing wood with square corners and edges. Cut Dutchman to exactly fit void, with exposed portion matching original profile of woodwork, and grain of Dutchman parallel to original wood grain direction.
2. Secure Dutchman with waterproof adhesive and clamp in place until glue is set.
3. Where it is necessary to cut off an end of a component and install Dutchman, use a diagonal scarf joint for end-to-end joints.

B. Sand to smooth surface.

3.05 FABRICATION OF REPLICATION WOODWORK AND REFINISHING

A. Whenever possible, use old salvaged material for wood replacement.

B. Fabricate all new woodwork as designated in the Contract.

C. New woodwork shall match the original wood species, grain and profile, as specified.

D. Finish the new woodwork to match the finish on the original millwork using marine-grade spar varnish.

3.06 INSTALLATION OF SALVAGED OR NEW REPLICATED WOODWORK

A. Discard prepared units of replication material which are unsound, warped, bowed, twisted, improperly treated, not adequately seasoned, or too small to fabricate work with a minimum of joints or optimum jointing arrangements, or which are of defective manufacture with respect to surfaces, sizes or patterns.

B. Install work plumb, level, true, and straight with no distortions. Shim as required using concealed shims. Install to a tolerance of 1/8" in 8'-0" for plumb and level work; and with 1/32" maximum offset in flush adjoining surfaces and 1/16" maximum offsets in revealed adjoining surfaces.

C. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces to the greatest extent possible.

D. Paneling: Anchor paneling to supporting substrate with concealed clips and by blind nailing on backup strips, splined-connecting strips, and similar associated trim and framing. Do not face nail unless otherwise indicated or approved.

E. Anchor finish carpentry work to anchorage devices or blocking built-in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation. Except where prefinished matching fastener heads are required, use fine finishing nails, countersunk and filled flush with finished surface, and matching the final surface finish. Mix various hues of colored putty to match the color of the surrounding finished wood as closely as possible.

F. Assure that elements are constructed to fit into proposed locations without disturbing the original or new construction.

G. Install woodwork in accordance with approved shop drawings/sketches. Plane panels, stiles and rails as required to fit properly and to align with adjacent existing woodwork.

H. Prior to installation of new woodwork, repair existing woodwork.

I. Install all finish hardware and fixtures as specified, accurately fitting and adjusting hardware as required.

3.07 SELECTIVE REFINISHING

A. The Contractor shall remove existing polyurethane finishes in areas of deterioration using denatured alcohol and fine steel wool.

B. Additional areas of deterioration not noted on drawings should be brought to the Architect’s attention.

C. The exposed woodwork shall be finished using Shellac, followed by a polished wax coating unless noted otherwise.

3.08 COMPLETE REFINISHING

A. The Contractor shall strip the damaged wood finish to bare wood in areas noted on contract drawings.

B. The finishes shall be blended with existing finishes to produce a uniform appearance and texture.

C. The varnish shall be followed by a layer of shellac and finished with a polished layer of wax.

3.09 CLEAN UP

A. The Contractor shall leave the removal site free of all debris at the end of each working day.

B. Work and adjacent areas shall be clean and free of all loose materials, debris, and surplus adhesives.

C. Repair damaged and defective finish carpentry work wherever possible to eliminate defects functionally and visually; where not possible to repair properly, replace woodwork. Adjust joinery for uniform appearance. Restore any marred or damaged areas using approved means at no expense to Owner.

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. 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; 2025.

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; 2023.

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 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. Gypsum sheathing in exterior cavity wall construction.

1.03 REFERENCES

A. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2022.

B. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2017.

C. ASTM C1280 - Standard Specification for Application of Exterior Gypsum Panel Products for Use as Sheathing; 2018.

D. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.

E. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2020.

F. GA-216 - Application and Finishing of Gypsum Panel Products; 2021.

G. GA-600 - Fire Resistance and Sound Control Design Manual; 2021.

H. GA-253 "Recommended Specifications for the Application of Gypsum Sheathing".

1.04 SUBMITTALS

A. Pursuant to Section 013300 - Submittal Procedures.

B. Pursuant to Section 016100 - Product Requirements.

C. Product Data:
   1. Submit manufacturer's product data for each type of exterior gypsum sheathing indicating where each type will be used.
   2. Submit fastener data as recommended by exterior gypsum sheathing manufacturer and as specified herein.

D. Warranty:
   1. Submit sample warranties for all warranty requirements specified in he Warranty paragraph below.

1.05 QUALITY ASSURANCE

A. Experienced workers familiar with the work and according to manufacturer’s recommendations and/or industry standards shall perform all work of this section.

B. All work of this section shall conform to industry standards and/or manufacturer’s recommendations.

C. Single-Source Responsibility for Panel Products: Obtain each type of gypsum board and other panel products from a single manufacturer.

D. Fire-Test-Response Characteristics: Where fire-rated gypsum board assemblies are indicated, provide gypsum board assemblies that comply with the following requirements:
   1. Fire Resistance Ratings: As indicated by reference to GA File Numbers in GA-600 “Fire Resistance Design Manual” or design designations in UL “Fire Resistance Directory” or in the listing of another testing and inspecting agency acceptable to authorities having jurisdiction.

2. Gypsum board assemblies indicated are identical to assemblies tested for fire resistance according to ASTM E119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Pursuant to manufacturers published instructions.

B. All materials shall be delivered in their original unopened packages and stored in an enclosed shelter providing protection from damage and exposure to the elements.

C. Neatly stack gypsum panels flat to prevent sagging.

1.07 WARRANTY

A. Provide products that offer twelve months of coverage against in-place exposure damage (delamination, deterioration and decay).

B. Manufacturer's Warranty:
   1. Five (5) years against manufacturing defects.

PART 2 PRODUCTS

2.01 MATERIALS

A. Gypsum Sheathing - Cavity Wall
   1. Glass-Mat Gypsum Board: Gypsum board designed as an exterior substrate for a weather barrier, consisting of a noncombustible water-resistant core, essentially gypsum, surfaced with glass mats on face and back, partially or completely embedded in core, and with unsurfaced square edges. Comply with ASTM C1177/C1177M and requirements below.
      a. Type: X
      b. Thickness: 5/8 inch
   2. Products: Subject to compliance with requirements, gypsum sheathing boards that may be incorporated in the Work include, but are not limited to, the following:
      a. Dens-Glass® Gold Exterior Sheathing; Georgia-Pacific Gypsum LLC
      b. GlasRoc® Sheathing; CertainTeed
      c. Fiberock® Aqua-Tough Sheathing; U.S. Gypsum Company
   3. Sheathing fasteners: ASTM C954, steel drill screws, Type S-12 fluted tip, a minimum of 1-¼ inches long with organic polymer coating or other corrosion-protective coating.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.

C. Coordinate wall sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

D. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

3.02 SHEATHING INSTALLATION

A. Comply with ASTM C1280, GA-253 and manufacturer's written instructions. Erect gypsum sheathing pursuant to GA-216 and fasten at 6" o.c. along panel edge locations and 12" o.c. field locations with 1 ¼" S #6 screws.
   1. Fasten sheathing to cold-formed metal framing with screws.
   2. Install boards with a 3/8-inch gap where non-load bearing construction abuts structural elements.

3. Install boards with a ¼ inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.

B. Apply fasteners so heads bear tightly against face of sheathing boards but do not cut into facing.

C. Horizontal Installation: Abut ends of boards over centers of studs, and stagger end joints of adjacent boards not less than one stud spacing. Attach boards at perimeter and within field of board to each stud.
   1. Space fasteners approximately 6 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.
   2. For sheathing under stucco cladding, boards may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.

D. Vertical Installation: Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud.
   1. Space fasteners approximately 6 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.
   2. For sheathing under stucco cladding, boards may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.

E. Do not bridge building expansion joints; cut and space edges of gypsum sheathing to match spacing of structural support elements.

3.03 PROTECTION

A. Protect gypsum sheathing and gypsum roof board until covered.

B. Replace broken or damaged sheathing.

C. Apply permanent or temporary covering within manufacturer’s stated exposure limits.

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. Wood Trim.
   2. Lumber Siding
   3. Plywood siding.
   4. Hardboard soffits.
   5. Exterior railings and supports and balusters.
   6. Exterior ornamental wood columns.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors 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. Include chemical-treatment manufacturer's written instructions for finishing treated material.
   2. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
   3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced before shipment to Project site to levels specified.
   4. Include copies of warranties from chemical-treatment manufacturers for each type of treatment.

B. Samples for Verification:
   1. For each species and cut of lumber and panel products, with 1/2 of exposed surface finished; 50 sq. in. (300 sq. cm) for lumber and 8 by 10 inches (200 by 250 mm) for panels.

1.04 INFORMATIONAL SUBMITTALS

A. Compliance Certificates:
   1. For lumber that is not marked with grade stamp.
   2. For preservative-treated wood that is not marked with treatment-quality mark.
   3. For fire-retardant-treated wood that is not marked with classification marking of testing and inspecting agency.

B. Evaluation Reports: For the following, from ICC-ES:
   1. Wood-preservative-treated wood.
   2. Fire-retardant-treated wood.

C. Sample Warranties: For manufacturer's warranties.

1.05 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.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber and other panels flat with spacers between each bundle to provide air circulation. Protect materials from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

1.07 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecast weather conditions permit work to be performed and at least one coat of specified finish can be applied without exposure to rain, snow, or dampness.
   1. For exterior ornamental wood columns, comply with manufacturer's written instructions and warranty requirements.

B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.
   1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

1.08 WARRANTY

A. Manufacturer's Warranty for wood trim and wood casings: Manufacturer agrees to repair or replace siding that fails in materials or workmanship within specified warranty period. Failures include, but are not limited to, deformation or deterioration beyond normal weathering.
   1. Warranty Period for Factory-Applied Finish: Five years from date of Substantial Completion.
   2. Warranty Period for Trim (Excluding Finish): 30 years from date of Substantial Completion.

B. Manufacturer's Warranty for Columns: Manufacturer agrees to repair or replace columns that fail in materials or workmanship within specified warranty period.
   1. Warranty Period for Columns: Five years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MATERIALS, GENERAL

A. Regional Materials: The following wood products shall be manufactured within 500 miles (800 km) of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site.
   1. Exterior trim and casing.
   2. Exterior lumber siding.
   3. Exterior plywood soffits.
   4. Exterior ornamental wood columns.

B. Certified Wood: The following wood products 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":
   1. Exterior trim.
   2. Exterior lumber siding.
   3. Exterior soffits.
   4. Exterior ornamental wood columns.

C. Lumber: DOC PS 20 and the following grading rules:
   1. WCLIB: West Coast Lumber Inspection Bureau, Standard No. 17, "Grading Rules for West Coast Lumber."
   2. WWPA: Western Wood Products Association, "Western Lumber Grading Rules."

D. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.
   1. For exposed lumber, mark grade stamp on end or back of each piece, or omit grade stamp and provide certificates of grade compliance issued by inspection agency.

E. Softwood Plywood: DOC PS 1.

2.02 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Water-Repellent Preservative Treatment by Nonpressure Process: AWPA N1; dip, spray, flood, or vacuum-pressure treatment.

1. Use chemical formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants in solution to distinguish treated material from untreated material.

B. Preservative Treatment by Pressure Process: AWPA C2; Use Category UC3B (Above Ground Exposed).
   1. Kiln dry lumber and plywood after treatment to a maximum moisture content of 19 and 18 percent respectively.
   2. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
   3. For exposed items indicated to receive transparent finish, do not use chemical formulations that contain colorants or that bleed through or otherwise adversely affect finishes.
   4. Do not use material that is warped or does not comply with requirements for untreated material.
   5. Mark lumber with treatment-quality mark of an inspection agency approved by the American Lumber Standard Committee's Board of Review.
   6. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
      a. For exposed plywood indicated to receive a stained or natural finish, mark back of each piece.

2.03 FIRE-RETARDANT-TREATED MATERIALS

A. General: For applications indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction, and comply with testing requirements; testing 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, 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 (3.2 m) beyond the centerline of the burners at any time during the test.
   1. Exterior Type: Materials shall comply with testing requirements after being subjected to accelerated weathering according to ASTM D2898.
   2. Kiln dry lumber and plywood after treatment to a maximum moisture content of 19 and 15 percent respectively.

C. Do not use material that does not comply with requirements for untreated material or is warped or discolored.

D. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.
   1. For exposed plywood indicated to receive a stained or natural finish, mark back of each piece.

E. Application: All exterior lumber and plywood.

2.04 EXTERIOR TRIM

A. Lumber Trim for Semitransparent-Stained Finish or Clear Finish:
   1. Species and Grade: Western red cedar, Clear Heart VG (Vertical Grain) ; NLGA, WCLIB, or WWPA.
   2. Maximum Moisture Content: 15 percent with at least 85 percent of shipment at 12 percent or less.
   3. Finger Jointing: Not allowed.
   4. Face Surface: Surfaced (smooth).

B. Lumber Trim for Painted Finish:
   1. Species and Grade: Eastern white pine, eastern hemlock-balsam fir-tamarack, eastern spruce, or white woods; Premium or 2 Common (Sterling); NeLMA, NLGA, WCLIB, or WWPA.

2. Maximum Moisture Content: 15 percent with at least 85 percent of shipment at 12 percent or less.
3. Finger Jointing: Allowed if made with wet-use adhesive complying with ASTM D 5572.
4. Face Surface: Surfaced (smooth).
5. Factory Priming: Factory coated on faces and edges with exterior primer compatible with topcoats specified.

C. Moldings for Painted Finish: WMMPA WM 4, P-grade wood moldings. Made from kiln-dried stock to patterns included in WMMPA WM 12.
1. Species: Eastern white, Idaho white, lodgepole, ponderosa, radiata, or sugar pine.
2. Finger Jointing: Allowed if made with wet-use adhesive complying with ASTM D 5572.
3. Factory Priming: Factory coated on faces and edges with exterior primer compatible with topcoats specified.
4. Brick-Mold Pattern: WM 180, 1-1/4 by 2 inches (32 by 51 mm).
5. Drip-Cap Pattern: WM 197, 11/16 by 1-5/8 inches (17 by 41 mm).
6. Bed-Mold Pattern: WM 75, 9/16 by 1-5/8 inches (14 by 41 mm).

D. Cellular PVC Trim: Extruded, expanded PVC with a small-cell microstructure, recommended by manufacturer for exterior use, made from UV- and heat-stabilized, rigid material.
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. Fypon Ltd.; Fypon PVC
   b. Kleer Lumber, LLC; Kleer Trimboard
   c. Vycom Corp.; Azek
2. Density: Not less than 31 lb/cu. ft. (500 kg/cu. m).
3. Heat Deflection Temperature: Not less than 130 deg F (54 deg C), according to ASTM D 648.
4. Coefficient of Thermal Expansion: Not more than 4.5 x 10-5 inches/inch x deg F (8.1 x 10-5 mm/mm x deg C).
5. Water Absorption: Not more than 1 percent, according to ASTM D 570.
6. Flame-Spread Index: 75 or less, according to ASTM E 84.

E. Foam Plastic Moldings: Molded product of shapes indicated, recommended by manufacturer for exterior use, with a tough outer skin on exposed surfaces; factory primed. Exposed surfaces shall not be shaped after molding.
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 or comparable product by one of the following:
   a. Focal Point Architectural Products
   b. Fypon Ltd
   c. Worthington Millwork
3. Density: Not less than 20 lb/cu. ft. (320 kg/cu. m).
4. Flame-Spread Index: Not more than [75] [Insert number] when tested according to ASTM E 84.
5. Thickness: Not more than 1/2 inch (12.7 mm).
6. Width: Not more than 8 inches (204 mm).
7. Patterns: As indicated by manufacturer's designations.

2.05 LUMBER SIDING

A. Provide kiln-dried lumber siding complying with DOC PS 20, factory coated with exterior primer compatible with topcoats specified.

B. Species and Grade: Clear VG (Vertical Grain) Heart western red cedar; NLGA, WCLIB, or WWPA.

C. Species and Grade: D Select (Quality) eastern white pine, eastern hemlock-balsam fir-tamarack, eastern spruce, or white woods; NeLMA, NLGA, WCLIB, or WWPA.

D. Pattern: Bevel siding, S1S2E, actual overall dimensions of 7-1/4 by 3/4 inch (184 by 19 mm), measured on the face and thick edge at 19 percent moisture content.

2.06 PLYWOOD SIDING

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. Georgia-Pacific Corp
   2. Roseburg Forest Products Co

B. Plywood Type: APA-Rated Siding, pressure-preservative treated, in panel sizes indicated.
   1. Face Grade: 303-OC.

C. Thickness: 5/8 inch.

D. Face Species: Western Red Cedar.

E. Pattern: APA Texture 1-11; grooves 4 inches on center.

F. Surface: Rough Sawn.

2.07 EXTERIOR ORNAMENTAL WOOD COLUMNS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Basis-of-Design Product Subject to compliance with requirements, provide product indicated or comparable product by one of the following:
   1. Chadsworth's Incorporated
   2. Hartmann-Sanders
   3. Worthington Millwork

C. Factory fabricate columns from clear stock, either solid or finger jointed, with a moisture content of not more than 19 percent.
   1. Wood Species: Western red cedar.

D. Shafts: Built up from tongue-and-groove staves joined with waterproof glue. Lathe turn shafts to provide base diameter indicated and true architectural entasis taper. Precisely mill flutes as indicated.

E. Capital and Base: Built up from wood components with waterproof glue. Turn circular elements on lathes.

F. Plinths: Cast-aluminum or molded glass-fiber-reinforced plastic, constructed to ventilate the interior of column shaft.

G. Treatment and Finishing:
   1. Treat wood columns with water-repellant preservative by nonpressure process.
   2. Coat inside of column shafts with bituminous mastic.
   3. Prime columns with two coats of exterior wood primer compatible with specified topcoats.

2.08 MISCELLANEOUS MATERIALS

A. Fasteners for Exterior Finish Carpentry: Provide nails or screws, in sufficient length to penetrate not less than 1-1/2 inches (38 mm) into wood substrate.
   1. For applications not otherwise indicated, provide stainless-steel fasteners.
   2. Hidden Fastening System shall be utilized for exposed PVC Trim conditions: Cortex Hidden Fastening system with TORX TTAP Drive System. Dual lead thread design in 2” and 2 ¾” lengths as required for 1 ½” penetration into substrate. System shall include screws, plugs and setting tools.

B. Wood Glue: Waterproof resorcinol glue recommended by manufacturer for exterior carpentry use.

C. Flashing: Comply with requirements in Section 076200 - {\t\#1000260} for flashing materials installed in exterior finish carpentry.

D. Insect Screening for Soffit Vents: Stainless steel, 18-by-18-inch (1.4-by-1.4-mm) mesh.

E. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTMC834, Type OP, Grade NF.
   1. See Section {\id\#1000279} - {\t\#1000279}.

2.09 FABRICATION

A. Ease edges of lumber less than 1 inch (25 mm) in nominal thickness to 1/16-inch (1.5-mm) radius and edges of lumber 1 inch (25 mm) or more in nominal thickness to 1/8-inch (3-mm) radius.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

B. Prime lumber and moldings to be painted, including both faces and edges, unless factory primed. Cut to required lengths and prime ends. Comply with requirements in Section 099113 - Exterior Painting.

3.03 INSTALLATION, GENERAL

A. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements.
   1. Do not use manufactured units with defective surfaces, sizes, or patterns.

B. Install exterior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.
   1. Scribe and cut exterior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
   2. Install to tolerance of 1/8 inch in 96 inches (3 mm in 2438 mm) for level and plumb. Install adjoining exterior finish carpentry with 1/32-inch (0.8-mm) maximum offset for flush installation and 1/16-inch (1.5-mm) maximum offset for reveal installation.
   3. Coordinate finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate finish carpentry.

3.04 CAP RAIL INSTALLATION

A. Install flat-grain lumber with bark side exposed to weather.

B. Install materials with the minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches (610 mm) long except where necessary.
   1. Use scarf joints for end-to-end joints.
   2. Stagger end joints in adjacent and related members.

C. Fit exterior joints to exclude water. Cope at returns and miter at corners to produce tight-fitting joints with full-surface contact throughout length of joint.

D. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.

3.05 RAILING AND BALUSTRADE INSTALLATIONS

A. Balusters: Fit balusters to horizontal intermediate rails, glue, and screw in place. Countersink screw heads, fill flush, and sand filler. Let into railings and glue in place.

B. Support and Intermediate Posts: Secure Support posts to stringers, deck joists and girders with countersunk-head wood screws and glue.

C. Railings: Fasten railings to support posts with stainless steel screws, glue and countersink-heads of wood screws or rail bolts.

3.06 ORNAMENTAL COLUMN INSTALLATION

A. Install columns to comply with manufacturer's written instructions. Comply with requirements below unless manufacturer's written instructions state otherwise.

B. Lay out column locations on soffits and beams and plumb down to locate column locations at supports.

C. Set plinths in location, shim as required to temporarily level, and scribe and trim as required so that top of plinths will sit level without use of shims. Fasten plinths in place to support using pins or fasteners as recommended by manufacturer.

D. Scribe and trim tops of columns to fit to soffits and beams. Maintain ventilation passages to interior of columns.

E. Seal ends of columns with two coats of wood sealer or primer.

F. Install column caps and flashing on columns and fasten to columns. Install caps and flashing so that loads are not imposed on caps and so that ventilation of column interior is not blocked.

G. Secure columns in place at top and bottom with fasteners recommended by manufacturer.

3.07 ADJUSTING

A. Replace exterior finish carpentry that is damaged or does not comply with requirements. Exterior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing. Adjust joinery for uniform appearance.

3.08 CLEANING

A. Clean exterior finish carpentry on exposed and semi-exposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.

3.09 PROTECTION

A. Protect installed products from damage from weather and other causes during construction.

B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.

1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

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. Section Includes Custom Molded and Fabricated Polyurethane:
   1. Balustrade Systems.
   2. Blocks, Brackets, and Gingerbreads.
   3. Columns and Porch Posts.
   4. Entrance and Window Systems.
   5. Medallions.
   6. Mouldings.

B. Related Documents and Sections:
   1. Section 061000 - Rough Carpentry, for blocking.
   2. Section 079200 - Sealants.
   3. Section 092116 - Gypsum Board Assemblies
   4. Section 099123 - Interior Painting

1.03 STANDARDS

A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.

B. American Society for Testing and Materials (ASTM)
   1. E84 "Standard Test Method for Surface Burning Characteristics of Building Materials".

1.04 SUBMITTALS

A. Submit Pursuant to 013300 - Submittal Procedures

B. Submit Pursuant to 016100 - Basic Product Requirements

C. Product Data: Submit manufacturer's descriptive literature and specifications.

D. Installation Instructions: Submit manufacturer's written installation instructions and recommendations.

E. Shop Drawings: Submit shop drawings, showing layout, field dimensions, profiles and product components, including anchorage, accessories, finish colors and textures.

F. Samples: Submit selection and verification samples for profiles if requested by Architect.

G. Finish: Painting of products of this Section is specified in Section 099100 - Painting.

H. Quality Assurance Submittals: Submit the following:
   1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
   2. Manufacturer's Instructions: Manufacturer's installation instructions.
   3. Manufacturer's Field Reports: Manufacturer's field reports specified herein.

I. Closeout Submittals: Submit manufacturer's standard limited warranty documents.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer experienced in producing molded decorative millwork of the types required for this Project. Obtain all molded decorative millwork from a single manufacturer.

B. Installer Qualifications: Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.

C. Performance Requirements: Provide simulated wood trim units which have been manufactured, fabricated and installed to maintain performance criteria stated by manufacturer without defects, damage or failure.

D. Fire Test Characteristics: Provide molded units which pass ASTM E84 for Class A or Class B requirements by UL or other testing and inspecting agency acceptable to authorities having jurisdiction.

E. Field Measurements: Verify actual measurements and openings by field measurements before fabrication. Show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

1.06 DELIVERY, STORAGE AND HANDLING

A. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

B. Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions acceptable to manufacturer.

C. Temperature Requirements: Maintain air temperature in spaces where products will be installed for time period before, during and after installation within limits recommended by manufacturer.

1.07 WARRANTY

A. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under the Contract Documents.

B. Warranty Period: Manufacturer's 5-year limited warranty against defects in materials and workmanship. Warranty shall commence on Date of Substantial Completion.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURES

A. Subject to compliance with requirements, simulated wood trim manufacturer offering products that may be incorporated in work include:
   1. Spectis Moulders Inc., Box 970, Niverville, Canada, MB. ROA 1E0, Phone (204) 388-6700 and (800) 685-9981, Fax (204) 388-6710. (Basis of Design)
   2. Fypon LLC, 1750 Indian Wood Circle, Maumee, OH 43537. Phone: 800-446-9373. (product must match in size, profile, and ornamentation)
   3. The Architectural Depot, web: www.architecturaldepot.com (product must match in size, profile, and ornamentation)

2.02 SIMULATED WOOD TRIM AND COLUMNS

A. Standard SPECTIS:
   1. Material: High-density polymer comparable to kiln-dried white pine millwork, with higher skin density. Overall Density: 14 to 18 pounds per cubic foot.
   2. Moisture Resistance: Non-water absorbing.
   3. Compressive Strength: 800 - 950 P.S.I. Range (Non-structural).
   4. Tensile Strength: 550 - 650 P.S.I. Range (Non-structural).
   5. Fire Rating: Optional ASTM E84 Class B.

B. Shop Finish: Provide units with manufacturer's standard barrier coat and shop-applied primer to receive field applied coating.

C. Accessory Materials:
   1. Fasteners: As recommended by manufacturer, provide trim screws, drywall screws or finishing nails. Application using a pneumatic nail gun is acceptable. Application using a staple gun is not acceptable.
   2. Joint Compound: As recommended by manufacturer, provide spackle joint compound, ready-mixed, vinyl tape, or two-component auto body type filler.
   3. Adhesive: Use manufacturer recommended adhesive for product installation.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Inspect conditions of substrate and other conditions which may affect installation of signage.

B. Do not begin installation until substrates are within manufacturer's specified tolerances and have been prepared in accordance with manufacturer's instructions.

C. If substrate preparation is the responsibility of another installer, do not proceed with installation. Notify Architect of unsatisfactory preparation immediately.

D. Commencement of work is deemed as acceptance of installation conditions.

3.02 INSTALLATION

A. Installation: Comply with requirements of manufacturer’s product data and approved submittals, including product technical bulletins, product catalog installation instructions and product carton instructions for installation. Fill holes using compound recommended by the manufacturer and sand to prepare surface for field painting.

B. Manufacturer’s Field Service: Upon Owner’s request, provide manufacturer’s field service consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer’s instructions.

3.03 FINISHING

A. Allow adhesive to dry 24-48 hours before beginning the finishing procedure. Cut off any excess adhesive using a utility knife.

B. Clean and remove all dirt, oil and greases from surface of product using a wax and grease remover product as recommended by the simulated wood trim manufacturer.

C. With 80 grit sandpaper, "rough up" surface surrounding screw or nail holes made during installation to ensure good filler adhesion. Sand all joint areas with 80 grit sandpaper to "rough up" and "blend in" any misalignment of product during installation.

D. Once all areas needing repair are "roughed up" and "blended in", remove all dust from the surface of the product, again using the wax and grease remover.
   1. Use compressed air to remove the excess sanding dust.

E. Apply filler to the areas needing repair. Use a 2- component, light weight automotive filler, as recommended by the simulated wood trim manufacturer. Apply the filler using thin coats, sanding between each coat with 120 or 180 grit sandpaper. Apply minimum of 2 coats of filler to get the results detailed in manufacturer's literature.

F. Prime all areas which have had filler applied. Use an interior/exterior latex primer such as recommended by the simulated wood trim manufacturer.

G. Caulk seams along bedding edges of mouldings, around balusters, and in any other area necessary to provide a clean installation. Use an exterior, paintable latex caulking as recommended by the simulated wood trim manufacturer.

H. Paint the product in color specified by Architect.

3.04 CLEANING AND PROTECTION

A. Cleaning: Remove temporary coverings. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer’s instructions. Remove construction debris from project site and dispose of legally.

B. Protection: Protect installed product and finished surfaces from damage from construction operations.

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. Cellular PVC trim boards for frieze boards, rake boards, louver/door/window trim and other trim boards as shown on the Contract Drawings.
   2. Cellular PVC Cornerboards.
   3. Cellular PVC Skirtboards.
   4. Cellular PVC trim boards for interior windowsills, jambs, and heads and top of wall trim where indicated on Contract Drawings.

1.03 STANDARDS

A. ASTM D570 - "Standard Test method for Water Absorption of Plastics".

B. ASTM D638 - "Standard Test method for Tensile Properties of Plastics".

C. ASTM D792 - "Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement".

D. ASTM E84 - "Standard Test Method for Surface Burning Characteristics of Building Materials".

1.04 SUBMITTALS

A. Submit following pursuant to Section 013300 - Submittal Procedures.

B. Submit pursuant to Section 016100 - Basic Product Requirements.

C. Product Data: Manufacturer’s data sheets on each product to be used, including but not limited to:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation instructions and methods.
   4. Code Compliance Reports.

D. Samples:
   1. For each product specified, two (2) samples, minimum size 6 inches long, representing actual product, color and finish.

E. Maintenance:
   1. Provide manufacturer's written recommended long term maintenance and cleaning instructions and recommendations.

F. Warranty:
   1. Submit sample warranty meeting the requirements specified in the "Warranty" paragraph below.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer with a minimum of 10 years experience producing PVC trim products.

B. Regulatory Requirements:
   1. Class A (Class 1) Flame Spread Classification.
   2. Meet ICC and CCMC code requirements.

C. ALLOWABLE TOLERANCES:
   1. Variation in component length: Minus 0.00/plus 1.00".
   2. Variation in component width: +/- 1/16”.
   3. Variation in component thickness: +/- 1/16”.
   4. Variation in component edge cut: +/- 2 degrees.

5. Variation in Density: -0% + 10%.

D. Workmanship, Finish, and Appearance:
   1. Free foam cellular PVC that is homogeneous and free of voids, holes, cracks, and foreign inclusions and other defects. Edges must be square, and top and bottom surfaces shall be flat with no convex or deviation.
   2. Uniform surface free from cupping, warping and twisting.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Trim materials should be stored on a flat and level surface on a full shipping pallet.

B. Handle materials to prevent damage to product edges and corners.

C. Store materials under a protective covering to prevent jobsite dirt and residue from collecting on the boards.

1.07 WARRANTY

A. Provide manufacturer's minimum 20 year warranty against defects in manufacturing that cause the products to rot, corrode, delaminate, or excessively swell from moisture.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Acceptable products:
   1. AZEK® Trim Boards manufactured by The Azek® Company, 999 N. Keyser Ave., Scranton, PA 18508, Phone: (570) 558-8000.
   2. CERATRIM® Cellular PVC Trim Boards by CertainTeed Corp., 20 Moores Road, Malvern, PA 19355, Phone: (800) 233-8990.
   3. VERSATEX, 400 Steel St., Aliquippa, PA 15001, Phone: (724) 857-1111.
   4. Architect approved equivalent.

2.02 MATERIAL

A. Free foam cellular PVC material with a small cell microstructure.
   1. Density: 0.55 grams/cubic centimeter when tested in accordance with ASTM D 792.
   2. Water Absorption: Less than 0.50 percent when tested in accordance with ASTM D 570.
   3. Tensile Strength: 3582 psi when tested in accordance with ASTM D 638.

2.03 SIMULATED WOOD TRIM

A. PVC Trim Boards: Trim boards with sealed edge, designed with a natural appearance.
   1. Size: Width and thickness as shown on Contract Drawings.
   2. Finish: Reversible with traditional (smooth) woodgrain finish.

B. PVC Sheet Board: For use as sheet materials to create patterns, surrounds, backplates, etc. as shown on the Contract Documents.
   1. Size: Width and thickness as shown on Contract Drawings.
   2. Finish: Reversible with traditional (smooth) woodgrain finish.

C. PVC Cornerboard: Folded, 90-degree, rabbeted with 3/4" pocket, one-piece assembly.
   1. Size: Width and thickness as shown on Contract Drawings.
   2. Finish: Reversible with traditional (smooth) woodgrain finish.

2.04 ACCESSORY PRODUCTS

A. Fasteners:
   1. Use fasteners designed for cellular PVC trim and wood siding (thinner shank, blunt point, full round head).
   2. Use stainless steel fasteners.
   3. Staples, small brads and wire nails must not be used as fastening members.
   4. The Fasteners should be long enough to penetrate the substrate a minimum of 1-1/2". All fasteners must be countersunk.
   5. Use two (2) fasteners per framing member for trim board applications.

6. Fasteners must be installed no more than 2” from the end of each board.
7. PVC Cellular Trim products should be fastened into a flat, solid substrate. Fastening Cellular PVC Trim products into hollow or uneven areas must be avoided.

B. Adhesives:
1. Glue all Cellular PVC to Cellular PVC joints such as window surrounds, long fascia runs, etc. with a cellular PVC cement approved by the PVC Cellular product manufacturer, to prevent joint separation.
2. The glue joint should be secured with a fastener and/or fastened one each side of the joint to allow adequate bonding time.
3. Surfaces to be glued should be smooth, clean and in complete contact with each other.
4. To bond Cellular PVC Trim products to other substrates, various adhesives may be used. Consult adhesive manufacturer to determine suitability.

C. Sealants:
1. Use urethane, polyurethane or acrylic based sealants without silicone.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Manufacturer’s instructions:
1. Comply with manufacturer’s product catalog installation instructions and product technical bulletin instructions.

B. Radius Applications:
1. Heat from PVC trim where radius applications are required at arched windows and doorways.

C. Fastener Locations:
1. Use two (2) fasteners per every framing member for trim board applications.
2. Use additional fasteners for trim boards 8” and wider.
3. Fasteners must be installed no more than 2” from the end of each board.

D. Thermal Expansion and Contraction:
1. Cellular PVC products expand and contract with changes in temperature.
2. Properly fastening Cellular PVC material along its entire length will minimize expansion and contraction.
3. When properly fastened, allow for 1/8” per 18 foot of cellular PVC product to expand and contract.
4. Joints between pieces of Cellular PVC should be glued to eliminate joint separation. When gaps are glued on a long run, allow expansion and contraction at ends of the run.

E. Finishes:
1. Install Cellular PVC products with grained surface exposed.
2. Countersunk nail holes must be filled with a prefabricated plug, polyurethane or acrylic based caulk. Plug or caulk color to match trim board color.

3.02 CLEANING

A. Clean simulated wood trim with mild detergent and water.

B. Products with pumice, such as Soft Scrub, may be applied with a nylon brush.

C. For more stubborn stains use a mild household cleaner and degreaser like Clorox Cleanup, Clorox Outdoors, Denatured Alcohol. Bleach, Mr. Clean Magic Eraser or Corte Clean with nylon brush. Always test a small area prior to widespread use.

3.03 PROTECTION

A. Protect installed products until completion of the project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

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PART 1 GENERAL

1.01 SECTION INCLUDES

A. Removal of existing roofing system in preparation for a new roof membrane system.

1.02 REFERENCE STANDARDS

A. ASTM C208 - Standard Specification for Cellulosic Fiber Insulating Board; 2022.

B. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2017.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with affected mechanical and electrical work associated with roof penetrations.

B. Preinstallation Meeting: Convene one week before starting work of this section.

C. Schedule work to coincide with commencement of installation of new roofing system.

1.04 QUALITY ASSURANCE

A. Roofing Construction Firm Qualifications: Company approved by the manufacturer holding the existing in force roof warranty specializing in performing the work of this section with minimum Five (5) years of documented experience.

1.05 FIELD CONDITIONS

A. Do not remove existing roofing membrane when weather conditions threaten the integrity of the building contents or intended continued occupancy.

B. Maintain continuous temporary protection prior to and during installation of new roofing system.

C. Contractor shall perform their own pre-construction field conditions visit and photograph and/or video existing existing landscape and physical building features and conditions prior to commencement of work. Contractors shall advise the Architect and Owner as to existing damages and conditions which exist that may impede the work of this contract or be construed as damage caused by the work of this contract accordingly.

PART 2 PRODUCTS

2.01 MATERIALS

A. Temporary Protection: Sheet polyethylene; provide weights to retain sheeting in position.

B. Protection Board: ASTM C208 cellulose fiber board, one face finished with mineral fiber, asphalt and kraft paper.
   1. Provide protection board with the following characteristics:
      a. High Density, Type II, Grade 2.
      b. Board Size: 48 x 96 inch (1219 x 2438 mm).
      c. Board Thickness: 1 inch (25.4 mm).
      d. Thermal Conductivity: K factor of 0.36 (KSI factor of 0.62).
      e. Board Edges: Square.

C. Recover Board: Glass mat faced gypsum panels, ASTM C1177/C1177M, moisture and fire resistant board with factory applied acrylic primer coating.
   1. Board Size: 4 feet by 8 feet (1219 mm by 2438 mm).
   2. Board Thickness: 5/8 inch (15.9 mm).
   3. Thermal Insulance: R-value (RSI-value) of 0.67 (5/8 inch thickness) (0.12).
   4. Board Edges: Square.
   5. Products:
      a. DensDeck by Georgia-Pacific or Architect approved equivalent.
      b. Substitutions: SECTION 012500 - PRODUCT SUBSTITUTION REQUIREMENTS and SECTION 016100 - BASIC PRODUCT REQUIREMENTS.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing roof surface is clear and ready for work of this section.

B. Protect all existing roof equipment, including but not limited to: Roof Solar Collectors, frames and appurtenances, Rooftop mechanical and plumbing equipment, conduits, curbs and piping.

3.02 PREPARATION

A. Sweep roof surface clean of loose matter.

B. Remove loose refuse and dispose off site.

3.03 MATERIAL REMOVAL

A. Remove only existing roofing materials that can be replaced with new materials the same day.

B. Remove metal counter flashings. Store and protect for re-use and re-installation if not being replaced with new.

C. Scrape roofing gravel from membrane surface.

D. Remove roofing membrane, perimeter base flashings, flashings around roof protrusions, pitch pans and pockets.

E. Cut and lay flat any membrane blisters.

F. Remove insulation and fasteners, cant strips, blocking.

G. Remove sheathing paper and underlay.

H. Repair existing steel deck surface to provide smooth working surface for new roof system.

3.04 FIELD QUALITY CONTROL

A. Independent agency inspection and testing will be provided under provisions of Section 014500 - QUALITY CONTROL.

B. The drawings identify the approximate limits to material removal.

C. Testing will identify the condition of existing materials and their reuse, repair or removal.

3.05 PROTECTION

A. Provide temporary protective sheeting over uncovered deck surfaces.

B. Turn sheeting up and over parapets, roof edges, and roof curbs. Retain sheeting in position with weights.

C. Provide for surface drainage from sheeting to existing drainage facilities.

D. Do not permit traffic over unprotected or repaired deck surface.

E. Install recovery board over all surfaces used for roof access, equipment, tool, material storage. Contractor shall make permanent repair to any and all roof surfaces damaged..

F. If roof top storage is permitted, contractor shall evenly distribute material across the roof in order to avoid damage to the structural roof deck. Contractor assumes full responsibility for loading the structural roof deck during contract operations. The Architect reserves the right to reject and such loadings deemed unacceptable.

END OF SECTION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
1. Ethylene-propylene-diene-monomer (EPDM) roofing system.
2. Roof edge systems.
3. Cover Board.
4. Tapered Roof insulation.
5. Roof Insulation.
6. Fire Thermal Barrier.
7. Vapor retarder.
8. Walkway Systems.
9. Expansion Joints.
10. New roof drains.
11. Vent pipe extensions.

1.03 DEFINITIONS

A. Roofing Terminology: Definitions in ASTM D1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" apply to work of this Section.

1.04 SUBSTITUTIONS / OR EQUALS

A. Substitutions or Equals for the roofing material manufacturer and items listed in this specification shall be submitted in conformance with Division 01 and as otherwise modified by the following:
1. A proposed Substitution/or Equal submission package must be submitted to the Architect no later than ten (10) business days prior to the bid date. Otherwise, any Substitution/or Equal other than the manufacturer specified will not be considered.
2. Submittal to Architect shall include:
a. Identification of Project - Project Name;
b. Name of Submitting Bidder;
c. Telephone and Email address of Submitting Bidder;
d. Manufacturer’s Name of Proposed or Equal/Substitution;
e. Model, line or material type;
f. Equivalent line by line item comparison for each item listed in the materials section of this specification, including each of the optional accessories. Note: Each proposed item must have proposed manufacturer and model/product numbers.
g. Addresses of two locations within 30 miles of the proposed site, where the proposed Substitution/or Equal manufacturer has installed their similar roofing product and name and telephone number of a contact person to be able to arrange a site visit.
h. A copy of the final signed warranty signed and issued by the manufacturer for the two projects provided.
3. Partial and/or Failure to follow any of the procedures outlined in Division 01 or above may subject the entire submission for rejection.
4. Incomplete submissions may not be reviewed.
5. Substitution/ or Equals if found acceptable will be approved via addenda, which will be issued to all bidder’s.
6. In order to include an approved Substitution/or Equal in the bid, the bidder must acknowledge on the bidders bid form that the bidder intends to provide the approved Substitution/or Equal and the bidder shall also list the name of the approved Substitution/or Equal manufacturer as well on the bidders bid form. Failure of the bidder to express their intent to use the approved Substitution/or Equal as part of the bid will exclude the bidder from being able to utilize another Manufacturer from the one specified.

7. If a bidder uses a Substitution/or Equal, the bidder will take responsibility to pay for the re-engineering and coordination of all other items that are to be provided that have been defined in the Contract Documents as additional items to the roofing system, including but not limited to all deck preparation/modifications, additional flashings or modification to existing roof drains.

1.05 PRE-INSTALLATION MEETINGS

A. Pre-installation Roofing Conference: Conduct conference at Project site.
   1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
   2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
   3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   4. Review the use and staging of hoisting equipment required for the project including safety OSHA regulations pertaining to operation and use of this equipment.
   5. Review Contractor's (and their Subcontractor's) responsibility to comply with OSHA regulations, requirements for provision and implementation of safety equipment and regulations. Additionally, Contractor shall keep on-site at all times a minimum of three complete additional safety units (i.e.: harnesses, rigging gear, hardhats, safety vests, etc.) for use by site visitors requiring access to the work.
   6. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
   7. Review structural loading limitations of roof deck during and after roofing.
   8. Review the location of any fresh-air intakes for the building with the building owner which may have to be covered or re-directed to maintain intakes during roofing operations.
   9. Review base flashings, special roofing details, roof drainage, roof penetrations; raising and/or replacement of equipment curbs, disconnection and re-connection of mechanical roof mounted equipment; and condition of other construction that affects roofing system.
   10. Review governing regulations and requirements for insurance and certificates if applicable.
   11. Review temporary protection requirements including but not limited to safety lines, roof barriers, walkway protections as required by OSHA during and after roofing installations.
   12. Review roof installation observations during construction; notifications and repair procedures after roofing installation with the manufacturer's field representative.
   13. Asbestos abatement work coordination.
   14. Debris removal procedures and requirements.

1.06 ACTION SUBMITTALS

A. Submittals shall be made in accordance with Section 013300 - SUBMITTALS.

B. Product Data: For each type of product.

C. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work, including:
   1. Base flashings and membrane terminations including laps, seam layout, direction of laps and flashing details.
   2. Tapered insulation, including slopes.
   3. Roof plan showing orientation of steel roof deck and orientation of roofing and fastening spacing's and patterns for mechanically fastened roofing or foam ribbon / adhesive patterns and spacing for fully adhered systems.
   4. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
   5. Roof plan showing proposed layout of roof walk way pads to provide an access pathway to all roof mounted equipment.

D. Samples for Verification: For the following products:

1. Membrane roofing, of color required, 12 inch x 12 inch.
2. Insulation Board - 12" x 12" sample.
3. Cover Board - 12 inch x 12 inch.
4. Walkway pads or rolls, of color required.

E. Manufacturers complete installation Instructions.

F. MSDS Sheets for all materials.

1.07 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and manufacturer.

B. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
   1. Submit evidence of complying with performance requirements.

C. Product Test Reports: For components of roofing system, tests performed by manufacturer and witnessed by a qualified testing agency.

D. Research/Evaluation Reports: For components of roofing system, from ICC-ES.

E. Sample Warranties: For manufacturer's special warranties.

1.08 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals.

1.09 QUALITY ASSURANCE

A. Perform work in accordance with NRCA Roofing and Waterproofing Manual and manufacturer's instructions.

B. Single Source Responsibility: Roofing system materials and components shall be supplied and warranted by membrane manufacturer for specified roofing system and specified membrane manufacturer's warranty and shall be in compliance with specified regulatory requirements.

C. Regulatory Requirements for Roof Assembly:
   1. Comply with Factory Mutual System Approval Guide to provide FMRC-Approved roof assembly meeting Class 1A-120 (FM 4470) requirements for fire resistance and wind uplift in accordance with FM Loss Prevention Data Sheets FM DS 1-28, FM 1-49 and FM DS 1-29.
   2. Underwriters Laboratories, Inc. (UL): Class A Fire Hazard Classification
   3. Conform to applicable code(s) for roof assembly fire hazard requirements.
   4. Conform to loading requirements indicated in ASCE 7 for applicable building location, exposure and use.
   5. Factory Mutual (FM) 1A-120 Compliance/Roof Assembly.

D. Qualifications.
   1. Manufacturer: Company specializing in manufacturing the products specified in this section with Ten (10) years documented experience.
   2. Applicator: Company specializing in performing the work of this section with Five (5) years documented experience. Installer shall be a qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
2. All curable materials must be stored between 60° F and 80°F.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

E. Protect adjacent materials and surfaces against damage from roofing work. Do not store materials on previously completed roofing.

1.11 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.12 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.
1. Special warranty includes membrane roofing, base flashings, roof insulation, fasteners, cover boards, substrate board, roofing accessories, edge materials, copings, and other components of roofing system.
2. Warranty Period: Thirty (30) years from date of Substantial Completion with no dollar limitation (NDL) on the cost or quantity of repairs. Pro-rated roofing warranties will not be accepted.
3. The warranty shall include coverage for wind speed with peak gusts of 120 mph measured at 30 feet above ground level. Certification is required with bid submittal indicating the manufacturer has reviewed and agreed to such wind coverage.
4. Warranty shall also provide coverage for roof leakage caused by hail up to and including 2 inch in diameter.
5. Materials and Workmanship for the following items shall be included in the manufacturer's warranty:
   a. Membranes.
   b. Flashings, including metal flashings and accessories supplied by roofing membrane manufacturer.
   c. Insulation.
   d. Fasteners and adhesives.
   e. Accessories.
   f. Roof drains.
   g. Roof Edge and coping systems.
6. The warranty deliverables shall include the following:
   a. Original of the warranty with original signature of a roofing manufacturer's company official authorized to sign the warranty.
   b. An additional three copies of the signed warranty noted above.
   c. Record set of as-built roofing drawings.
   d. Final Roof Inspection Report by the manufacturer's authorized Field Representative.

B. Warranty: This project is being constructed in an existing Commercial Building with and EPDM roof having an in-place existing warranty. Contractor will be required to provide a roofing contractor that is approved by the existing roofing manufacturer. Contractor shall maintain and modify existing warranty to include the work required by this project. Contractor shall meet with and provide for all required meetings, and construction inspections by an authorized Field Representative from the Roofing manufacturer issuing and modifying / extending the current warranty. Contractor shall provide to the building owner (with a copy to the Tenant), an original

Warranty copy signed by a current authorized representative of the Roofing manufacturer at the completion of the work and prior to final payment claim submittal.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Source Limitations: Obtain components including roof insulation for roofing system from manufacturer approved by membrane roofing manufacturer.

2.02 PERFORMANCE REQUIREMENTS

A. General Performance: Installed roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing and base flashings shall remain watertight.
   1. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G154, or ASTM G155.
   2. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D3746 or ASTM D4272.

B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.

C. Structural Design Criteria:
   1. Basic Wind Speed: 123 mph
   2. Exposure: B
   3. Internal Pressure Coefficient: +/- 0.55
   4. Roofing System Design: Tested by a qualified testing agency to resist the following uplift pressures:
      a. Corner Uplift Pressure: 85.1 lbf/sq. ft.
      b. Perimeter Uplift Pressure: 64.7 lbf/sq. ft.
      c. Field-of-Roof Uplift Pressure: 72.6 lbf/sq. ft.
      d. Overhangs: 72.6lbf/sq.ft.
   5. Component and cladding values listed are based on 10 square foot "effective area" as defined by ASCE 7-22. All items specified as delegated design shall be designed to withstand component and cladding loads shown, unless specifically noted otherwise in plans, specifications or by RFI response. wind loads may be reduced based on increased "effective area." submittal shall include effective area assumptions for each component and wind load calculations using parameters specified herein.

D. Energy Star Listing: Roofing system shall be listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low -slope roof products.

E. Energy Performance: Roofing system shall have an initial solar reflectance index of not less than 0.70 and an emissivity of not less than 0.75 when tested according to CRRC-1.

F. Exterior Fire-Test Exposure: ASTM E108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

G. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.03 EPDM ROOFING

A. EPDM: ASTM D4637/D4637M, Type I, non-reinforced, uniform, flexible EPDM sheet.
   1. Manufacturers: Subject to compliance with requirements, provide products by the following:
   2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
      a. Carlisle SynTec Incorporated, Basis of Design.
      b. Johns Manville.

c. Versico Incorporated.
3. Thickness: 90 mils, nominal.
4. Exposed Face Color: Black.

2.04 AUXILIARY ROOFING MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing.
1. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the following limits for VOC content:

a. Plastic Foam Adhesives:	50 g/L.
b. Gypsum Board and Panel Adhesives:	50 g/L.
c. Multipurpose Construction Adhesives:	70 g/L
d. Fiberglass Adhesives:	80 g/L.
e. Single-Ply Roof Membrane Adhesives:	250 g/L
f. Single-Ply Roof Membrane Sealants	450 g/L
g. Non-membrane Roof Sealants:	300 g/L
h. Sealant Primers for Nonporous Substrates:	250 g/L
i. Sealant Primers for Porous Substrates	775 g/L
j. Other Adhesives and Sealants:	250 g/L

B. Bonding Adhesive, splice cleaners, splice cement and splice tape: Manufacturer's standard.

C. Prefabricated Control or Expansion Joint Flashing: Type approved for the total roof system by roofing manufacturer.

D. Seaming Material: Manufacturer's standard, synthetic-rubber polymer primer and 6 inch (75mm) wide minimum, butyl splice tape with release film.

E. Lap Sealant: Manufacturer's standard, single-component sealant, colored to match membrane roofing.

F. Molded Pipe Flashings inside and outside corner flashing: as recommended by membrane manufacturer.

G. Water Cutoff Mastic: Manufacturer's standard butyl mastic sealant.

H. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 inch by 1/8 inch (25mm by 3mm) thick; with anchors.

I. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, molded pipe boot flashings, preformed inside and outside corner sheet flashings, reinforced EPDM securement strips, T-joint covers, in-seam sealants, termination reglets, cover strips, and other accessories.

J. Walkway Pads: Protective surfacing for roof traffic shall be non-slip textured, pressure-sensitive walkway pads (with Factory-Applied Tape on the underside of the walkway) adhered to the membrane surface in conjunction with primer. Color to match roofing.

K. Roof edge and coping system materials: Material shall be as specified herein or in Section 076200 - Sheet Metal Flashing and Trim; Coping Covers, Scuppers, Flashings and Roof edge systems shall be included in the Roofing manufacturer's Thirty (30) year Total System NDL Warranty. Kynar finish for all metal components shall be as selected by Architect. Provide complete system with concealed cover plate, extenders, Factory-fabricated corners, end caps and fasteners.

2.05 SUBSTRATE BOARDS / THERMAL BARRIER

A. Substrate Board / Thermal Barrier: ASTM C1177/C1177M, cellulosic-fiber-reinforced, water-resistant gypsum substrate, 5/8 inch (16 mm) thick.
1. Products: Subject to compliance with requirements, provide the following:
a. Georgia-Pacific; DensDeck Prime Roof Board.
b. USG Corporation; Securock Gypsum-Fiber Roof Board.

c. Architect approved equivalent.

B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM 4470, designed for fastening substrate panel to roof deck.

2.06 VAPOR RETARDER

A. Self-Adhering-Sheet Vapor Retarder: ASTM D1970/D1970M, polyethylene film laminated to layer of rubberized asphalt adhesive, minimum 40-mil total thickness; maximum permeance rating of 0.1 perm; cold applied, with slip-resisting surface and release paper backing. Provide primer when recommended by vapor-retarder manufacturer.

2.07 ROOF INSULATION

A. General: Preformed roof insulation boards manufactured or approved by EPDM roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated. Minimum LTTR of 33 required.

B. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 1, Grade 3, felt or glass-fiber mat facer on both major surfaces.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
      a. Carlisle Syntec Systems: InsulBase Polyisocyanurate insulation.
      b. Architect approved equivalent.

C. Tapered Insulation: Provide factory-tapered insulation boards fabricated to minimum slope of 1/4 inch per 12 inches (1:48) for new roof installations (unless otherwise indicated for re-roofing projects). Minimum LTTR-33 Average, 4' x 4' board size.

D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated or at least twice the slope of the tapered insulation in the field of the roof areas.

2.08 INSULATION ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with roofing.

B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM 4470, designed for fastening roof insulation and cover boards to substrate, and acceptable to roofing system manufacturer.

C. Flexible FAST Adhesive: Sure-Seal FAST 100 or 100 LV Adhesive: A low rise two-component spray-applied or extruded bead applied, to approved insulations to compatible substrates (concrete, cellular lightweight insulating concrete, gypsum, cementitious wood fiber, wood or steel) or sooth or gravel surfaced BUR, modified bitumen or cap sheets.

D. Cover Board: Cellulosic-fiber reinforced, water-resistant gypsum substrate, 5/8 inch (16 mm) thick.
   1. Products: Subject to compliance with requirements, provide the following:
      a. Securshield HD Plus Coverboard, ASTM C1289.
      b. ProtectoR HD Polyiso Cover Board, ASTM C1289
      c. VersiCore HD Polyiso Cover Board, ASTM C1289

2.09 ROOF DRAINS

A. General Contractor shall provide new roof drains of equal size and configuration as existing roof drains.

B. Roof drains shall have a dura-coated cast iron body with combination membrane flashing clamp/gravel guard and high aluminum dome strainers.

C. Install in accordance with manufacturer's written instructions.

2.10 ROOF VENT PIPE

A. General Contractor shall extend existing roof vent pipes in kind to provide 18" minimum pipe length above finished roof surface.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions with Installer present, for compliance with requirements and other conditions affecting performance of the Work:
   1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
   2. Verify that perimeter wood blocking, curbs, and nailers are securely anchored to roof deck at roof perimeters, penetrations and terminations in accordance with Factory Mutual 1-49 requirements and that nailers match thicknesses of insulation .
   3. Steel Decks: Verify that surface plane flatness and fastening of steel roof deck complies with manufacturer's requirements.
   4. Concrete Decks:
      a. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
      b. Verify that concrete substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D4263.
      c. Verify that concrete-curing compounds that will impair adhesion of roofing components to roof deck have been removed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

3.03 ROOFING INSTALLATION, GENERAL

A. Install roofing system according to roofing system manufacturer's written instructions.

B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.04 SUBSTRATE BOARD / THERMAL BARRIER INSTALLATION

A. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.
   1. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to roofing system manufacturers' written instructions.

3.05 VAPOR-RETARDER INSTALLATION

A. Self-Adhering-Sheet Vapor Retarder: Prime substrate if required by manufacturer. Install self-adhering-sheet vapor retarder over area to receive vapor retarder, side and end lapping each sheet a minimum of 3-1/2 inches and 6 inches, respectively. Seal laps by rolling.

B. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into roofing system.

3.06 INSULATION INSTALLATION

A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.

B. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.

C. Install tapered insulation under area of roofing to conform to slopes indicated. Form crickets and saddles as indicated on approved roof installation shop drawings.

D. Install insulation under area of roofing to achieve required LTTR of 33 minimum. Install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.

E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.

F. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.

G. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

H. Mechanically Fastened Insulation: Install insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

I. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.

J. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction. Loosely butt cover boards together and fasten to roof deck.
   1. Fasten cover boards according to requirements in FM Global's "RoofNav" for specified Windstorm Resistance Classification.
   2. Fasten cover boards to resist uplift pressure at corners, perimeter, and field of roof.

3.07 ADHERED MEMBRANE ROOFING INSTALLATION

A. Adhere roofing over area to receive roofing according to membrane roofing system manufacturer's written instructions. Unroll membrane roofing and allow to relax before installing.

B. Start installation of roofing in presence of roofing system manufacturer's technical personnel.

C. Accurately align roofing and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

D. Bonding Adhesive: Apply to substrate and underside of roofing at rate required by manufacturer and allow to partially dry before installing roofing. Do not apply to splice area of roofing.

E. In addition to adhering, mechanically fasten roofing securely at terminations, penetrations, and perimeters.

F. Apply roofing with side laps shingled with slope of roof deck where possible.

G. Tape Seam Installation: Clean and prime both faces of splice areas, apply splice tape, and firmly roll side and end laps of overlapping roofing according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of roofing terminations.

H. Repair tears, voids, and lapped seams in roofing that do not comply with requirements.

I. Spread sealant or mastic bed over deck-drain flange at roof drains and securely seal membrane roofing in place with clamping ring.

J. Adhere protection sheet over membrane roofing at locations indicated.

3.08 WALKWAY INSTALLATION

A. Flexible Walkways: Install walkway products in locations as indicated on shop drawings. Adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.09 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components, and to furnish reports to Architect.

B. Manufacturer's Field Services: The manufacturer's authorized Field Representative and Roofing Quality Control Inspector shall provide the following:
   1. Attend and conduct Pre-installation Meeting.
   2. Perform preparatory, initial, follow-up and final inspections for roof insulation and roofing system.
   3. Prepare and submit inspection reports for each inspection made.

C. Upon completion of the installation the manufacturer's authorized Field Representative shall conduct an on-site inspection in the presence of the Architect/Engineer to ensure that the installation has been installed in accordance with the manufacturer’s specifications.

D. Flood Testing: Flood test each roofing area for leaks, according to recommendations in ASTM D 5957, after completing roofing and flashing but before overlying construction is placed. Install temporary containment assemblies, plug or dam drains, and flood with potable water.
   1. Flood to an average depth of 2-1/2 inches with a minimum depth of 1 inch and not exceeding a depth of 4 inches. Maintain 2 inches of clearance from top of base flashing.
   2. Flood each area for 24 hours.
   3. After flood testing, repair leaks, repeat flood tests, and make further repairs until roofing and flashing installations are watertight.

E. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.

F. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.

G. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.10 PROTECTING AND CLEANING

A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements, repair substrates, and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the 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. Copper flashing soldered to existing copper roofing.
   2. Flat locked and soldered (flat seam soldered) roofing.

1.03 STANDARDS AND REFERENCES

A. "Copper in Architecture" handbook published by the Copper Development Association Inc. (CDA).

B. ASTM B370 - "Standard Test Methods and Definitions for Mechanical Testing of Steel Products".

C. ASTM E907 - "Standard Test Method for Field Testing Uplift Resistance of Adhered Membrane Roofing Systems".

1.04 INSTALLATION AND PERFORMANCE REQUIREMENTS

A. Installation Requirements: Fabricator is responsible for installing system, including anchorage to substrate and necessary modifications to meet specified and drawn requirements and maintain visual design concepts in accordance with Contract Documents and following installation methods as stipulated in the "Copper in Architecture" handbook.
   1. Drawings are diagrammatic and are intended to establish basic dimension of units, sight lines, and profiles of units.
   2. Make modifications only to meet field conditions and to ensure fitting of system components.
   3. Obtain Architect's approval of modifications.
   4. Provide concealed fastening wherever possible.
   5. Attachment considerations: Account for site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening and fracturing connection between units and building structure or between components themselves.
   6. Obtain Architect's approval for connections to building elements at locations other than indicated in Drawings.
   7. Accommodate building structure deflections in system connections to structure.

B. Performance Requirements
   1. System shall accommodate movement of components without buckling, failure of joint seals, undue stress on fasteners, or other detrimental effects when subjected to seasonal temperature changes and live loads.
   2. Design system capable of withstanding building code requirements for negative wind pressure.

C. Interface With Adjacent Systems
   1. Integrate design and connections with adjacent construction.
   2. Accommodate allowable tolerances and deflections for structural members in installation.
   3. Separate and isolate dissimilar metals.

1.05 SUBMITTALS

A. Pursuant to Section 013300 – Submittal Procedures.

B. Pursuant to Section 016100 - Basic Product Requirements.

C. Product data including metal manufacturers and fabricator’s specifications.

D. Submit manufacturer's installation instructions and recommendations.

E. Submit certification or other data substantiating that materials comply with requirements.

F. Samples consisting of 6" or 12" square specimens of specified copper roofing material.

G. Shop drawings showing manner of forming, joining, and securing copper roofing, and pattern of seams. Show expansion joint details and waterproof connections to adjoining work and at obstructions and penetrations.

H. Submit sample warranty for approval.

1.06 QUALITY ASSURANCE

A. Installer: A firm with five (5) years of successful experience with installation of copper roofing of type and scope equivalent to Work of this Section.

B. Industry Standard: Except as otherwise shown or specified, comply with applicable recommendations and details of "Copper in Architecture Handbook". Conform to dimensions and profiles shown on the Contract Drawings.

C. Wind Uplift: Provide roof assemblies meeting requirements of ASTM E907 for Class 90 wind uplift resistance as described in “Copper in Architecture Handbook”.

D. Mock-Up: Before proceeding with final purchase of materials and fabrication of copper roofing components, prepare a mock-up of work. Incorporate materials and methods of fabrication and installation identical with project requirements. Install mock-up at roof area location directed by Architect. Retain accepted mock-up as quality standard for acceptance of completed copper roofing. If accepted, mock-up may be incorporated as part of copper roofing work.
   1. Provide mock-up of sufficient size and scope to show typical pattern of seams, fastening details, edge construction, and finish texture and color.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Packing, Shipping, Handling, and Unloading: Protect finish panel faces.

B. Acceptance at Site: Examine each panel and accessory as delivered and confirm that finish is undamaged. Do not accept or install damaged panels.

C. Storage and Protection:
   1. Stack pre-formed material to prevent twisting, bending, and abrasions.
   2. Provide ventilation.
   3. Prevent contact with materials which may cause discoloration or staining.
   4. Store off the ground, on level blocking spaced to prevent any deflection of paneling.

1.08 WARRANTY

A. Installer shall warrant installed system and components to be free from defects in material and workmanship for period of 2 years.
   1. Include coverage against leakage and damages to finishes.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering materials that may be incorporated in the Work include, but are not limited to, the following:
   1. Revere Copper Products, Inc.
   2. Hussey Copper, Ltd.
   3. Outokumpu American Brass Company.
   4. KME America

2.02 MATERIALS

A. Copper Roofing Sheets: Cold-rolled copper sheet complying with ASTM B 370 temper designation, H00, unless otherwise indicated, and as follows:
   1. Weight: 20 oz. per sq. ft. in flat seam roofing.

B. Miscellaneous Materials: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants and accessory items as recommended by copper sheet manufacturer and fabricator for copper roofing work, except as otherwise indicated.

C. Expansion Joint Sealant: For hooked-type expansion joints, which must be free to move, provide nonsetting, nonhardening, nonmigrating, heavy-bodied polyisobutylene mastic sealant.

D. Paper Slip Sheet: Minimum 4-lb per square, rosin-sized building paper applied over all felt and/or fabric underlayment.

E. Accessories: Except as indicated as work of another specification Section, provide components required for a complete roof system, including trim, copings, fascias, ridge closures, clips, seam covers, battens, flashings, sealants, gaskets, and closure strips. Match materials and finishes of roof.
   1. Sealing Tape: Pressure-sensitive 100 percent solids polyisobutylene compound sealing tape with release paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.
   2. Joint Sealant: One-part elastomeric polyurethane or silicone rubber sealant. Apply sealant in seams for slopes of 4/12 or lower. Refer to Division 7.

F. Bituminous Coating: Cold-applied asphalt mastic, SSPC paint 12, compounded for 15mil dry film thickness per coat, except as otherwise indicated. Provide inert-type non-corrosive compound, nominally free of sulfur components and other deleterious impurities.

G. High Temperature Grade Water Barrier Underlayment: Cold applied, self-adhering membrane composed of a high density, cross laminated polyethylene film coated on one side with a layer of high temperature adhesive. Adhesive must withstand temperatures up to 250 degrees Fahrenheit. Provide primer when recommended by water barrier underlayment manufacturer.
   1. Minimum Thickness: 30 mil.
   2. Tensile Strength: ASTM D 412 (Die C Modified); 250 psi.
   3. Membrane Elongation: ASTM D412 (Die C Modified); 250%.
   4. Permeance (Max): ASTM E96; 0.05 Perms.
   5. Acceptable Products:
      a. Blueskin PE 200 HT, Henry.
      b. Grace Ultra™, GCP Applied Technologies.
      c. CCW MiraDRI WIP 300 High Temperature, Carlisle Coatings and Waterproofing.

H. Nails: Copper or hardware bronze, 0.109 inch minimum not less than 7/8" long barbed with large head.

I. Screws & Bolts: brass or passivated stainless steel (300 Series) of sufficient size and length to sustain imposed stresses.

J. Cleats: Cold rolled copper (weight to match roofing material) 2" wide x 3" long.

K. Solder: ASTM Specification B-32, Composition 50% tin and 50% lead.

L. Flux: Muriatic acid neutralized with zinc or approved brand of soldering flux.

M. Rivets: 1/8" - 3/16" diameter, with solid copper mandrels and washers.

2.03 SHOP-FABRICATED UNITS

A. General Metal Fabrication: Shop-fabricate work to greatest extent possible. Comply with details shown and with applicable requirements of CDA "Copper in Architecture Handbook" and other recognized industry practices. Fabricate for waterproof and weather- resistant performance with expansion provisions for running work, sufficient to permanently prevent leakage, damage, or deterioration of the work. Form work to fit substrate. Comply with material manufacturer's instructions and recommendations for forming material. Form exposed copper work without excessive oil-canning, buckling, and tool marks, true to line and levels indicated, with exposed edges folded back to form hems.

B. Seams: Fabricate nonmoving seams in copper sheet with flat-lock seams. Tin edges to be seamed, form seams, and solder. Rivet joints for additional strength where indicated.

C. Expansion Provisions: Where lapped or bayonet-type expansion provisions in work cannot be used, or would not be sufficiently water/weatherproof, form expansion joints of intermeshing hooked flanges, not less than 1" deep, filled with mastic sealant (concealed within joints).

D. Sealant Joints: Where movable, non-expansion-type joints are indicated or required for proper performance of work, form copper to provide for proper installation of elastomeric sealant, in compliance with CDA standards. Apply sealant in seams for slopes of 4/12 or lower.

E. Separations: Provide for separation of copper from non-compatible metal or corrosive substrate by coating concealed surfaces at locations of contact, with bituminous coating or other permanent separation as recommended by manufacturer/fabricator.

2.04 FINISHES

A. Natural weathering mill finished copper. No applied finish.

PART 3 EXECUTION

3.01 COORDINATION

A. Coordinate copper roofing with rain drainage work, flashing, trim and construction of decks, parapets, walls, and other adjoining work to provide a permanently leak proof, secure, and non-corrosive installation.

3.02 PREPARATION

A. Clean surfaces to receive copper roofing. Substrate to be smooth and free of defects. Drive all projecting nails or other fasteners flush with substrate.

B. Water Barrier Underlayment:
   1. Install high temperature grade water barrier on clean, dry roof substrate.
   2. Remove dust, dirt, and loose fasteners.
   3. Remove protrusions from the deck area.
   4. Verify substrate has no voids, damaged, or unsupported areas.
   5. Repair voids or unacceptable areas before installing membrane.
   6. Prime substrates with manufacturer's approved primer if required for proper installation of membrane over substrate.
   7. Install membrane in strict accordance with manufacturer's printed application procedures, precautions, and limitations.
   8. Start application at low points and lap membrane shingle fashion to prevent water penetration.
   9. Membrane Underlayment: Apply horizontally, lapping preceding layer not less than 4-inches (100 mm). End lap membrane not less than 6-inches (150-mm).
      a. Maximize adhesion to substrate by brooming or rolling membrane in place after placement.
      b. Center membrane at valleys, hips, and ridges.

3.03 INSTALLATION

A. Manufacturer's Recommendations: Except as otherwise shown or specified, comply with recommendations and instructions of manufacturer of copper being fabricated and installed.

B. General:
   1. Separate dissimilar metals by painting each metal surface in area of contact with a bituminous coating by applying rubberized asphalt underlayment to each metal surface, or by other permanent separation as recommended by manufacturers of dissimilar metals.
   2. Form and fabricate sheets, seams, strips, cleats, valleys, ridges, edge treatments, integral flashings and other components of copper roofing to profiles, patterns and drainage arrangements shown and as required for permanently leakproof construction. Provide for thermal expansion and contraction of the work, as indicated. Seal joints as shown and as required for leakproof construction. Shop-fabricate materials to greatest extent possible.
   3. Sealant-Type Joints: Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1" into sealant. Form joints to conceal sealant completely. When ambient temperature is moderate at time of installation, 40 deg to 70 deg F (4 deg to 21 deg C), set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant- type joints at

temperatures below 40 deg F (4 deg C). Comply with requirements of Division-7 "Sealant" Sections for handling and installing sealants.

4. Fabricate and install work with lines and corners of exposed units true and accurate. Form exposed faces flat and free of buckles, excessive waves, and avoidable tool marks considering temper and reflectivity of metal. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant. Except as otherwise shown, fold back sheet metal to form a hem on concealed side of exposed edges.
5. Conceal fasteners and expansion provisions where possible in exposed work and locate so as to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
6. Tin copper surfaces, including lead coated copper at edges of sheets, to be soldered for a width of 1-1/2", using solder recommended for copper work.

C. Flat Lock Soldered (“Flat Seam Soldered”) Seam Roofing and Copper Flashing to existing roofing.
1. Install copper work in accordance with CDA "Copper in Architecture Handbook."
2. Flat Seam Metal Roof Panels: Fasten system to substrate with concealed metal cleats and screws at spacings required by fabricator to resist code required wind uplift.
3. Align, level, and plumb system with structure.
4. Fasten cleats or nails using cleats mated to folded flat seams and fastener pattern to resist design loads with screws or barbed nails of sufficient length to penetrate substrate.
5. Tin and prepare panels as described in specification Section 2.3 “Fabrication”.
6. Only install the number of panels in a day that can be field soldered before the end of the day’s work. Install overnight protection on the unsoldered tinned edges of panel seams to prevent contamination before the start of the next workday.
7. Fully seat adjacent panel to on two sides to achieve continuous engagement of seam joint.
8. Mallet or dress down engaged seams.
9. Apply flux and fully sweat seams with solder to achieve watertight installation.
10. Install expansion battens at 25 to 30 feet (7500 mm to 9000 mm) in both directions.

D. Coordinate installation of panels with adjacent construction to ensure watertight enclosure.

3.04 CLEANING

A. Remove protective film (if any) from exposed surfaces of copper roofing promptly upon installation. Strip with care to avoid damage to finishes.

B. Upon completion of each area of soldering, carefully remove flux and other residue from surfaces. Neutralize acid flux by washing with baking soda solution and then flushing clear water rinse. Use special care to neutralize and clean crevices.

C. Clean exposed metal surfaces of substances that would interfere with uniform oxidation and weathering.

3.05 PROTECTION

A. Provide final protection in a manner acceptable to installer that ensures that copper roofing is without damage or deterioration at time of 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. Fascia.
   2. Copings and splice plates.
   3. Drip edges.
   4. Base and Counter 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 counterflashings 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. Copper Sheet: ASTM B370, cold-rolled copper sheet, H00 or H01 temper, natural finish, 20 0z. / s.f. (22 gage) minimum or as indicated on the 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. Hussey Copper Ltd
      b. Revere Copper Products, Inc
      c. Or approved equal.
   2. Non-patinated Exposed Finish: Mill.

C. 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.

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 ROOF-DRAINAGE SHEET METAL FABRICATIONS

A. Scuppers: Fabricate sheet metal scuppers in width, height and depths required by the drawings or to match existing conditions, as applicable. Materials shall be 0.050 inch thick Aluminum to match and provide compatibility with adjacent metals. Fabricate in accordance with SMACNA standards in accordance with the base metal required. Construct scupper pan in one formed piece with extended drip edge, roof extension plate and side flanges for interface with roofing. Provide separate counterflashing as required by details or field conditions in compatible and matching sheet metal. Weld / solder joints to produce a watertight installation.
   1. Provide certification of the scupper design / detailing by the approved roof manufacturer stating that the scupper installation shall be acceptable the manufacturer and be included in the warranty coverage specified for the roofing system.

2.07 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.

E. Fascia: Factory Fabricate 0.050 inch thick aluminum fascia with continuous extruded aluminum anchor bar and 20 gauge galvanized steel continuous cleat.
   1. Basis of Design: Metal Era Anchor-Tite Extended Fascia with an overall height 11 1/2 inches.
   2. Finish: Premium fluoropolymer, PVDF, Kynar 500/HYLAR 5000 coating.
      a. Color as selected by the Architect.

2.08 COPINGS

A. Copings: Manufactured coping system consisting of formed-metal coping cap in section lengths not exceeding 12 feet, concealed anchorage; corner units, end cap units, and concealed splice plates with same finish as coping caps.

B. When utilized in conjunction with Low slope roof applications, all metals must be purchased through the manufacturer providing the Total System Warranty for the project and be included in the Total System warranty.

C. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   1. Metal-Era, Inc.
   2. Hickman Company, W. P.

3. Merchant & Evans, Inc
4. MM Systems Corporation.
5. Perimeter Systems; a division of Southern Aluminum Finishing Company, Inc.
6. Petersen Aluminum Corporation.

D. Coping Material: aluminum, 0.063 inch thick.
1. Finish: Three-coat fluoropolymer.
2. Color: As selected by Architect from manufacturer's full range.
3. Corners: Factory mitered and continuously welded.
4. Coping-Cap Attachment Method: Snap-on, fabricated from coping-cap material.
5. Snap-on-Coping Anchor Plates: Concealed, galvanized-steel sheet, 12 inches wide, with integral cleats.

2.09 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.

2.10 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 {\id\#1000279} - {\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 or copper 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.

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 Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Penetrations in fire-resistance-rated walls.
   2. Penetrations in horizontal assemblies.
   3. Penetrations in smoke barriers.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product specified.

B. Product Schedule: For each penetration firestopping system. Include location and design designation of qualified testing and inspecting agency.

1.04 FIELD QUALITY CONTROL

A. Section 014500 - QUALITY CONTROL: Field inspection and testing.
   1. Inspect the installed firestopping after application and curing for integrity, prior to its concealment.
   2. Ensure that actual thicknesses, densities, and bond strengths meet requirements for specified ratings.
   3. Re-inspect the installed firestopping for integrity of fire protection, after installation of subsequent work.
   4. Provide written inspection report and certification to the Architect, indicating installation meets or exceeds requirements of contract documents.

1.05 FIELD MOCK-UP

A. Field Mock-up Installations: Prior to installing firestopping, erect mock-up installations for each type firestop system indicated in the Firestop Schedule to verify selections made and to establish standard of quality and performance by which the firestopping work will be judged by the Owner or Owner’s Representative. Obtain acceptance of mock-up installations by the Owner or Owner’s Representative before start of firestopping installation. Provide at least 72 hours notice to Owner or Owner’s Representative prior to inspection.

1.06 INFORMATIONAL SUBMITTALS

A. See Section 013300 - SUBMITTALS, for Submittal Procedures.

B. Qualification Data: For qualified Installer.

C. Installer Certificates: From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written recommendations.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for penetration firestopping.

1.07 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Global according to FM 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

B. Installer Qualifications: A firm experienced in installing penetration firestopping similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its penetration firestopping products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

C. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:
   1. Penetration firestopping tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
   2. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems complying with the following requirements:
      a. Penetration firestopping products bear classification marking of qualified testing and inspecting agency.
      b. Classification markings on penetration firestopping correspond to designations listed by the following:
         1) FM Global in its "Building Materials Approval Guide."
         2) UL Fire Resistance Directory.
            (a) Firestop Devices (XHJI)
            (b) Fire Resistance ratings (BXRH)
            (c) Through Penetration Firestop Systems (XHEZ)
            (d) Fill Voids or Cavity Materials (XHHW)
            (e) Forming Materials (XHKU)

D. Preinstallation Conference: Conduct conference at Project site.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and UL label where applicable.

B. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.

C. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements.

D. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.

E. Do not use damaged or expired materials.

1.09 PROJECT CONDITIONS

A. Environmental Limitations: Do not install penetration firestopping when ambient or substrate temperatures are outside limits permitted by penetration firestopping manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.

B. Install and cure penetration firestopping per manufacturer's written instructions using natural means of ventilation's or, where this is inadequate, forced-air circulation.

1.10 COORDINATION

A. Do not use materials that contain flammable solvents.

B. Scheduling:
   1. Schedule installation of Cast in Place firestop devices after completion of floor formwork, metal form deck, or composite deck but before placement of concrete.
   2. Schedule installation of other firestopping materials after completion of penetrating item installation but prior to covering or concealing of openings.

C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.

D. Weather Conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.

E. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

F. Coordinate construction of openings and penetrating items to ensure that penetration firestopping is installed according to specified requirements.

G. Coordinate sizing of sleeves, openings, core-drilled holes, Cast-in place sleeves or cut openings to accommodate penetration firestopping.

H. Coordinate construction of openings and penetrating items to ensure that penetration firestopping is installed according to specified requirements.

I. Coordinate sizing of sleeves, openings, core-drilled holes, Cast-in place sleeves or cut openings to accommodate penetration firestopping.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Hilti, Inc.
   2. 3M Fire Protection Products.
   3. STI Firestop
   4. Tremco, Inc.; Tremco Fire Protection Systems Group.
   5. USG Corporation.

2.02 PENETRATION FIRESTOPPING

A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

B. Penetrations in Fire-Resistance-Rated Walls: Provide penetration firestopping with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
   1. Fire-resistance-rated walls include fire walls fire-barrier walls smoke-barrier walls and fire partitions.
   2. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

C. Penetrations in Horizontal Assemblies: Provide penetration firestopping with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
   1. Horizontal assemblies include floors floor/ceiling assemblies and ceiling membranes of roof/ceiling assemblies.
   2. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.
   3. T-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.

D. Penetrations in Smoke Barriers: Provide penetration firestopping with ratings determined per UL 1479.
   1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at 0.30-inch wg at both ambient and elevated temperatures.

E. W-Rating: Provide penetration firestopping showing no evidence of water leakage when tested according to UL 1479.

F. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E84.

G. VOC Content: Penetration firestopping sealants and sealant primers shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
   1. Sealants: 250 g/L.
   2. Sealant Primers for Nonporous Substrates: 250 g/L.

3. Sealant Primers for Porous Substrates: 775 g/L.

H. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.
   1. Permanent forming/damming/backing materials, including the following:
      a. Slag-wool-fiber or rock-wool-fiber insulation.
      b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
      c. Fire-rated form board.
      d. Fillers for sealants.
   2. Temporary forming materials.
   3. Substrate primers.
   4. Collars.
   5. Steel sleeves.

I. Identification Labels:
   1. Furnished by fire stopping manufacturer of suitable material for permanent field identification of through-penetration firestops.
   2. Identify the following:
      a. Warning Wording
      b. Manufacturer Name.
      c. Product Catalog number.
      d. Tested System number.
      e. F-rating.
      f. T-rating, if applicable.
      g. Firestop Contractor name.
      h. Firestop Contractor Contact Number.
      i. Firestop Inspection Date & Inspector Initials.
   3. Field fabricated labels are not acceptable.

2.03 FILL MATERIALS

A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
   1. Hilti CP 680 M or P Cast-In-Place Firestop Device
      a. Add Aerator adapter when used in conjunction with aerator ("sovent") system.
   2. Hilti CP 681 Tub Box Kit for use with tub installations.
   3. Specified Technologies Inc. CID cast-in devices.

B. Sealants, caulking materials or foams for use with non-combustible items including steel pipe. copper pipe, rigid steel conduit and electrical metallic tubing (EMT), the following products are acceptable:
   1. Hilti FS-ONE MAX Intumescent Firestop Sealant.
   2. Hilti CP 604 Self-leveling Firestop Sealant.
   3. Hilti CP 620 Fire Foam
   4. Hilti CP 606 Flexible Firestop Sealant
   5. Hilti CP 601s Elastomeric Firestop Sealant.

C. Sealants, caulking materials or foams for use with sheet metal ducts the following products are acceptable:
   1. Hilti FS-ONE MAX Intumescent Firestop Sealant.
   2. Hilti CP 606 Flexible Firestop Sealant
   3. Hilti CP 601s Elastomeric Firestop Sealant:

D. Firestop Joint Spray: sprayable fire-rated mastic for deck flutes and joints where greater movement is expected:
   1. Hilti Firestop Joint Spray CFS-SP-WB.

E. Mineral Wool plugs for filling steel deck flute and wall gap openings:
   1. Hilti CP 777 Friction Fit sized and cut to depth for deck flute openings as recommended by the manufacturer.
   2. Hilti CP 767 continuous filler strip for filling continuous gaps at top of walls.

F. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
   1. Hilti FS-ONE MAX Intumescent Firestop Sealant
   2. Hilti CP 620 Fire Foam
   3. Hilti CP 601s Elastomeric Firestop Sealant
   4. Hilti CP 606 Flexible Firestop Sealant.

G. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized-steel sheet.

H. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
   1. Hilti FS-ONE MAX Intumescent Firestop Sealant
   2. Hilti CP 604 Self-leveling Firestop Sealant

I. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with steel lining on one side.
   1. Hilti CP 643N Firestop Collar
   2. Hilti CP 644 Firestop Collar.
   3. Hilti CP 645 / 648 E Wrap Strips.

J. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
   1. Acceptable materials are "BIO FIRESHIELD "Novasit K-10".

K. Pillows/Bags / Pads: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.
   1. Hilti CP 617 Firestop Putty Pad

L. Foams, intumescent sealants, or caulking materials for use with flexible cable or cable bundles, the following products are acceptable:
   1. Hilti FS-ONE MAX High Performance Intumescent Firestop sealant
   2. Hilti CP 620 Fire Foam
   3. Hilti CP 601s Elastomeric Firestop Sealant.
   4. Hilti CP 606 FS Flexible Firestop Sealant.

M. Sleeves: Re-penetrable cable management device for electrical and telecommunication cabling and cable bundles for use with appropriate Firestopping sealant, fill mortar, putty or other devices and materials. Concrete assemblies up to 3 hour and Gypsum Board assemblies up to 4 hour.
   1. Hilti CP 653 Speed Sleeve.

N. Non-curing, re-penetrable intumescent putty or foam materials for use with flexible cable or cable bundles, the following products are acceptable:
   1. Hilti CP 618 Firestop Putty Stick
   2. Hilti CP 658T Firestop Plug.

O. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and sloped surfaces, unless indicated firestopping limits use of nonsag grade for both opening conditions.

P. Non-curing, re-penetrable materials used for large openings and complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable.
   1. Hilti FS 657 Fire Block
   2. Hilti CP 675T Firestop Board / Brick

Q. Materials used for large openings and complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes. electrical busways in raceways, the following products are acceptable:
   1. Hilti FS 637 Trowelable Firestop Compound.

R. Mineral Fiber Fire Safing insulation:
   1. Provide insulation as manufactured by USG INTERIORS, INC. Product "Thermafiber Safing", CAFCO INDUSTRIES LTD., FIBREX INC. or approved equal. Density shall be 4 pcf with thickness to suit condition
      a. Provide 20 gauge minimum metal plate where required for fire safing support to comply with fire ratings
      b. Do not use fibrous safing insulation unless it is in conjunction with a compatible smoke seal as specified herein.

S. Mineral Wool
   1. Loose mineral wool, rated noncombustible when tested according to ASTM E136, free of asbestos and glass fiber, and suitable for stuffing into metal deck flutes to an in place density of 6 to 12 pcf.

2.04 MIXING

A. For those products requiring mixing before application, comply with penetration firestopping manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Verification of Conditions: Examine areas and conditions under which Work is to be performed and identify conditions detrimental to proper or timely completion.

B. Surface Cleaning: Clean out openings immediately before installing penetration firestopping to comply with manufacturer's written instructions and with the following requirements:
   1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping.
   2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping. Remove loose particles remaining from cleaning operation.
   3. Remove laitance and form-release agents from concrete.

C. Priming: Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

D. Masking Tape: Use masking tape to prevent penetration firestopping from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing firestopping seal with substrates.

3.03 INSTALLATION

A. General: Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
   1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping.

C. Install fill materials for firestopping by proven techniques to produce the following results:
   1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
   2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
   3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.04 IDENTIFICATION

A. Identify penetration firestopping with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of firestopping edge so labels will be visible to anyone seeking to remove penetrating items or firestopping. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
   1. Identify the following:
      a. "WARNING - FIRESTOP MATERIAL - DO NOT DISTURB. NOTIFY BUILDING MANAGEMENT OF ANY DAMAGE".
      b. Manufacturer Name: _____.
      c. Product Catalog number:_____.
      d. Tested System number: _____.
      e. F rating:_____.
      f. T rating, if applicable.
      g. Firestop Contractor name:_____.
      h. Firestop Contractor Contact Number: _____.
      i. Firestop Inspection Date & Initials:_____.
      j. T-rating, if applicable.
      k. Firestop Contractor name.
      l. Firestop Contractor Contact Number.
      m. Firestop Inspection Date & Inspector Initials.

3.05 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping is without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping and install new materials to produce systems complying with specified requirements.

END OF SECTION

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FIRESTOP SCHEDULE

Project No:	Contractor Name and Address:	Date Submitted:
Project Title:	Supplier/Installer Name and Address:	Company Field Advisor Name and Address:
	Manufacturer Name and Address:	

Manufacturer's Product Reference Numbers and/or Drawing Numbers	U.L., FM, Warnock Hersey or Omega Point Lab Penetration Design Nos.	Penetrating Item: Material, Size, Insulated, Combustible, Joint, Perimeter, etc. Description:	Maximum Allowable Annular Space or Maximum Size Opening	Wall type Construction		Floor Type Construction	Fire Resistance Rating of Wall or Floor (Hourly)	F Rating	T Rating (floors Only)	L Rating (if available)	W Rating (if available)
				DES.	CONST.						
Example No. 1 DCFSS-130	UL #130	Maximum 4" Steel Pipe Non-Insulated		P4	6" CMU	N.A.	1 Hour	1 Hour	N.A	.	
Example No. 2 5300-ICF88.01	UL #591	Maximum 4" PVC Pipe		N.A.	N.A.	UL # D916	3 Hour	1 Hour	2 Hour		
Exmple No. 3	CW-S-2006	Curtain Wall/Perimeter	6” to 12”	NA	NA	4 ½” Reinforced LW concrete	2 Hour	2 Hour	NA	1 CFM/ Lin Ft.	

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 SECTION INCLUDES

A. This Section references specification sections relating to commercial door hardware for the following:
   1. Swinging doors.
   2. Sliding Doors.
   3. Other doors to the extent indicated.

B. Commercial door hardware includes, but is not necessarily limited to, the following:
   1. Mechanical door hardware.
   2. Electromechanical and access control door hardware.
   3. Electromechanical and access control door hardware power supplies, back-ups and surge protection.
   4. Automatic operators.
   5. Cylinders specified for doors in other sections.

1.03 RELATED REQUIREMENTS

A. Section 087100 - DOOR HARDWARE.

1.04 CODES AND REFERENCES

A. 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.

B. Standards: Reference Related Sections for requirements regarding compliance with applicable industry standards.
   1. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
   2. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
   3. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2025, with Amendment (2024).
   4. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
   5. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives; 2025.

1.05 SUBMITTALS

A. See Section 013300 - SUBMITTALS, for submittal procedures.

B. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

C. 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.
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.

D. Keying Schedule: Prepared under the supervision of the Owner, separate schedule detailing final keying instructions for locksets and cylinders in writing. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner to approve submitted keying schedule prior to the ordering of permanent cylinders.

E. 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.

F. 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 Submittals. The manual to include the name, address, and contact information of the manufacturers providing the hardware and their nearest service representatives. The final copies delivered after completion of the installation test to include "as built" modifications made during installation, checkout, and acceptance.

G. Warranties and Maintenance: Special warranties and maintenance agreements specified in the Related Sections.

1.06 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. Installer Qualifications: Installers, trained by the primary product manufacturers, with a minimum 3 years documented experience installing both standard and electrified builders 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.

C. 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 in good standing 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.

D. Source Limitations: Obtain each type and variety of Door Hardware specified in the Related Sections from a single source, qualified supplier unless otherwise indicated.

E. Regulatory Requirements: Comply with NFPA 70, NFPA 80, NFPA 101 and ICC A117.1 requirements and guidelines as directed in the applicable model building code.

F. 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.

1.07 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".

1.08 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: Division 08 Sections (Steel, Aluminum and Wood) 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.

1.09 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.

1.10 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.

1.11 WARRANTY

A. See Section 017800 - CLOSEOUT SUBMITTALS, for additional warranty requirements.

PART 2 - PRODUCTS

2.01 SCHEDULED DOOR HARDWARE

A. See Section 087100 - DOOR HARDWARE.

PART 3 - EXECUTION

3.01 DOOR HARDWARE SETS

A. The door hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

B. The supplier is responsible for handing and sizing all products as listed in the door hardware sets. Quantities listed are for each pair of doors, or for each single door.

C. Products listed in the Door Hardware Sets must meet the requirements described in the specification sections noted.
   1. Section 087100 - DOOR HARDWARE.

END OF SECTION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes hollow-metal doors, fixed panels and frames.

1.03 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or ANSI/SDI A250.8.

1.04 COORDINATION

A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.05 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.

B. Shop Drawings: Include the following:
   1. Elevations of each door type.
   2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
   3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
   4. Locations of reinforcement and preparations for hardware.
   5. Details of each different wall opening condition.
   6. Details of anchorages, joints, field splices, and connections.
   7. Details of accessories.
   8. Details of moldings, removable stops, and glazing.
   9. Details of conduit and preparations for power, signal, and control systems.

C. Samples for Verification:
   1. For each type of exposed finish required, prepared on Samples of not less than 3 by 5 inches.
   2. For "Doors" and "Frames" subparagraphs below, prepare Samples approximately 12 by 12 inches to demonstrate compliance with requirements for quality of materials and construction.

D. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.

1.06 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use non-vented plastic.
   1. Provide additional protection to prevent damage to factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Ceco Door Products; an Assa Abloy Group company.
   2. Curries Company; an Assa Abloy Group company.
   3. Karpen Steel Custom Doors & Frames.
   4. Steelcraft; an Ingersoll-Rand company.

B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.02 REGULATORY REQUIREMENTS

A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
   1. Smoke- and Draft-Control Assemblies: Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.

B. Fire-Rated, Borrowed-Light Assemblies: Complying with NFPA 80 and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

2.03 INTERIOR DOORS AND FRAMES

A. Construct interior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Extra Heavy-Duty Doors and Frames: SDI A250.8 - Level 3. At locations indicated in the Door and Frame Schedule.
   1. Physical Performance: Level B according to ANSI/SDI A250.4.
   2. Doors:
      a. Type: As indicated in the Door and Frame Schedule.
      b. Thickness: 1 3/4 inches.
      c. Face: cold-rolled steel sheet, minimum thickness of 0.053 inch (16 gauge) (Level 3).
      d. Edge Construction: Model 2, Seamless.
      e. Core Materials: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core at manufacturer's discretion.
   3. Frames:
      a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch (16 gauge) (Level 3).
      b. Construction: Full Profile Weld Type.
   4. Exposed Finish: Prime.

2.04 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

A. Construct exterior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Extra Heavy-Duty Doors and Frames: SDI A250.8 - Level 3. At locations indicated in the Door and Frame Schedule.
   1. Physical Performance: Level A according to SDI A250.4.
   2. Doors:
      a. Type: As indicated in the Door and Frame Schedule.
      b. Thickness: 1 3/4 inches.

c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch (16 gauge) (Level 3), with minimum A60 coating.
d. Edge Construction: Model 2, Seamless.
e. Core Materials:
1) Thermal-Rated Doors: Provide doors fabricated with a thermal-resistance value (R-value) of not less than R-10 when tested according to ASTM C1363. Provide Polyisocyanurate insulation.
2) Provide Proprietary Bullet-resistant Core for doors noted as Security Doors on the drawings.
(a) Manufacturer: Total Security Solutions or approved equal.
(b) Security Level: Level 3 in accordance with UL 752.
(c) Hinges: Continuous Geared Hinge provided from factory.

3. Frames:
a. Materials: Metallic-coated steel sheet, minimum thickness of 0.067 inch (14 gauge) (Level 4), with minimum A60 (ZF120) coating.
b. Construction: Full Profile Weld Type.
4. Exposed Finish: Prime.

2.05 FRAME ANCHORS

A. Jamb Anchors:
1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
3. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch, and as follows:
1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.06 MATERIALS

A. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.

C. Frame Anchors: ASTM A879/A879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.
1. For anchors built into exterior walls, steel sheet complying with ASTM A1008/A1008M or ASTM A1011/A1011M, hot-dip galvanized according to ASTM A153/A153M, Class B.

D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A153/A153M.

E. Grout: ASTM C476, except with a maximum slump of 4 inches, as measured according to ASTM C143/C143M.

F. Glazing: Comply with requirements in Section 088000 - GLAZING.

G. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.07 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Hollow-Metal Doors:
   1. Steel-Stiffened Door Cores: Provide minimum thickness 0.026 inch, steel vertical stiffeners of same material as face sheets extending full-door height, with vertical webs spaced not more than 6 inches apart. Spot weld to face sheets no more than 5 inches o.c. Fill spaces between stiffeners with glass- or mineral-fiber insulation.
   2. Fire Door Cores: As required to provide fire-protection ratings indicated.
   3. Vertical Edges for Single-Acting Doors: Bevel edges 1/8 inch in 2 inches.
   4. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets.
   5. Bottom Edge Closures: Close bottom edges of doors with end closures or channels of same material as face sheets.
   6. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
   7. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.

C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
   1. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
   2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
   3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
   4. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
   5. Jamb Anchors: Provide number and spacing of anchors as follows:
      a. Masonry Type: Locate anchors not more than 16 inches from top and bottom of frame. Space anchors not more than 32 inches o.c., to match coursing, and as follows:
         1) Two anchors per jamb up to 60 inches high.
         2) Three anchors per jamb from 60 to 90 inches high.
         3) Four anchors per jamb from 90 to 120 inches high.
         4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
      b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
         1) Three anchors per jamb up to 60 inches high.
         2) Four anchors per jamb from 60 to 90 inches high.
         3) Five anchors per jamb from 90 to 96 inches high.
         4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
      c. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
   6. Head Anchors: Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.
   7. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
      a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
      b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

8. Terminated Stops: Terminate stops 6 inches above finish floor with a 45 degree angle cut, and close open end of stop with steel sheet closure. Cover opening in extension of frame with welded-steel filler plate, with welds ground smooth and flush with frame.

D. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.

E. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to ANSI/SDI A250.6, the Door Hardware Schedule, and templates.
1. Reinforce doors and frames to receive non-templated, mortised, and surface-mounted door hardware.
2. Comply with applicable requirements in ANSI/SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

F. Stops and Frame Moldings: Provide beveled stops and frame moldings around glazed lites and louvers where indicated. Form corners of interior stops and moldings with mitered hairline joints. Exterior frame moldings shall be welded and ground smooth prior to priming.
1. Single Glazed Lites: Provide beveled fixed stops and moldings welded on secure side of hollow-metal work.
2. Multiple Glazed Lites: Provide beveled fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
3. Provide beveled fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
4. Frame profiles shall be beveled unless indicated otherwise on the drawings.
5. Provide beveled loose stops and moldings on inside of hollow-metal work.
6. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.08 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

2.09 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

B. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Drill and tap doors and frames to receive non-templated, mortised, and surface-mounted door hardware.

3.03 INSTALLATION

A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.

B. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with ANSI/SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.
   1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
      a. At fire-rated openings, install frames according to NFPA 80.
      b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
      c. Install frames with removable stops located on secure side of opening.
      d. Install door silencers in frames before grouting.
      e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
      f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
      g. Field apply bituminous coating to backs of frames that will be filled with grout containing anti-freezing agents.
   2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
   3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
   4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
   5. Concrete Walls: Solidly fill space between frames and concrete with mineral-fiber insulation.
   6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
   7. In-Place Metal or Wood-Stud Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.
   8. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
      a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
      b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
      c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
      d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.
   1. Non-Fire-Rated Steel Doors:
      a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch.
      b. Between Edges of Pairs of Doors: 1/8 inch to 1/4 inch plus or minus 1/32 inch.
      c. At Bottom of Door: 5/8 inch plus or minus 1/32 inch.
      d. Between Door Face and Stop: 1/16 inch to 1/8 inch plus or minus 1/32 inch.
   2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
   3. Smoke-Control Doors: Install doors and gaskets according to NFPA 105.

D. Glazing: Comply with installation requirements in Section 088000 - GLAZING and with hollow-metal manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.04 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow-metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

E. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION

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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. Extent and location of each type of flush wood door is indicated on Construction Documents and in schedules.

B. Types of doors required include the following:
   1. Solid core flush wood doors with wood veneer faces.
   2. Fire-rated flush wood doors with wood veneer faces.

C. Factory-finishing of flush wood doors is included in this Section.

D. Factory pre-fitting to frames and factory pre-machining for hardware for wood doors is included in this Section.

E. Louvers for flush wood doors, including furnishing and installation, are specified under this Section.

F. Metal door frames for flush wood doors are specified in another Division 08 Section.

1.03 STANDARDS

A. All work of this section shall conform to industry standards and/or manufacturer’s recommendations.

B. NWWDA Quality Standard: I.S.1 “Industry Standard for Wood Flush Doors”, of National Wood Window and Door Association (NWWDA).

C. AWI Quality Standard: “Architectural Woodwork Quality Standards”; including Section 1300 “Architectural Flush Doors”, of Architectural Woodwork Institute (AWI) for grade of door, core construction, finish and other requirements exceeding those of NWWDA quality standard.

D. NFPA 80 "Standard for Fire Doors and Other Opening Protectives".

E. ASTM E90 "Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements".

F. ASTM E152 "Standard Methods of Fire Tests of Door Assemblies".

1.04 SUBMITTALS

A. Submit pursuant to Section 013300 - Submittal Procedures.

B. Submit pursuant to Section 016100 - Basic Product Requirements.

C. Product Data
   1. For each type of door, include grade of door information, core and edge construction, louver information and trim for openings.
   2. Factory finishing specifications.
   3. Fire rated doors showing conformance with NFPA 80.
   4. Certification of acoustical rating and test report for doors requiring a STC Rating.

D. Shop Drawings
   1. Submit shop drawings indicating location and size of each door, elevation of each kind of door, details of construction, location and extent of hardware blocking, fire ratings, STC rating, undercuts, requirements for factory finishing, requirements for veneer matching and other pertinent data.
      a. Include details of electrical raceway and preparation for electrified hardware, access control systems, and security systems if applicable.
   2. For factory pre-machined doors, indicate dimensions and locations of cutouts for locksets and other cutouts adjacent to light and louver openings.

E. Samples

1. Factory finishes applied to actual door veneer materials, approximately 8" x 10". Provide three (3) samples of each available stain.
2. Glazing stops: Two (2) 6" long samples for each available glazing stop if requested by Architect.

F. Warranty
1. Sample Warranty.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is a certified participant in AWI's Quality Certification Program.

B. Provide wood flush doors complying with:
1. ANSI/WDMA: Industry Standard I.S.1-A-13 Series.
2. Duty Level: Heavy Duty.
3. Fire Rated Doors Duty Level: Extra Heavy Duty
4. Match between Veneer Leaves: Book Match.
5. Double doors and sliding doors shall be pair and set matched.
6. Room Match: Provide door faces of compatible color and grain within each separate room or area of building.
7. Fire-Rated Doors: In addition to complying with I.S.1 Series standards, provide flush wood doors identical in materials and construction to units tested in frame and door assemblies pursuant ASTM E 152 and which are labeled and listed for ratings indicated by Underwriters Laboratories, Factory Mutual, or other testing and inspection agency acceptable to authorities having jurisdiction.

C. Obtain doors from a single manufacturer, unless otherwise indicated.
1. Mark each door with stamp indicating conformance with WDMA Wood Flush Door Certification Hallmark.
2. Mark each door manufactured with Type I (exterior) adhesives with permanent Type I glue bond mark.

D. Experienced workers familiar with the work and according to manufacturer’s recommendations and/or industry standards shall perform all work of this section.

1.06 DELIVERY, STORAGE AND HANDLING

A. Package, deliver, store, and handle doors pursuant to WDMA standards and appendix plus manufacturer's published instructions.

B. Store doors flat on a level surface in a dry, well-ventilated building. Do not put doors in direct contact with water and keep them at least four inches off the floor to avoid contact with condensation.

C. Use cross supports under door panels and place protective coverings under the bottom door and over the top. Select a covering material that will protect doors from contact with dirt, water and abuse, while allowing air to circulate under and around the stack.

D. Avoid placing doors in areas with direct sunlight. Certain varieties of wood, such as cherry, mahogany, walnut and teak, are susceptible to discoloration when exposed to sunlight or even some forms of artificial light, particularly when they are not factory-finished.

E. Do not store doors in buildings with uncontrolled temperature or humidity. The optimal climate-controlled condition for storing wood doors are storage facilities that can maintain 25% to 55% relative humidity and temperature of 50 degrees to 90 degrees Fahrenheit.

F. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.07 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until building is enclosed and weather tight, wet work is complete and dry, and HVAC System is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.

1.08 WARRANTY

A. General: Warranties shall be in addition to, and not a limitation of, other rights the Owner may have under the Contract Documents.

B. Door Manufacturer's Warranty: Submit written agreement in door manufacturer's standard form signed by Manufacturer, Installer and Contractor, agreeing to repair or replace defective doors that have warped (bow, cup, or twist) or that show telegraphing of core construction in face veneers, or do not conform to tolerance limitations of referenced quality standards.
   1. Warranty shall include reinstallation that may be repaired due to repair or replacement of defective doors where defect was not apparent prior to hanging.
   2. Warranty shall be in effect during following period of time after date of Substantial Completion.
   3. Solid Core Interior Doors:
      a. Life of installation

C. Contractor's Responsibilities: Replace or refinish doors where Contractor's work contributed to rejection or to voiding of manufacturer's warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering doors which may be incorporated in the Work include, but are not limited to, the following:
   1. Solid Core Doors with Wood Veneer Faces and Fire Rated Flush Wood Doors.
      a. Haley Brothers, Inc., SCL Series
      b. Masonite International Corporation, Aspiro™ Series
      c. Oshkosh Architectural Door Company
      d. VT Industries, Inc., Heritage Collection

2.02 FLUSH WOOD DOORS, GENERAL

A. Fabricate doors pursuant to WDMA Industry Standard I.S.1 Series.

B. WDMA I.S.1A-13 Performance Grade: Heavy Duty

C. Construction: Five plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering. Faces are bonded to core using a hot press.

2.03 INTERIOR DOORS - SOLID CORE - 1 3/4" THICK (UNLESS NOTED OTHERWISE).

A. Face:
   1. Species: birch, rotary cut, natural, select white veneer, Custom Grade .
   2. Factory finished: transparent manufacturer's standard stain color selection by Architect.
      a. Minimum of eight standard stain colors are required.

B. Core Construction:
   1. Core Duty: Heavy Duty, Extra Heavy Duty for STC Fire-rated doors.
   2. Structural Composite Lumber Core (SCLC) Non-Rated and Twenty minute rated doors.
      a. Structural Composite Lumber: Engineered hardwood composite wood products tested in accordance with WDMA I.S.1A, Testing Cellulosic Composite Materials for use in Fenestration Products containing no added urea formaldehyde.
      b. Provide top rail blocking for doors specified to have a closer.
   3. Fire doors shall be constructed with manufacturer's label permanently attached to the hinge side stile indicating the testing agency's approval for the rating classification required.
   4. Mineral-core fire doors shall be constructed with manufacturer's incombustible mineral core of a single or tightly fitted sections. Core may not contain any asbestos. Stiles and rails bonded to core: 45, 60, and 90 minute rated doors.
      a. Provide top rail and lockset rated blocking.

C. Hardware Preparation:

1. Factory machine doors for hardware that is not surface applied. Comply with final, approved hardware schedules, door frame shop drawings, DHI A115-W series standards, and hardware templates.
2. Electrical Raceways: Provide wood doors receiving electrified hardware with concealed pathway for wiring harness with plug connectors on both ends. Coordinate with hardware supplier if wiring harness is to be factory installed in wood door.
3. Blocking: Provide blocking (rated where required) in all doors to allow for secure application of all hardware.

D. Edge Bands:
1. Vertical Edges: Matching same species as faces. Wood or composite material, one piece, laminated, or veneered. Minimum requirements per WDMA Section P-1, Performance Standards for Architectural Wood Flush Doors.
2. Horizontal Edges: Solid wood or structural composite material meeting the minimum requirements per WDMA Section P-1, Performance Standards for Architectural Wood Flush Doors.

E. Doors for fire rated openings:
1. Provide construction and fire resistive composite core containing no asbestos as needed to provide fire ratings indicated.
2. Category A Edge Construction: Provide fire rated door edge construction with intumescent seals concealed by outer stile (Category A) at 45, 60 and 90 minute rated doors. Comply with specified requirements for exposed edges.
3. Category B Edge Construction: Provide 20 minute fire rated doors at Category B, with smoke and fire seals applied to frame for 20 minute openings.
4. Pairs: Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
   a. Provide fire retardant stiles that are listed and labeled for applications indicated without formed steel edges and astragals.
   b. Where required for concealed hardware, provide formed steel edges and astragals with intumescent seals. Finish steel edges and astragals with baked enamel in color as selected by the Architect.

F. Finishes
1. Doors shall receive factory finishing, unless scheduled to be field painted.
2. Factory Finishing: WDMA System TR-6, catalyzed polyurethane, premium grade.
   a. Stain Coat
   b. Sealer: 3 coats
   c. Sanding: Sand
   d. Topcoat: 2 coats

2.04 LOUVERS AND LIGHT FRAMES

A. Metal Louvers: Size, type and profile shown on the Contract Drawings and fabricated from the following:
1. Steel: 20-gage, galvanized and factory primed for paint finish.
   a. Color: To be selected by Architect from the manufacturer's full range of colors.
2. Provide fusible link, self-closing louvers in fire rated doors.

B. Metal Frames for Lite Openings in Fire Rated Doors: Manufacturer's standard frame formed of 18-gage cold-rolled steel, factory-primed, and approved for use in door of fire-rating indicated.

C. Wood Frames for Lite Openings in Non-Rated Doors: Manufacturer's standard wood frame in same species as door faces, factory stained to match face of doors.

PART 3 EXECUTION

3.01 EXAMINATION AND INSTALLATION

A. Inspect openings to verify that frames are plumb and level and comply with tolerance requirements of WDMA Industry Standard I.S.1 Series and Appendix.

1. Bring frames into compliance with WDMA Industry Standard I.S.1 Series and Appendix prior to installation of doors.

B. Hardware: For installation, refer to Division 08 Section “Door Hardware.”

C. Install doors pursuant to door manufacturer's published instructions and WDMA Industry Standard I.S.1 Series and Appendix.
   1. Install fire-rated doors pursuant to requirements of NFPA 80 and WDMA Standards and Instructions.
   2. Seal cut in prefinished doors pursuant to door manufacturer's published instructions.
   3. Putty all nail/staple holes in wood glass trim. Putty shall match wood door color.

D. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.
   1. Clearances: Provide 1/8-inch at heads, jambs, and between pairs of doors. Provide 1/8-inch from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide ¼-inch from bottom of door to top of threshold.
      a. Comply with NFPA 80 for fire-rated doors.
   2. Bevel non-fire-rated doors 1/8-inch in 2-inches at lock and hinge edges.
   3. Bevel fire-rated doors 1/8-inch in 2-inches at lock edge; trim stiles and rails only to extent permitted by labeling agency.

E. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

F. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project Site.

G. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

3.03 CLEANING

A. Clean doors pursuant to door manufacturer's published instructions.

3.04 PROTECTION

A. Protect doors, as recommended by door manufacturer, to ensure that wood doors will be without damage and/or deterioration at time of 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. 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. Mechanical door hardware.

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. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

D. 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.

E. 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. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

H. 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

I. 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 latchbolts, 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).

C. Overhead Door Stops and Holders: ANSI/BHMA A156.8, Grade 1 Certified Products Directory (CPD) listed overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.
   1. Manufacturers:
      a. dormakaba (DO).
      b. Norton Rixson (RF).
      c. Rockwood (RO).

D. Electromagnetic Door Holders: Wall surface mounted devies; 25 lbf nominal holding force; adjustable, swivel contact plate. Edwards 1500 Series.
   1. Manufacturers
      a. Edwards Signaling (ES).
      b. Architect approved equivalent.

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 new or modified 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 DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
   1. Quantities listed are for each pair of doors, or for each single door.
   2. The supplier is responsible for handing and sizing all products.
   3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
   4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

3.09 HARDWARE SCHEDULE

A. Manufacturer Abbreviations
   1. Manufacturer's Abbreviations:
      a. BAS - Best Access Systems.
      b. ES - Edwards Signaling.
      c. IVE - Ives.
      d. McK - McKinney.
      e. NOR - Norton.
      f. PEM - Pemko.
      g. RO - Rockwood.
      h. SA - Sargent.
      i. ZER - Zero Industries, Inc.

B. HARDWARE SET # 01: "EXTERIOR EXIT DOOR"
   1. Template Closer to swing 180 degrees where possible.
   2. For use on Door Number(s): Refer to Door Schedule
   3. Provide for each Single (SGL) door(s).

UNITS	ITEM	DESCRIPTION	FINISH	MFR
3	HINGES - HEAVY WEIGHT	T4A3786 4.5 X 4.5 NRP	US32D	MCK
1	RIM EXIT DEVICE W/ NIGHTLATCH	MD8413xETP, keyed to Owner's Master Key	626	SA

		System		
1	CLOSER	7500 / P7500	689	NOR
1	KICKPLATE	K1050, 10 INCH X 2 INCH LDW	630	RO
1 set	FRAME WEATHER STRIP	2891 APK	ALUM	PEM
1	DOOR SWEEP	3452CNB	ALUM	PEM
1	SILL WEATHERSTRIP	321AN	ALUM	PEM
1	THRESHOLD	1717	ALUM	PEM

4. Exit device shall permit immediate, single-motion egress at all times in accordance with IBC, NFPA 101, and ADA requirements.

C. HARDWARE SET # 02: "CORRIDOR TO CLASSROOMS"
1. Template Closer to swing 180 degrees where possible.
2. For use on Door Number(s): Refer to Door Schedule
3. Provide for each Single (SGL) door (s).

UNITS	ITEM	DESCRIPTION	FINISH	MFR
3	HINGES	TA2314 4.5 X 4.5	US26D	MCK
1	INTEGRATED ACCESS CONTROL SECURITY LOCKSET	Remove existing lockset, re-install on new door, re-connect all security system wiring, prep new door accordingly		
1 set	GASKETING	S442	BR	PEM
1	KICK PLATE	K1050, 10 inch x 2 inch LDW	630	RO
1	DOOR STOP	400 / 441 CU	626	RO

D. HARDWARE SET # 03: "OFFICE ENTRY DOORS"
1. Template Closer to swing 180 degrees where possible.
2. For use on Door Number(s): Refer to Door Schedule. .
3. Provide for each Single (SGL) door (s).

UNITS	ITEM	DESCRIPTION	FINISH	MFR
3	HINGES	TA2314 4.5 X 4.5	US26D	MCK
1	INTEGRATED ACCESS CONTROL LOCKSET	Remove existing lockset, re-install on new door, re-connect all security system wiring, prep new door accordingly		
1 Set	GASKETING	S442	BR	PEM

1	KICK PLATE	K1050, 10 Inch X 2 Inch LDW	630	RO
1	CLOSER	7500 / P7500	689	NOR
1	DOOR STOP	400 /441 CU	626	RO

4. Locks shall permit mechanical operation by key and authorized access by electronic credential. Coordinate credential technology, power requirements, programming, and integration with the Owner's electronic access control system. All cylinders shall be keyed into the Owner's existing master key system.

E. HARDWARE SET # 04: "STORAGE ROOM DOORS"
1. Template Closer to swing 180 degrees where possible.
2. For use on Door Number(s): Refer to Door Schedule
3. Provide for each Single (SGL) door(s).

UNITS	ITEM	DESCRIPTION	FINISH	MFR
3	HINGES	TA2314 4.5 X 4.5	US26D	MCK
1	INTEGRATED ACCESS CONTROL LOCKSET	Remove existing lockset, re-install on new door, re-connect all security system wiring, prep new door accordingly	Re630	SA
1	PERMANENT CORE	DG1 - keyed to Owners Master	630	SA
1 Set	GASKETING	S442	BR	PEM
1	KICK PLATE	K1050, 10 Inch X 2 Inch LDW	630	RO
1	CLOSER	7500 / P7500	689	NOR
1	DOOR STOP	400 /441 CU	626	RO

4. Exterior access shall be by authorized electronic credential or key only. Outside lever shall remain locked at all times. Inside lever shall provide immediate, single-motion free egress in accordance with IBC, NFPA 101, and ADA requirements.

F. HARDWARE SET # 05: "SINGLE-USER RESTROOM"
1. Template Closer to swing 180 degrees where possible.
2. For use on Door Number(s): Refer to Door Schedule.
3. Provide for each Single (SGL) door(s).

UNITS	ITEM	DESCRIPTION	FINISH	MFR
3	HINGES	TA2314 4.5 X 4.5	US26D	MCK
1	INTEGRATED ACCESS CONTROL PRIVACY MORTISE LOCKSET	8200 x F05 x P, Integrated Credential Reader, Privacy Function with Interior Thumbturn, Emergency Key Override from Corridor Side, Scheduled Unlock/Lock Through Access Control System, Keyed to Owner's Master Key System	630	SA

1	PERMANENT CORE	DG1 - keyed to Owners Master	630	SA
1 Set	GASKETING	S442	BR	PEM
1	KICK PLATE	K1050, 10 Inch X 2 Inch LDW	630	RO
1	CLOSER	7500 / P7500	689	NOR
1	DOOR STOP	400 /441 CU	626	RO

4. Lock shall be integrated with the building access control system to provide scheduled unlocking during normal school hours and scheduled locking after hours. Authorized personnel shall be able to gain access by electronic credential or key. Occupants shall be able to engage the interior privacy thumbturn when the room is occupied. The privacy function shall be capable of emergency override by authorized personnel using a key from the corridor side. The inside lever shall provide immediate, single-motion free egress at all times.

G. HARDWARE SET # 06: "MULTI-USER RESTROOM"
1. Template Closer to swing 180 degrees where possible.
2. For use on Door Number(s): Refer to Door Schedule
3. Provide for each Single (SGL) door(s).

UNITS	ITEM	DESCRIPTION	FINISH	MFR
3	HINGES	TA2314 4.5 X 4.5	US26D	MCK
1	INTEGRATED ACCESS CONTROL MORTISE LOCKSET	Remove existing lockset, re-install on new door, re-connect all security system wiring, prep new door accordingly		
1 Set	GASKETING	S442	BR	PEM
1	KICK PLATE	K1050, 10 Inch X 2 Inch LDW	630	RO
1	CLOSER	7500 / P7500	689	NOR
1	DOOR STOP	400 /441 CU	626	RO

4. Lock shall be integrated with the building access control system to provide scheduled unlocking during normal school hours and scheduled locking after hours. Authorized personnel shall be able to gain access by electronic credential or key. The inside lever shall provide immediate, single-motion free egress at all times.

H. HARDWARE SET # 07: "INTERIOR STAIR DOORS (NON-LATCHING)"
1. Template Closer to swing 180 degrees where possible.
2. For use on Door Number(s): Refer to Door Schedule.
3. Provide for each Single (SGL) door(s).

UNITS	ITEM	DESCRIPTION	FINISH	MFR
3	HINGES - HEAVY WEIGHT	T4A3786 4.5 X 4.5	US26D	MCK
1	PASSAGE SET	Grade 1 Mortise	630	SA
1	ELECTROMAGNETIC HOLD-OPEN	Wall-Mounted Hold-Open, Fire Alarm Released	689	ES

1	KICK PLATE	K1050, 10 Inch X 2 Inch LDW	630	RO
1	CLOSER	7500 / P7500 Heavy-Duty Surface Closer - 180 Degree	689	NOR
1	DOOR STOP	400 /441 CU	626	RO
1 Set	GASKETING	S442	BR	PEM

4. Provide SARGENT Grade 1 mortise lock with positive latching. Door shall be self-closing. Provide wall-mounted electromagnetic hold-open connected to the building fire alarm system. Hold-open shall automatically release upon activation of the fire alarm or loss of power, allowing the door to close. Modify frame for strike plate.

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

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 - SUBSTITUTION REQUEST PROCEDURES.

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 Agreement, including General and Supplementary Conditions, and Division 01 of the Specifications, apply to work of this Section.

B. Section 099100 - Painting.

1.02 SCOPE

A. Furnish labor, materials and equipment necessary to refinish existing wood flooring where indicated on the Contract Drawings.

1.03 STANDARDS

A. All work of this section shall conform to industry standards and manufacturer's recommendations.

B. National Wood Flooring Association (NWFA)

1.04 SUBMITTALS

A. Submit pursuant to Section 013300 - Submittal Procedures.

B. Submit pursuant to Section 016100 - Basic Product Requirements.

1.05 QUALITY ASSURANCE

A. All work of this section shall be performed by experienced workmen 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 WOOD FLOORING

A. Match existing wood flooring in kind, matching as close as possible.

2.02 STAIN & POLYURETHANE

A. Sherwin Williams or Architect approved equivalent.
   1. Primer: Follow manufacturer's instructions for wood grain filler and/or wood conditioner.
   2. First Coat: Minwax® Wood Finish™ 250 VOC Compliant Stain (multiple coats if necessary to achieve desired color). Color to match existing wood flooring.
   3. Three (3) coats Minwax® Performance Series Fast-Drying Polyurethane @ 4.0 mils wet, 1.2 - 1.5 dry per coat.

PART 3 EXECUTION

3.01 INSPECTION

A. Inspect existing wood floors for any nails, carpet staples or tacks. Reset any nails and remove any staples and/or tacks.

B. Replace any wood flooring that is:
   1. Missing.
   2. Has holes from previous piping and conduit penetrations.
   3. Is deteriorated.
   4. Is stained beyond sanding repair.

3.02 CLEAN AND PREPARATION

A. Vacuum thoroughly.

B. Clean old adhesives, cosmetics, and skin oils from the surface of the old finish using a tack rag soaked in cleaner solution.

C. Fill nail holes, cracks, or other surface defects by using putty. Where stained or clear finihses will be applied, use putty that is colored to match natural color of the unfinished wood.

3.03 SAND

A. Contractor must provide proper dust control measures and equipment during sanding procedures to minimize the possibility of dust particles in the air. All affected areas must be restored to their original furnished/cleanliness state.

B. Floors are to be sanded to a smooth undulation free bare wood surface removing all existing paint, adhesive, and or finish.

C. Vacuum thoroughly.

D. Tack with untreated dust mop or slightly water dampened cloth or towel.

3.04 STAIN & POLYURETHANE

A. Apply in accordance with manufacturer’s instructions. Allow proper drying times between coats.

B. Allow finish to fully cure prior to foot traffic. No lift or rolling scaffolds allowed on re-finished wood floors.

END OF SECTION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Interior gypsum board.
   2. Fire resistive Type X Gypsum Board.
   3. Glass-Mat Interior Gypsum Board.
   4. Cementitious Tile Backer Board.
   5. Trim and Accessories.
   6. Joint treatment, tapes, compounds and finishing.
   7. Miscellaneous metal framing, furring, and fasteners.
   8. All related items necessary to complete the work of this section.

1.03 SUBMITTALS

A. Product Data: For each type of product.

1.04 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.05 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
   1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

2.02 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.03 INTERIOR GYPSUM BOARD

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. National Gypsum Company.
   2. USG Corporation.
   3. Architect approved equivalent.

B. Gypsum Wallboard: ASTM C1396/C1396M.
   1. Thickness: 5/8 inch (15.9 mm) and 1/2 inch (12.7 mm).

2. Long Edges: Tapered and featured (rounded or beveled) for Pre-filling.

C. Gypsum Board, Type X: ASTM C1396/C1396M.
1. Thickness: 5/8 inch (15.9 mm) and 1 inch (25.4 mm).

2.04 SPECIALTY GYPSUM BOARD

A. Glass-Mat Interior Gypsum Board: ASTM C 1658/C 1658M with fiberglass mat laminated to both sides. Specifically designed for interior use.
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. Georgia-Pacific Gypsum LLC; DensArmour Plus.
b. Approved equal
2. Core: 5/8 inch (15.9 mm), regular type; Long Edges: Tapered.
3. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D 3274.
a. CertainTeed Corp.; GlasRoc Sheathing.

2.05 TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A118.9 and ASTM C1288 or ASTM C1325, with manufacturer's standard edges.
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. USG Corporation; DUROCK Cement Board.
b. Architect approved equivalent.
2. Thickness: 1/2 inch
3. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D 3274.
4. Tape: 2 inch wide, coated glass fiber tape for joints and corners;

2.06 TRIM ACCESSORIES

A. Interior Trim: ASTM C1047.
1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
2. Shapes:
a. Cornerbead.
b. L-Bead: L-shaped; exposed long flange receives joint compound.
c. Expansion (control) joint.

B. PVC Rip Bead L-Trim (VLZL) with tear-away strip to be removed after drywall finishing and painting to form a crisp, clean edge. 0.028 PVC material with 5/8 inch Tear away flange, 10 foot lengths with perforated flanges. Manufacturer: ClarkDietrich or approved equal.

C. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
a. Fry Reglet Corp.
b. Gordon, Inc.
c. Pittcon Industries.
2. Trim: 1/16 inch thick extruded aluminum 6063-T5 mill finish manufactured by Gordon Inc., (unless noted otherwise), Fry Reglet or Architect approved equivalent:
a. J-Trim: Model JD-58 (5/8 inch gypsum board).
b. Drywall Reveal Trim: Model DRM-625-625 (5/8 inch deep by 5/8 inch wide) with DRM-SNAP-IN-50 (fits 625 profiles)
c. Wallcovering Outside Corner: WCTOSC
d. Wallcovering Base / Termination: WCTBT125-217
e. 3-Step Outside Corner: Model 902-3X-625 (5/8 inch gypsum - 5/8 inch gypsum).
f. Drywall Control Joints: Model DRM-50-25 2-PC unless indicated otherwise on the drawings.
3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified or finish as specified on the drawings.

2.07 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C475/C475M.

B. Joint Tape:
   1. Interior Gypsum Board: Paper.
   2. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
   3. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
   1. Pre-filling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
   2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
      a. Use setting-type compound for installing paper-faced metal trim accessories.
   3. Fill Coat: For second coat, use setting-type, sandable topping compound.
   4. Finish Coat: For third coat, use setting-type, sandable topping compound.

2.08 MATERIALS

A. Metal Framing: Protective coating of framing shall conform to ASTM A653/A653M - G40 minimum, or shall be a protective coating with equal or better corrosion resistance.
   1. Runners: In compliance with ASTM C645, provide 1-1/2” galvanized steel runners to match applicable assembly specified, to match wall framing members, unless indicated otherwise.
   2. Furring members: In compliance with ASTM C645, provide galvanized cold rolled steel, 0.0296" minimum thickness of base metal or 20 gage min., screw type hat shaped channels; 7/8" depth, width approx. 2¾”, hemmed edges. Where furring channels are used in conjunction with resilient clips, width of channel shall be coordinated with clip configuration to ensure proper fit.
   3. Vertical Supports: 1” x 1/8” steel flat bars installed a maximum 4’-0” on center, slotted for 3/8” diameter bolts at each end. 3” x 3” x 3/16” steel angle, slotted to receive 3/8” diameter bolt and faster to truss above with a safe working load of 300 pounds minimum.
   4. Fasteners for Metal Framing: Provide fasteners of type, size, style, grade, holding power, class, and other properties required for secure installation of framing and furring. Galvanize all fasteners and accessories. All devices, other than bolts, used to interconnect ceiling members are required to be certified and listed by an Approved Agency.

B. Fasteners: Fasteners for securing board to metal furring or wood shall be Phillips Head, black oxidized screws made for fastening gypsum wall board, size and length as recommended by the drywall manufacturer for the applications shown.

2.09 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Steel Drill Screws: ASTM C1002, unless otherwise indicated.
   1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
   2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
   1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.
   2. Fit gypsum panels around ducts, pipes, and conduits.
   3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch (6.4- to 9.5-mm-) wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4 to 1/2-inch (6.4 to 12.7-mm) wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.

J. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

K. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.03 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:
   1. Type X: As indicated on Drawings.
   2. Ceiling Type: As indicated on Drawings.

B. Single-Layer Application:
   1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
   2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
      a. Stagger abutting end joints not less than one framing member in alternate courses of panels.

b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.

3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches (400 mm) minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

3.04 CONSTRUCTION TOLERANCES

A. Do not exceed 1/8" in 8'-0" variation from plumb or level in any exposed line or surface, except at joints between units do not exceed 1/16" variation between planes of abutting edges or ends. Shim as required to comply with specified tolerances. Variations shall not be visible in finished surfaces.

B. For soffits and ceilings verify that direct suspension system has been installed properly, that main runners are spaced evenly and have been leveled to a tolerance of 1/8" in 12 feet measured both lengthwise on each runner and transversely between parallel runners so that furring member installation may proceed accurately.

C. Cementitious Backer Units: ANSI A108.11, at showers and locations indicated to receive tile.

3.05 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints according to ASTM C840 and in specific locations approved by Architect for visual effect.

C. Interior Trim: Install in the following locations:

1. Exposed Edges: Where an exposed edge of gypsum drywall abuts dissimilar materials use Gold Bond #C250 casing bead or equal. Casing beads to be finished with joint compound. Same casing bead and joint treatment is to be used on exposed wallboard edges.

D. Neatly cut all openings so that they may be covered by plates and escutcheons.

E. Place control joints consistent with lines of building spaces as directed.

1. Gypsum Panel surfaces should be isolated with control joints or other means where:
   a. Partition, furring or column fireproofing abuts a structural element (except floor) or dissimilar wall or ceiling;
   b. Ceiling abuts a structural element, dissimilar wall or partition or other vertical penetration; construction changes or ceiling;
   c. Construction changes within the plane of the partition or ceiling;
   d. Partition or furring run exceeds 30 feet;
   e. Ceiling dimensions exceed 50 feet in either direction;
   f. The area within separate ceiling sections exceeds 2,500 sq. ft.;
   g. Wings of "L", "U", and "T" shaped ceiling areas are joined;
2. Penetrations of the gypsum panel diaphragm, such as door frames, borrowed-light openings, vents, grilles, access panels and light troffers, require additional reinforcement at the corners to distribute concentrated stresses if a control joint is not used.
3. Place edge trim where gypsum board abuts dissimilar materials. Use longest practical length.

4. Provide additional framing and blocking as required to support gypsum board at openings and cutouts, and to support built-in anchorage and attachment devices for other work.
5. Coordinate installation of joint sealers specified in Section 079200 at penetrations and where abutting different materials.
6. Cornerbead: Use at outside corners unless otherwise indicated.
7. LC-Bead: Use where indicated.
8. L-Bead: Use where indicated.

3.06 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Pre-fill open joints, rounded or beveled edges, and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C840:
   1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
   2. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated. All joints and interior angles shall have tape embedded in joint compound and two separate coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. All joint compound shall be smooth and free of tool marks and ridges. Prepared surface shall be coated with a drywall primer/sealer prior to the application of finish paint.
      a. Primer and its application to surfaces are specified in Section 099113 - Exterior Painting and 099123 - Interior Painting.
   3. Level 5: Where indicated on Drawings.
      a. Primer and its application to surfaces are specified in Section 099113 - Exterior Painting and 099123 - Interior Painting.

E. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.

F. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.07 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
   1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

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 applicatin 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, Micro chips 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, Micro chips 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. Section includes surface preparation and the application of paint systems on the following exterior substrates:
   1. Galvanized metal.
   2. Steel.

1.03 DEFINITIONS

A. Gloss Level 1: Not more than 5 units at 60 degrees and not more than 10 units at 85 degrees, according to ASTM D523.

B. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.

C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.

D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D523.

E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D523.

F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D523.

G. 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.

C. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
   1. Submit Samples on rigid backing, 8 inches square.
   2. Step coats on Samples to show each coat required for system.
   3. Label each coat of each Sample.
   4. Label each Sample for location and application area.

D. Product List: For each product indicated, include the following:
   1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
   2. Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
   3. VOC content.

1.05 CLOSEOUT SUBMITTALS

A. 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.

1.06 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.

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.
      b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
      c. 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 manufacture’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 in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Sherwin Williams
   2. Benjamin Moore & Co.
   3. PPG Architectural Finishes, Inc.

B. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in other Part 2 articles for the paint category indicated.

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: Provide materials that comply with VOC limits of authorities having jurisdiction.

D. Colors: As selected by Architect from manufacturer's full range.

2.03 SOURCE QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
   1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
   2. Testing agency will perform tests for compliance with product requirements.
   3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

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. Portland Cement Plaster: 12 percent.
      e. Gypsum Board: 12 percent.
   2. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
   3. Proceed with coating application only after unsatisfactory conditions have been corrected.
      a. 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 and paint systems 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.

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.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

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 3, "Power Tool Cleaning."
   2. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
   3. 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 Substrates: Remove grease and oil residue from galvanized sheet metal 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. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.
   2. Sand surfaces that will be exposed to view, and dust off.
   3. Stain 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. Plastic Trim Fabrication Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.03 APPLICATION

A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."
   1. Use applicators and techniques suited for paint and substrate indicated.
   2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
   3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
   4. Paint entire exposed surface of window frames and sashes.
   5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
   6. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. 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. Paint the following work where exposed to view:
      a. Equipment, including panelboards and switch gear.
      b. Uninsulated metal piping.
      c. Uninsulated plastic piping.
      d. Pipe hangers and supports.
      e. Metal conduit.
      f. Plastic conduit.
      g. Tanks that do not have factory-applied final finishes.

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 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.06 EXTERIOR PAINTING SCHEDULE

A. Steel Substrates:
   1. Pigmented Polyurethane System: (MPI EXT 5.1H)
      a. Prime Coat: Alkyd anti-corrosive, quick dry for metal, MPI #79: Sherwin-Williams Kern Kromik Universal Primer, B62WZ111 Series, at 3.0 to 4.0 mils dry, per coat..
      b. Intermediate Coat: Polyurethane, two component, pigmented, semi-gloss, Gloss Level 5, MPI #72: Sherwin-Williams Acrolon 218 HS Acrylic Polyurethane, B65-650 Series, at 3.0 to 6.0 mils dry , per coat.
      c. Topcoat: Polyurethane, two-component, pigmented, gloss (Gloss Level 6), MPI #72: Sherwin Williams Acrolon 218 HS Acrylic Polyurethane, B65-600 Series, at 3.0 to 6.0 mils dry, per coat.

B. Galvanized-Metal Substrates:
   1. Water-Based Light Industrial Coating System:
      a. Prime Coat: Primer, water-based, anti-corrosive for metal, MPI #107: S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, 5.0 to 10.0 mils wet, 2.0 to 4.0 mils dry.
      b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
      c. Topcoat as selected by the Architect from the following:

1) Topcoat: Light industrial coating, exterior, water based, semi-gloss, (Gloss Level 5), MPI #163: S-W Pro Industrial Acrylic Semi-Gloss Coating, B66-650 Series, at 2.5 to 4.0 mils dry, per coat.

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 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

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

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 5402 - Surface 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. Napkin / Tampon Vendor:
   1. Basis-of-Design Product: Bradley Model 407-11 - Surface Mounted
   2. Type: Sanitary napkin and tampon dispenser.
   3. Mounting height: as indicated on the drawings or as required to meet ADA requirements.
   4. Operation: No Coin (Free) Operation

F. Sanitary-Napkin Disposal Units :
   1. Basis-of-Design Product: Bradley Model 4722-15 - Surface Mounted

G. Mirror Units:
   1. Basis-of-Design Product: Bradley Model 781-1830

H. 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. Cabinet Shelving.
   3. Countertop Support Brackets.
   4. Standards and Brackets.
   5. Shelving.
   6. Window Sills.
   7. Horizontal In-fills behind Base Cabinets.
   8. Wall and Base Cabinets.
   9. Closet Rod with Shelf.
   10. Cabinet Door and Drawer Locking Devices.

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 088000 - Glazing for cabinet door glass.
   4. Section 092116 - Gypsum Board Assemblies.
   5. Section 096513 - Resilient Base and Accessories for application of rubber base to casework.
   6. Section 123653 - Laboratory Work Surfaces.
   7. Section 123661 - Quartz Surfacing Countertops.
   8. 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.
   9. 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.

B. Closet Rod with Shelf
1. U-Line Model H-2515 wall mounted coat rack.
2. Provide multiple units of various lengths to fill entire wall.
3. Finish: Satin aluminum.

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), and Window Sills, Horizontal Fillers Behind Base Cabinets

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.
5. Where horizontal plastic laminate covered fillers are required behind casework, provide 1-1/2" x 1-1/2" x 1/4" aluminum angle along rear of backsplash and along wall for filler support.

F. Casework Ventilation
1. Manufacturers:
   a. REGGIO Registers, Jytek Rd., Leominster, MA 01453. Phone: (800) 880-3090.
   b. Architect Approved Equivalent.
2. Styles:
   a. Royal Toe Kick Vent Cover
      1) Thickness: 3/16".
      2) Material: Steel.
      3) Edge: Beveled.
      4) Size: Outside 3.5" x 12", 14", 16", 20" or 26", depending on cabinet dimensions.
   b. Surface Grilles:
      1) Thickens: 1/8".
      2) Material: Aluminum.
      3) Edge: Straight with mounting holes.
      4) Size: Outside 3.5" or 5.5" x available length to suit field conditions.

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. Cabinet Door and Drawer Locks:
1. Provide electronic cabinet door and/or cabinet drawer locks where called for on the Contract Drawings.
2. Electronic cabinet lock:
   a. KITLOCK Codelocks KL1006 Standard Electronic Cabinet Lock or Architect approved equivalent.
   b. 10 button keypad.
   c. Battery powered.

d. Provide emergency opening capabilities.
e. Provide left, right, vertical versions as required.

I. 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 WINDOW SILL AND WINDOW SURROUND INSTALLATION

A. Fabricate components in shop to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and manufacturers requirements.

B. Install window sills and window surrounds, if any, plumb, level, true and straight with no distortions. Shim as required using concealed shims. Where sills and/or surrounds abut other finished work, scribe and cut for accurate fit. Provide filler strips, scribe strips and molding as indicated or required, and in finish to match.

C. Anchor sills and surrounds securely in place with concealed fasteners, anchored into structural support members of wall construction.

3.06 CLOSET ROD AND SHELF INSTALLATION

A. Provide solid blocking in wall at all attachment points of wall mounted coat rack with shelf.

B. Contractor's Option: In lieu of solid wood blocking concealed in wall, provide two (2) layers of 3/4" plywood, 10" high x full width of room, finished with plastic laminate on all exposed surfaces.

Secure to wall studs with two (2) decorative fasteners at each stud. Attach coat rack to plastic laminate ledger.

3.07 CLEANING AND PROTECTION

A. Repair or remove and replace defective work as directed upon completion of installation.

B. Clean exposed and semi-exposed surfaces, touch-up as required. Use only cleaning products approved by the manufacturer of the surfaces being cleaned.

C. Remove and refinish damaged or soiled areas.

D. Make final adjustments to doors and drawers. Doors shall swing freely, catches shall hold securely, and all doors shall be aligned both vertically and horizontally. Drawers shall open and close smoothly, without binding and without excessive side play.

E. Protection: Provide 10-mil plastic or other suitable water-resistant covering over countertop and work surfaces. Tape to underside or countertop/work surface to securely hold protection material in place. Remove protection material and all tape at Substantial Completion.

END OF SECTION

PART 1 GENERAL

1.01 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. Section Includes the following:
   1. Epoxy resin worksurfaces, sinks, accessories, and backsplashes.
   2. Setting materials.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. Division 01: Administrative, procedural, and temporary work requirements.
   2. Section 061000 - Rough Carpentry
   3. Section 079200 - Joint Sealers
   4. Section 123216 - Plastic Laminate Countertops, Shelving and Casework
   5. Section 224000 - Plumbing Fixtures

1.03 REFERENCES

A. ASTM D570 - Standard Test Method for Water Absorption of Plastics; 1998 (Reapproved 2018).

B. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 2022.

C. ASTM D648 - Standard Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position; 2018.

D. ASTM D695 - Standard Test Method for Compressive Properties of Rigid Plastics; 2015.

E. ASTM D696 - Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30°C and +30°C with a Vitreous Silica Dilatometer; 2024.

F. ASTM D785 - Standard Test Method for Rockwell Hardness of Plastics and Electrical Insulating Materials; 2023.

G. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials; 2017.

H. ASTM D792 - Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement; 2020.

I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2026a.

J. ISO 9001 - Quality Management Systems — Requirements; 2015.

K. NSF 51 - Food Equipment Materials; 2023.

L. SCS (CPD) - SCS Certified Products; Current Edition.

M. SEFA 3 - Laboratory Work Surfaces; 2020.

N. GREENGUARD Environmental Institute (GREENGUARD):
   1. Indoor Air Quality Certification Program.
   2. Children and Schools Certification Program.

O. International Organization for Standardization ISO 9001 - Quality Management Systems - Requirements.

P. NSF International / American National Standards Institute NSF 51 - Food Equipment Materials.

Q. Scientific Certification Systems SCS (CPD)- Recycled Content Certifications.
   1. Scientific Equipment and Furniture Association SEFA 3 - Work Surfaces.

1.04 SUBMITTALS

A. Pursuant to Section 013300 - Submittal Procedures.

B. Pursuant to Section 016100 - Basic Product Requirements.

C. Shop Drawings:
   1. Submit plan, section, elevation and perspective drawings necessary to describe and convey layout, profiles, and product components, including edge conditions, joints, fitting and fixture locations, anchorage, accessories, and finish colors.
   2. Verify actual measurements/openings by field measurements before fabrication, if possible; show recorded measurements on Shop Drawings.
   3. Show sink locations and sizes.
   4. Provide required holes in countertops for faucets and gas valves proved by Plumbing Contractor (PC). Coordinate with PC for exact locations and hole sizes.
   5. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

D. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Product Data: Manufacturer's data sheets on each product to be used, including:
      a. Preparation instructions and recommendations.
      b. Storage and handling requirements and recommendations.
      c. Installation methods.

E. Samples:
   1. Selection samples: For each finish product specified, submit complete set of color chips representing manufacturer's full range of standard colors.
   2. Verification samples: For each finish product specified, submit samples representing actual product color; supplied product color and gloss may vary slightly from supplied samples.

F. Quality Control Submittals:
   1. Test Reports: Certified test reports or recognized evaluation reports showing compliance with specified performance characteristics and physical properties.

G. Closeout Submittals:
   1. Maintenance Data:
      a. Provide maintenance, cleaning, and life cycle information.
      b. Include recommended cleaning materials and procedures and list of materials detrimental to epoxy resin.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. Primary products furnished by single manufacturer with minimum [10] [ ] years [documented] experience in work of this Section.
   2. Products manufactured in ISO 9001 certified facility.

B. Installer Qualifications: Minimum three (3) years documented experience in work of this Section.

C. Mockup:
   1. Construct worksurface mockup, six (6) feet wide x full depth.
   2. Include worksurface, and trim.
   3. Locate as directed by the Owner's Construction Representative.
   4. Approved mockup may remain as part of the Work.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Delivery:
   1. Use pallets larger than sheets during transportation.
   2. Package materials to prevent damage during shipping and handling.

B. Storage:
   1. Store products in enclosed area protected from ultraviolet.
   2. Store products in manufacturer's unopened packaging until ready for installation.
   3. Store panels using protective dividers to avoid damage to surfaces.

4. For horizontal storage, store sheets on pallets of equal or greater size than sheets with protective layer between pallet and sheet and on top of uppermost sheet.
5. Do not store sheets or fabricated panels vertically.

C. Handling:
1. If protective film is provided, do not remove until panel has been installed.
2. Handle sheets to prevent damage.
3. Remove stickers immediately after installation.

1.07 PROJECT CONDITIONS

A. Do not install products under environmental conditions outside manufacturer's limits.

B. Avoid direct exposure of products to sunlight.

C. Do not use worksurfaces such as bench, ladder, or seating.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Contract Documents are based on products by Durcon, Incorporated, 206 Allison Drive, Taylor, TX 76574, 512-595-8000, www.durcon.com.

B. Architect approved equivalent.

C. Substitutions: See Section 016100 - Product Requirements and Section 012500 - Substitution Procedures.

2.02 MATERIALS

A. Solid Epoxy Resin:
1. Sheets cast from modified epoxy resin and non-asbestos inert fillers; compounded mixture cured and thermoset specifically from formulation to provide exceptional physical and chemical resistance required in medium to heavy duty laboratory environments.
2. Sheets cast from modified epoxy resin and non-asbestos inert fillers with 10 percent of filler certified as post-consumer glass by SCS; compounded mixture cured and thermoset specifically from formulation to provide exceptional physical and chemical resistance required in medium to heavy duty laboratory environments.
3. Sheets monolithic throughout without surface coating application.
4. Certified to NSF 51.
5. Certified by GREENGUARD under Indoor Air Quality and Children and Schools Certification Programs.
6. Physical properties; minimum acceptable physical performance in accordance with SEFA 3 testing procedures:
   a. Density/specific gravity: Tested to ASTM D792; minimum test rating of 133.6 lb/ft3 or 2.14 g/cm3.
   b. Rockwell hardness: Tested to ASTM D785; minimum M scale rating of 109.
   c. Fire resistance: tested to ASTM D635; classified as self-extinguishing.
   d. Surface burning characteristics: Tested to ASTM E84; flame spread index 5 and smoke developed index of 185.
   e. Coefficient of linear thermal expansion: Tested to ASTM D696; rating of 1.2 x 10-5 in/in degrees F or 2.15 x 10-5 mm/mm degrees C.
   f. Heat deflection: Tested to ASTM D648; maximum 293 degrees F or 145 degrees C .
   g. Flexural strength: Tested to ASTM D790; minimum rating 12.6 KPSI or 87 Mpa.
   h. Flexural modulus: Tested to ASTM D790; 3240 KPSI or 22.4 mm degrees C.
   i. Water absorption, 24 hours: tested to ASTM D570; maximum 0.03% by weight.
   j. Compression strength: Tested to ASTM D695; minimum 32.7 kpsi or 226 Mpa.
   k. Chemical resistance; minimum acceptable chemical resistance performance in accordance with SEFA 3:

Testing Method Descriptions:

Method A - Volatile chemicals (organic solvents): Cotton ball saturated with test reagent is placed in one-ounce bottle (20 x 75mm test tube or similar container) with reservoir of liquid above ball. Container is inverted on test material for period of 24 hours at standard temperature 23 degrees C plus or minus 2 degrees C (73 degrees F plus or minus 4 degrees F).

Method B - Non Volatile Chemicals: Five drops (1/4 cc) of test reagent are placed on test material surface. Reagent is then covered with watch glass (25 mm) for period of no less than 24 hours at standard temperature of 23 degrees C plus or minus 2 degrees C (73 degrees F plus or minus 4 degrees F).

Result Definitions:

0 - No Effect: No detectible change in material surface.

1 - Good: Slight detectable change in color or gloss but no change to function or life of work surface material. 2 - Fair: Slight surface etching or severe staining. Clearly discernible change in color or gloss but no significant impairment of surface life or function.

2 - Fair: Slight surface etching or severe staining. Clearly discernible change in color or gloss but no significant impairment of surface life or function.

3 - Poor: Pitting, cratering or erosion of work surface material; obvious and significant deterioration. Objectionable change in appearance due to surface discoloration.

B. Color: as selected by the Architect from the manufacturer's full color offering.

2.03 ACCESSORIES

A. Provide solid epoxy resin laboratory countertops, backsplashes, integral sinks, and fume hood base work surfaces where indicated.

B. Installation Materials: Manufacturer's joint adhesive, panel adhesive, and sealants as required to suit project conditions.

C. Provide aluminum ledger angles where required for countertop suport.
   1. 2" x 2" x 1/4" aluminum angle unless noted otherwise.

2.04 FABRICATION

A. Fabricated tops and accessories in accordance with manufacturer's recommendations, approved Shop Drawings, and SEFA 3.

B. Epoxy Resin Worksurfaces:
   1. Thickness: 1-1/4 inches (32 mm) unless indicated otherwise.
      a. Check each approved shop drawing sheet at factory for required thickness.
      b. Maximum variation in thickness: plus, or minus 1/16 inch (1.6 mm) from corner to corner.
   2. Warpage:
      a. Inspect tops for warpage prior to fabrication by placing on true flat surface.
      b. Maximum allowable warpage: 1/16 inch (1.5 mm) in 36 inch (900 mm) span or 3/16 inch (4.5 mm) in 96 inch (2400 mm) span.
   3. Fabrication:
      a. Shop fabricate in longest practical lengths.
      b. Bond joints with highly chemical resistant cement with properties and color similar to base material.
      c. Provide 1/8 inch (3 mm) drip groove at underside of exposed edges, set back 1/2 inch (13 mm) from face.
      d. Finish exposed edges.
   4. Fabricate tops as indicated on the drawings at epoxy sink locations.
   5. Edge treatment: Marine Edge.
   6. Corner treatment: exposed corners shall be eased slightly for safety.
   7. Back and end splashes:
      a. Supplied loose for field installation.
      b. Same material and color as worksurfaces.

c. Thickness: 3/4".
d. Height: as indicated on the drawings.
e. Top-mounted end splash where worksurfaces abut adjacent construction at and locations indicated on Drawings.

8. Joints: As indicated on drawings or as recommended by manufacturer and fabricator.
9. Make joints between two benches level.
10. Locate joints away from sinks and over or near supports.
11. Sink cutouts: Dictated by sink sizes indicated below.
12. Allowable tolerances:
    a. Square: Plus, or minus 1/64 inch (0.4 mm) for each 12 inches (300 mm) of length.
    b. Location of cutouts and drilled openings: Plus, or minus 1/8 inch (3 mm) of design dimension.
    c. Size of cutouts and drilled openings: Plus 1/8 inch (3 mm) or minus 0 inches (0 mm).

C. Epoxy Resin Sinks:
1. Mold sinks from thermosetting epoxy resin.
2. Mold interior corners to radius. Slope sink base to drain outlet.
3. Provide 1-1/2 inch (38 mm) outlet with open ended standpipe; standpipe overflow 2 inches (50 mm) shorter than depth of sink.
4. Unless otherwise indicated, fabricate sinks of drop-in design supported by upper flange from worksurface.
5. Sink Sizes:
    a. ADA Sinks; 25" x 15" x 5" (Model A55).
    b. STD Sinks: 25" x 15" x 10" (Model D55).
6. Drain fittings, drain piping, drain line piping insulation (if required), faucets, and hot water/cold water supplies are provided by PC.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until cabinets have been installed.

B. Confirm that surfaces to receive tops are plumb and level, with maximum deflection of 1/4 inch (6 mm) in 20 feet (6 m).

3.02 PREPARATION

A. Clean surfaces just prior to installation.

B. Prepare surfaces using methods recommended by manufacturer.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved Shop Drawings.
1. Install tops plumb and level.

B. Scribe to adjacent surfaces in accordance with manufacturer's recommendations.

C. Fasten tops to supporting construction with adhesives appropriate for use with adjoining construction and as recommended by manufacturer.

D. Form field joints using manufacturer's recommended adhesive. Form joints to be inconspicuous and nonporous.

E. Install countertops, back splashes, and laboratory fume hood base work surface using fasteners and adhesive appropriate for use with adjoining construction and as recommended by manufacturer.

3.04 PROTECTION

A. Protect installed products until completion of Project.

B. Touch up, repair, or replace damaged products.

END OF SECTION

PART 1 GENERAL

1.01 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. Kitchen countertops, backsplashes and side splashes.
   3. Casework countertops unless noted otherwise.
   4. Work surface countertops unless noted otherwise.
   5. Other countertops as shown on Contract Drawings.
   6. 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. Sustainable Design Reporting:
   1. Provide documentation from manufacturer of the amounts of pre-consumer and/or post-consumer recycled content for products.
   2. Provide documentation from manufacturer showing manufacturing locations for products manufactured and sourced within 500 miles of project site.

D. 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

E. Product Data:
   1. Submit the following:
      a. Product specification sheet(s).
      b. Manufacturer's written installation instructions.
      c. Manufacturer's warranty.

F. 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.

G. 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.

H. 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

B. Pipe hangers and supports

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

2.01 PIPE HANGERS AND SUPPORTS

A. Combination clevis hanger, pipe insulation shield and vapor barrier jacketed high density insulating saddle with companion high density filler piece.
   1. Insulating saddles and filler pieces shall be of the same thickness and materials as the adjoining pipe insulation. Saddles shall cover the lower 180 degrees of the pipe or tubing, and companion filler pieces shall cover the upper 180 degrees of the pipe or tubing. Physical sizes, gages, etc. of the components of insulated hangers shall be in accordance with the following schedule:

PIPE OR TUBING SIZE (Inches)	SHIELD LENGTH (Inches)	SHIELD GAGE	SADDLE LENGTH (Inches)	VAPOR BARRIER JACKET LENGTH (Inches)
Up to 2-1/2	4	16	6	10
3 to 6	4	14	6	10
8 to 14	10	12	12	16
16 and up	10	10	12	16

B. Pipe Insulation Shields: Fabricated of steel, with a minimum arc of 180 degrees, unless otherwise indicated. Shields for use with hangers and supports, with the exception of combination clevis type hangers, shall be in accordance with the following schedule:

PIPE OR TUBING SIZE (Inches)	SHIELD LENGTH (Inches)	SHIELD GAGE
Up to 2-1/2	8	18
3 to 8	10	16

10 to 14	12	12
16 and up	18	10

C. Pipe Covering Protection Saddles: 3/16 inch thick steel, of sufficient depth for the insulation thickness specified, notched so that saddle contact with the pipe is approximately 50 percent of the total axial cross section. Saddles for pipe 12 inches in size and larger shall have a center support.

D. Pipe Hangers: Height adjustable standard duty clevis type, with cross bolt and nut.
   1. Pipe spreaders or spacers shall be used on cross bolts of clevis hangers, when supporting piping 10 inches in size and larger.

E. Adjustable Floor Rests and Base Flanges: Steel.

F. Hanger Rods: Mild, low carbon steel, fully threaded or threaded at each end, with two nuts at each end for positioning rod and hanger, and locking each in place.

G. Riser Clamps: Malleable iron or steel.

H. Rollers: Cast Iron.

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

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe markers and accessories

1.02 REFERENCES

A. ANSI A13.1 - Scheme for Identification of Piping Systems.

1.03 SUBMITTALS

A. Product Data: Catalog sheets, specifications and installation instructions for each item specified.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. W.H. Brady Co., Milwaukee, WI.

B. Emed Co., Buffalo, NY.

C. Panduit Corp., Tinley Park, IL.

D. Seton Nameplate Corp., New Haven, CT.

2.02 PIPE MARKERS AND ACCESSORIES

A. Snap-on Marker: One piece wrap around type constructed of precoiled acrylic plastic with clear polyester coating, integral flow arrows, legend printed in alternating directions, 3/4 inch adhesive strip on inside edge, and 360 degree visibility.

B. Strap-On Marker: Strip type constructed of precoiled acrylic plastic with clear polyester coating, integral flow arrows, legend printed in alternating directions, factory applied grommets, and pair of stainless steel spring fasteners.

C. Stick-On Marker: Pressure sensitive adhesive backed type constructed of vinyl with clear polyester coating, and integral flow arrows for applications where flow arrow banding tape is not being used.

D. Pipe Marker Legend and Color Field Sizes:

OUTSIDE DIAMETER OF PIPE OR INSULATION (Inches)	LETTER SIZE (Inches)	LENGTH OF COLOR FIELD (Inches)
3/4 to 1-1/4	1/2	8
1-1/2 to 2	3/4	8
2-1/2 to 6	1-1/4	12
8 to 10	2-1/2	24
Over 10	3-1/2	32

E. Banding Tapes: Pressure sensitive adhesive backed type constructed of vinyl with clear polyester coating.
   1. Plain Tape: Unprinted type; color to match pipe marker background.
   2. Flow Arrow Tape: Printed type with integral flow arrows; color to match pipe marker background.

F. Pipe Size Labels: Pressure sensitive adhesive backed type constructed of vinyl with clear polyester coating, vertical reading pipe size in inches, and legend size matching adjacent pipe marker.

PART 3 EXECUTION

3.01 PREPARATION

A. Complete testing, insulation and finish painting work prior to completing the Work of this Section.

B. Clean pipe surfaces with cleaning solvents prior to installing piping identification.

C. Remove dust from insulation surfaces with clean cloths prior to installing piping identification.

3.02 INSTALLATION

A. Install the Work of this Section in accordance with the manufacturer's printed installation instructions, unless otherwise specified.

B. Stick-On Pipe Markers:
   1. Install minimum of 2 markers at each specified location, 90 degrees apart on visible side of pipe.
   2. Encircle ends of pipe markers around pipe or insulation with banding tape with one inch lap. Use plain banding tape on markers with integral flow arrows, and flow arrow banding tape on markers without integral flow arrows.

C. Pipe Size Labels: Install labels adjacent to each pipe marker and upstream from flow arrow. Install a minimum of 2 pipe size labels at each specified location, 90 degrees apart on visible side of pipe.

D. Pipe Service Identification Tags: Attach tags to piping being identified with "S" hooks or jack chains.

3.03 PIPING IDENTIFICATION SCHEDULE

A. Piping Identification Types:
   1. Piping or Insulation under 3/4 inch od: Pipe identification tags.
   2. Piping or Insulation 3/4 inch to 5-7/8 inch od: Snap-on marker or stick-on marker.
   3. Piping or Insulation 6 inch od and Larger: Strap-on marker or stick-on marker.

B. Identify exposed piping, bare or insulated, as to content, size of pipe and direction of flow, with the following exceptions:
   1. Piping in non-walk-in tunnels or underground conduits between manholes.
   2. Piping in furred spaces or suspended ceilings, except at valve access panels where valves and piping shall be identified as specified for exposed piping systems.
   3. Piping in finished spaces such as offices, class rooms, wards, toilet rooms, shower rooms and spaces as specified.

C. Locate piping identification to be visible from exposed points of observation.
   1. Locate piping identification at valve locations; at points where piping enters and leaves a partition, wall, floor or ceiling, and at intervals of 20 feet on straight runs.
   2. Where 2 or more pipes run in parallel, place printed legend and other markers in same relative location.

3.04 VALVE IDENTIFICATION SCHEDULE

A. Valve Service Identification Tags:
   1. Tag control valves, except valves at equipment, with a brass tag fastened to the valve handle or stem, marked to indicate service and numbered in sequence for the following applications:
      a. Domestic water valves controlling mains, risers and branch runouts.
      b. Gas valves controlling mains, risers, and branch runouts.
      c. Valves in sprinkler and fire standpipe systems, except hose valves.

B. Valve Service Identification Charts:
   1. Provide 2 framed valve charts for each piping system specified to be provided with valve identification tags. Type charts on 8-1/2 x 11 inches heavy white bond paper, indicating valve number, service and location.
   2. Hang framed charts at locations as directed.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

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

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

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. Natural gas piping and fittings

C. Sanitary and storm piping and fittings

D. Sanitary piping and fittings for acid waste applications

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Through Penetration Firestops: Section 078400.

B. Sealants: Section 079200.

1.03 SUBMITTALS

A. Product Data:
   1. Catalog sheets and specifications indicating manufacturer name, type, applicable reference standard, schedule, or class for specified pipe and fittings.
   2. Material Schedule: Itemize pipe and fitting materials for each specified application in Pipe and Fittings Schedule in Part 3 of this Section. Where optional materials are specified indicate option selected.

B. Quality Control Submittals
   1. Copy of hydraulic press fitting manufacturer's printed field inspection procedures for hydraulic press joints in domestic tubing.

PART 2 PRODUCTS

2.01 STEEL PIPE AND FITTINGS

A. Steel Pipe for Threading: Standard weight, Schedule 40, black or galvanized; ASTM A 53 or ASTM A 135.

B. Malleable Iron, Steam Pattern Threaded Fittings:
   1. 150 lb Class: ASME B16.3.
   2. 300 lb Class: ASME B16.3.

C. Cast Iron Fittings:
   1. Drainage Pattern, Threaded: ASME B16.12.
   2. Steam Pattern, Threaded: ASME B16.4.
      a. Standard Weight: Class 125.
      b. Extra Heavy Weight: Class 250.

D. Unions: Malleable iron, 250 lb class, brass to iron or brass to brass seats.

E. Couplings: Same material and pressure rating as adjoining pipe, conforming to standards for fittings in such pipe. Use taper tapped threaded type in screwed pipe systems operating in excess of 15 psig.

F. Nipples: Same material and strength as adjoining pipe, except nipples having a length of less than one inch between threads shall be extra heavy.

2.02 COPPER AND BRASS PIPE, TUBING AND FITTINGS

A. Copper Tube, Types K, L, and M: ASTM B 88.

B. Wrot Copper Tube Fittings, Solder Joint: ASME B16.22.

C. Cast Copper Alloy Tube Fittings, Solder Joint: ASME B16.18.

D. Drainage Tube, Type DWV: ASTM B 306.

E. Wrot Copper Drainage Tube Fittings, Solder Joint: ASME B16.29.

F. Cast Copper Alloy Drainage Fittings, Solder Joint: ASME B16.23.

G. Unions: Cast bronze, 150 lb Class, bronze to bronze seats, threaded or solder joint.

H. Plumber's Tube: Seamless, semi-annealed, minimum 65 percent copper, No. 18 B & S Gage.

I. Flared Tube Fittings:
   1. Water Tube Type: ASME B16.26.

J. Flanges: Conform to the Standards for fittings used in systems.
   1. Brazing Flanges: ASME B16.24, hubs modified for brazing ends.

2.03 HYDRAULIC PRESS FITTINGS FOR COPPER TUBING

A. Acceptable Fittings:
   1. ProPress by Viega, 301 N. Main, Wichita, KS 67202, (877) 843-4262, www.viega.com.
   2. Operating Conditions:
      a. Maximum Operating Pressure: 200 psi.
      b. Operating Temperature Range: 0-250 degrees F.
      c. Maximum Test Pressure: 600 psi.
      d. Maximum Vacuum: 29.2 inches hg @ 68 degrees F.
   3. Features:
      a. Fittings: Copper and copper alloy conforming to material requirements of ASME B16.18 or ASME B16.22.
         1) Stainless Steel Grip Ring: Adds strength to the joint without collapsing the interior passageway
      b. No flame for soldering required for installation of fittings and valves.
      c. Unpressed connections identified during pressure testing when water flows past sealing element.
      d. Sealing Elements: Factory installed, EPDM.
      e. Fittings that have been pressed can be rotated. If rotated more than 5 degrees, the fitting must be repressed to restore its resistance to rotational movement.
      f. Extended fitting end lead allows for twice the retention grip surface, and assists with proper tube alignment.
      g. Soldered adapter fittings are not allowed.

2.04 CAST IRON PIPE AND FITTINGS

A. Bell and Spigot Soil Pipe: Service Weight, Bitumin coated; ASTM A 74.

B. Bell and Spigot Soil Pipe Fittings: Service Weight, Bitumin coated; ASTM A 74.

C. Hubless Pipe: Bitumin coated; Cast Iron Soil Pipe Institute Standard No. 301.

D. Hubless Pipe Fittings: Drainage Pattern, Bitumin coated; Cast Iron Soil Pipe Institute Standard No. 301.

E. Hubless Joint Couplings: Stainless steel shield and clamp assembly, and elastomer sealing sleeve; CISPI-310.

F. Water Pipe Fittings: Bitumin coated, cement-mortar lined; AWWA C110.

2.05 DUCTILE IRON PIPE AND FITTINGS

A. Water Pipe: Bitumin coated and cement-mortar lined; AWWA C151.
   1. 3 and 4 Inch Sizes: Class 51.
   2. 6 inch Size and Over: Class 50.

B. Fittings: Bitumin coated and cement-mortar lined; AWWA C110.

2.06 COUPLINGS AND FITTINGS FOR GROOVED END PIPE

A. Couplings: Grinnell Corp.'s Rigidlok Fig. 7401, or Victaulic Co.'s Style 107, having minimum pressure rating of:
   1. 750 psi from 1-1/2 inch to 4 inch.
   2. 700 psi for 6 inch.
   3. 600 psi for 8 inch.

4. Couplings: Gustin-Bacon Inc.'s No. 100 Gruvagrips, or Victaulic Co.'s Style 77, having pressure rating of:
   a. 1000 psi for 3/4 inch to 6 inch.
   b. 800 psi for 8 inch to 12 inch.
   c. 300 psi for 14 inch to 24 inch.
5. Fittings: By same manufacturer as couplings, having pressure ratings equal to or greater than couplings. Comply with the following standards:
   a. Steel: ASTM A 53 or A 106, Grade B.
   b. Malleable Iron: ASTM A 47.
   c. Ductile Iron: ASTM A 536.

2.07 ACID WASTE PIPE, FITTINGS AND COUPLINGS

A. Glass Drainline Piping: Tempered and annealed borosilicate glass pipe and fittings, FS DD-G-541A; Schott Process Systems, Inc., 1640 S.W. Boulevard, Vineland, NJ 08360, or QVF Process Systems, Inc., 35 West William St., Corning, NY 14830.
   1. Drainline Couplings: Compression type; comprised of a stainless steel outer shell and bolting assembly, a Buna-N Rubber Compression liner, and a seal ring gasket of tetra-fluoro-ethylene; Schott Process Systems or QVF Process Systems.
   2. High Silicon Cast Iron Pipe and Fittings: Acid resistant cast iron bell and spigot pipe and fittings, containing not less than 14 percent silicon.

2.08 JOINING AND SEALANT MATERIALS

A. Thread Sealant:
   1. LA-CO Industries', Slic-Tite Paste with Teflon.
   2. Loctite Corp.'s No. 565 Thread Sealant.
   3. Thread sealants for potable water shall be NSF approved.

B. Thread Sealant (Natural Gas Piping): Rectorseal Corp.'s T Plus 2 non-hardening pipe dope with teflon.

C. 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.

D. 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.

E. Lead for Calking Joints in Cast Iron Soil Pipe: ASTM B 29 for pig lead.

F. 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.

G. 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.

H. 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.

I. 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.

J. Anti-Seize Lubricant: Bostik Inc.'s Never Seez or Dow Corning Corp.'s Molykote 1000.

2.09 PACKING MATERIALS FOR BUILDING CONSTRUCTION PENETRATIONS

A. Oiled Oakum: Manufactured by Nupak of New Orleans, Inc., 931 Daniel St., Kenner, LA 70062, (504)466-1484.

2.10 DIELECTRIC CONNECTORS

A. Dielectric Fitting: Bronze ball valve with end connections and pressure rating to match associated piping.
   1. Nipples with inert non-corrosive thermoplastic linings are not acceptable.
   2. Flange Electrical Insulation Kit: Consisting of dielectric sleeves and washers, and dielectric gasket.
      a. Rated 150 psi at 250 degrees F: ANSI Class 150, full faced neoprene gasket with bolt holes, double phenolic washers, and mylar sleeves; Model 150 by APS, Lafayette, LA 70596, (337) 233-6116.

2.11 PIPE SLEEVES

A. Type A: Schedule 40 steel pipe.

B. Type B: No. 16 gage galvanized sheet steel.

C. Type C: Schedule 40 steel pipe with 1/4 inch steel collar continuously welded to pipe sleeve. Size steel collars as required to span a minimum of one cell or corrugation, on all sides of the rough opening thru the metal deck.

D. Type D: No. 16 gage galvanized sheet steel with 16 gage sheet steel metal collar rigidly secured to sleeve. Size metal collars as required to span a minimum of one cell or corrugation, on all sides of the rough opening thru the metal deck.

2.12 FLOOR, WALL AND CEILING PLATES

A. Cast Brass: Solid type with polished chrome plated finish, and set screw.
   1. Series Z89 by Zurn, 929 Riverside Drive, 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.

2.13 FLEXIBLE CONNECTIONS

A. Underground Application:
   1. Acceptable Companies:
      a. Titeflex Inc., Springfield, MA.
      b. Flex-ing, Sherman, TX.
   2. Features:
      a. Construction: Stainless steel innercore covered with braided Type 304 stainless steel outer jacket.
      b. UL listed for underground fuel storage tank systems.
      c. Permanently crimped stainless steel collars with one threaded end and one threaded swivel end.

B. Underground or Above Ground Application:
   1. Acceptable Companies:
      a. Titeflex Inc., Springfield, MA.
      b. Flex-ing, Sherman, TX.
   2. Features:
      a. Construction: Convoluted, Type 321 stainless steel inner core, minimum .012 inch wall thickness covered with braided Type 304 stainless steel outer jacket.
      b. UL listed for above ground and underground use.

c. Factory installed male swivel on one end.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install piping at approximate locations indicated, and at maximum height.

B. Install piping clear of door swings, and above sash heads.

C. Make allowances for expansion and contraction.

D. Allow for a minimum of one inch free air space around pipe or pipe covering, unless otherwise specified.

E. Install horizontal piping with a constant pitch, and without sags or humps.
   1. Water Piping: Pitch 1/4 inch per 10 feet upward in direction of flow, unless otherwise noted. If it is not possible to maintain constant pitch, establish a new low point and continue. At the low point, provide a 1/2 inch drip leg and gate valve with a hose bibb end. Provide an air vent at the high point.
   2. Drainage Piping: Pitch 1/4 inch per foot downward, in direction of flow, unless otherwise noted.
   3. Vent Piping: Pitch 1/4 inch per foot upward, unless otherwise noted.

F. Install vertical piping plumb.

G. Use fittings for offsets and direction changes, except for Type K soft annealed copper temper water tube.

H. Cut pipe and tubing ends square; ream before joining.

I. Threading: Use American Standard Taper Pipe Thread Dies.
   1. Thread brass pipe with special brass threading dies.

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 NATURAL GAS PIPING SYSTEM

A. Install gas piping system in conformance with the National Fuel Gas Code, NFPA 54, or as required by the serving gas supplier.

B. Use non-hardening pipe dope on threads. Do not use thread seal tape.

3.05 PIPE JOINT MAKE-UP

A. Threaded Joint: Make up joint with a pipe thread compound applied in accordance with manufacturer's printed application instructions for the intended service.
   1. Chrome Plated Brass Pipe: Tighten joint with a strap or Parmalee wrench; do not mar pipe finish. Install piping so that no threads are visible.

B. 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.

C. 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.

D. 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.

E. 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.

F. 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.

G. Hubless CI Pipe Joint: Make up joint with hubless fitting and couplings, in conformance with the manufacturer's printed installation instructions.

H. Mechanical Joint: Make up joint in conformance with the manufacturer's printed installation instructions, with particular reference to tightening of bolts.

I. Glass Pipe Joint: Make up joint with glass drainline fittings and couplings in conformance with the manufacturer's printed installation instructions.

J. Polyethylene Containment Pipe Joint: Follow manufacturer's printed installation instructions.

K. High Density Polyethylene Pipe Joint (HDPE): Follow manufacturer's printed installation instructions.

L. Hydraulic Pressed Joint: Follow manufacturer's printed installation instructions.

M. 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.

3.06 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.

3.07 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.

3.08 PIPE AND FITTING SCHEDULE

A. Where options are given, choose only one option for each piping service. No deviations from the selected option will be allowed.

B. Acid Waste (Above Ground):
   1. Glass drainline pipe, fittings and couplings.
   2. High silicon cast iron bell and spigot pipe and fittings, with joints calked with lead and acid resistant joint packing.

C. Acid Waste (Below Ground): High silicon cast iron bell and spigot pipe and fittings, with joints calked with lead and acid resistant joint packing.

D. Domestic Water (Above Ground):
   1. 3 inch and Under: Type L hard drawn copper tube, with cast copper alloy or 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.

E. 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.

F. 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.

G. 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.

H. 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.

I. Natural Gas Piping including associated vent:
1. Inside Building: Standard weight black steel pipe, with 150 lb malleable iron fittings, and threaded joints.
2. Underground: HDPE piping with butt or socket fusion fittings, unless otherwise required by serving gas supplier.

J. Vent Piping: Same materials that are used for piping system to which vent is connected.

END OF SECTION

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PART 1 GENERAL

1.01 SECTION INCLUDES

A. Countertop sink

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 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.

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) / 2020
24. NEMA National Electrical Manufacturers Association
25. NFPA National Fire Protection Association

26. OSHA Occupational Safety and Health Act
27. SMACNA Sheet Metal and Air Conditioning Contractor's National Association
28. TEMA Tubular Exchanger Manufacturers Association
29. UL Underwriters Laboratories, Inc.
30. USAS USA Standards Institute (Formerly ASA)

B. Compliance with the following Codes, Rules and Regulations and those referenced within as applicable to work in the State of New York shall be required:
1. New York State Industrial Code Rules
2. New York State Building Code 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. New York State Property Maintenance Code 2025
10. New York State 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 PAINTING

A. Prime paint all bare supplemental steel, supports and hangers required for the installation of Division 23 Work in accordance with “Painting” Specification Section. Touch up welds of galvanized surfaces with galvanizing primer (ASTM A780).

1.15 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).

1.16 MOTORS AND STARTERS

A. Provide new NEMA Standard electric motors, sized and designed to operate at full load and full speed continuously without causing noise, vibration, and temperature rise in excess of their rating. Provide motors with a service factor of at least 1.15.

B. Equip motors for belt driven equipment with rails with adjusting screws for belt tension adjustment. Weather protect motors exposed to the weather.

C. Install high efficiency electric motors for air handling units, relief fans, and exhaust fans.

D. Provide all motors for use with Variable Frequency Drives with “high efficiency inverter duty” insulation class “F” with class “B” temperature rise and that conform to or exceed the International Energy Conservation Code or the Federal EP Act of 1992 requirements for efficiency.

E. Provide stainless steel nameplates, permanently attached to the motor, and having the following information as a minimum:
   1. Manufacturer
   2. Type
   3. Model
   4. Horsepower
   5. Service Factor
   6. RPM
   7. Voltage/Phase/Frequency
   8. Enclosure Type
   9. Frame Size
   10. Full-Load Current
   11. UL Label (where applicable)
   12. Lead Connection Diagram
   13. Bearing Data
   14. Efficiency at Full Load.

F. Provide motors whose sound power levels do not exceed that recommended in NEMA MG 1-12.49.

G. Provide motors with drive shafts long enough to extend completely through belt sheaves when sheaves are properly aligned and balanced.

H. 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.

1.17 ACOUSTICAL PERFORMANCE OF EQUIPMENT AND SYSTEMS

A. Install the Work in such a manner that noise levels from operation of motor driven equipment, whether airborne or structure-borne, and noise levels created by or within air handling equipment and air distribution and control media, do not to exceed sound pressure levels determined by the noise criteria curves published in the ASHRAE guide.

B. Acoustical Tests
   1. Owner may direct the Contractor to conduct sound tests for those areas he deems too noisy.
   2. If NC level exceeds the requirements of the Contract Documents due to improper installation or operation of mechanical systems, make changes or repairs to bring noise levels to within required levels.
   3. Retest until specified criteria have been met.

1.18 OPERATING AND MAINTENANCE INSTRUCTIONS

A. Instructions and Demonstration for Owner's Personnel
   1. Provide operating and maintenance instruction to the Owner when project is completed and all HVAC equipment serving the building is ready to be turned over to the Owner.
   2. Turn over the HVAC equipment to the Owner only after the final testing and proper balancing of HVAC systems.
   3. Instruct the Owner's personnel in the use, operation and maintenance of all equipment of each system.
   4. The above instruction requirements are in addition to that specified for specific equipment or systems. Conform to specified requirements if more stringent or longer instruction is specified for specific equipment or systems.

1.19 CODES, RULES, PERMITS & FEES

A. Give all necessary notices, obtain all permits and pay all government sales taxes, fees, and other costs, in connection with the Work. Unless indicated otherwise, fees for all utility connections, extensions, and tap fees for water, storm, sewer, gas, telephone, and electricity will be paid directly to utility companies and/or agencies by the Owner. File all necessary plans, prepare all documents and obtain all necessary approvals of all governmental departments having jurisdiction; obtain all required certificates of inspection for the Work and deliver same to the Owner's Representative before request for acceptance and final payment for the Work.

B. Conform to the requirements of the NFPA, NEC, FM, UL and any other local or State codes which may govern.

1.20 RECORD DRAWINGS

A. During the progress of the Work, make a record set of drawings of all changes by which the actual installation differs from the Drawings.

B. Create all record drawings in AutoCAD version 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 Contractor shall submit all air and hydronic test balance reports a minimum of 5 days prior to requesting punchlist inspection. The reports shall be complete for all subject equipment. If any reports are missing or incomplete, contractor shall identify those items and provide a schedule of balancing completion and excepted report submission.
   3. 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.
      a. The contractor shall provide a written response to the punchlist items within 2 weeks of receipt of punchlist with a schedule of completion of the open items (or commentary if discussion or objection are raised).
   4. If contractor requests a punchlist inspection and engineer finds incomplete work within the work claimed to be substantially complete, the engineer will inform the contractor and may (at engineer's choice) terminate the inspection prior to reviewing all work. The Contractor will be responsible for reimbursing engineer for subsequent punchlist activities.
   5. Upon receipt of engineer's punchlist inspection report, the contractor shall respond to each comment with an acknowledgement of each item (initialed, dated and photo evidence of completed work) or disagreement and written explanation of disagreement.
   6. 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. Inspection Report of Underground Piping Systems
   3. 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.

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 REFRIGERANT REMOVAL

A. Recover and dispose of all existing refrigerant charges in accordance with EPA regulations. Comply with all regulations applicable to the release of chlorofluorocarbon refrigerants to the atmosphere.

3.08 DUCTWORK REMOVAL

A. Disconnect all ductwork which must be removed, at the closest joint and support the remaining ductwork.

B. Prepare all remaining ductwork joints at the point of disconnection to receive new ducts or blank-off panels.

C. Remove all ductwork supports and miscellaneous steel with ductwork to be demolished.

3.09 INSULATION REMOVAL

A. Remove insulation, together with all piping, fittings, valves and equipment designated for demolition.

3.10 CONTROL WIRING REMOVAL

A. Disconnect and remove all control wiring and tubing, including conduit, for the Automatic Temperature Control (ATC) System associated with equipment and systems to be removed.

END OF SECTION

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PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. The Work covered under this Section consists of the furnishing of all necessary labor, supervision, materials, equipment, and services to completely execute the pipe hanger and supports as described in this Specification. Size hangers and supports to fit the piping's outside diameter.

1.02 REFERENCES

A. ASTM B633 - Specification for Electrodeposited Coatings of Zinc on Iron and Steel

B. ASTM A123 - Specification for Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip

C. ASTM A653 - Specification for Steel Sheet, Zinc-Coated by the Hot-Dip Process

D. ASTM A1011 - Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability (Formerly ASTM A570)

E. MSS SP58 - Manufacturers Standardization Society: Pipe Hangers and Supports- Materials, Design, and Manufacture

F. MSS SP69 - Manufacturers Standardization Society: Pipe Hangers and Supports- Selection and Application

1.03 QUALITY ASSURANCE

A. Provide hangers and supports used in fire protection piping systems listed and labeled by Underwriters Laboratories.

B. Steel pipe hangers and supports shall have the manufacturer’s name, part number, and applicable size stamped in the part itself for identification.

C. Design and manufacture hangers and supports in conformance with MSS SP 58.

1.04 SUBMITTALS

A. Submit for review, products utilized under this Contract per the requirements of section 013300-Submittals. Submissions shall include but not be limited to:
   1. Pipe, Hangers, and Supports Product Data Submittal
      a. Pipe Hanger and Support Application Schedule.
      b. Product data on all hanger and support devices, including shields and attachment methods. Include as a minimum as part of product data materials, finishes, approvals, load ratings, and dimensional information.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Manufacturer: Subject to compliance with these specifications, provide pipe hanger and support systems manufactured by:
   1. Cooper B-Line, Inc.
   2. Carpenter and Patterson
   3. Grinnell

2.02 PIPE HANGERS AND SUPPORTS

A. Hangers
   1. Uninsulated pipes 2 inch and smaller:
      a. Adjustable steel swivel ring (band type) hanger, B-Line B3170.
      b. Adjustable steel swivel J-hanger, B-Line B3690.
      c. Malleable iron ring hanger, B-Line B3198R or hinged ring hanger, B3198H.
      d. Malleable iron split-ring hanger with eye socket, B-Line B3173 with B3222.
      e. Adjustable steel clevis hanger, B-Line B3104 or B3100.
   2. Uninsulated pipes 2-1/2 inch and larger:

a. Adjustable steel clevis hanger, B-Line B3100.
b. Pipe roll with sockets, B-Line B3114.
c. Adjustable steel yoke pipe roll, B-Line B3110.

3. Insulated pipe- Hot or steam piping:
   a. 2 inch and smaller pipes: use adjustable steel clevis with galvanized sheet metal shield. B-Line B3100 with B3151 series.
   b. 2-1/2 inch and larger pipes
      1) Adjustable steel yoke pipe roll with pipe covering protection saddle. B-Line B3110 with B3160-B3165 series.
      2) Pipe roll with sockets with pipe covering protection saddle, B-Line B3114 with B3160-B3165 series.

B. Pipe Clamps
1. When flexibility in the hanger assembly is required due to horizontal movement, use pipe clamps with weldless eye nuts, B-Line B3140 or B3142 with B3200. For insulated lines use double bolted pipe clamps, B-Line B3144 or B3146 with B3200.

C. Multiple or Trapeze Hanger
1. Construct trapeze hangers from 12 gauge roll formed ASTM A1011 SS Grade 33 structural steel channel, 1-5/8 inch by 1-5/8 inch minimum, B-Line B22 strut or stronger as required.
2. Mount pipes to trapeze with 2 piece pipe straps sized for outside diameter of pipe, B-Line B2000 Series.
3. For pipes subjected to axial movement:
   a. Strut mounted roller support, B-Line B3126. Use pipe protection shield or saddles on insulated lines.
   b. Strut mounted pipe guide, B-Line B2417.

D. Wall Supports
1. Pipes 4 inch and smaller:
   a. Carbon steel hook, B-Line B3191.
   b. Carbon steel J-hanger, B-Line B3690.
2. Pipes larger than 4 inch:
   a. Welded strut bracket and pipe straps, B-Line B3064 and B2000 series.
   b. Welded steel brackets, B-Line B3066 or B3067, with roller chair or adjustable steel yoke pipe roll. B-Line B3120 or B3110. Use pipe protection shield or saddles on insulated lines.

E. Floor Supports
1. Hot piping under 6 inch and all cold piping:
   a. Carbon steel adjustable pipe saddle and nipple attached to steel base stand sized for pipe elevation. B-Line B3093 and B3088T or B3090 and B3088. Screw or weld pipe saddle to appropriate base stand.
2. Hot piping 6 inch and larger:
   a. Adjustable Roller stand with base plate, B-Line B3117SL
   b. Adjustable roller support and steel support sized for elevation, B-Line B3124

F. Vertical Supports
1. Steel riser clamp sized to fit outside diameter of pipe, B-Line B3373.
2. Copper Tubing Supports
   a. Size hangers to fit copper tubing outside diameters.
      1) Adjustable steel swivel ring (band type) hanger, B-Line B3170CT.
      2) Malleable iron ring hanger, B-Line B3198RCT or hinged ring hanger B3198HCT.
      3) Malleable iron split-ring hanger with eye socket, B-Line B3173CT with B3222.
      4) Adjustable steel clevis hanger, B-Line B3104CT.
   b. For supporting vertical runs use epoxy painted or plastic coated riser clamps, B-Line B3373CT or B3373CTC.

c. For supporting copper tube to strut use epoxy painted pipe straps sized for copper tubing, B-Line B2000 series, or plastic inserted vibration isolation clamps, B-Line BVT series.

G. Plastic Pipe Supports
1. V-Bottom clevis hanger with galvanized 18-gauge continuous support channel, B-Line B3106 and B3106V, to form a continuous support system for plastic pipe or flexible tubing.
2. Supplementary Structural Supports
a. Design and fabricate supports using structural quality steel bolted framing materials as manufactured by Cooper B-Line. Provide roll formed channels, 12 gauge ASTM A1011 SS Grade 33 steel, 1-5/8 inch by 1-5/8 inch or greater as required by loading conditions. Submit designs for pipe tunnels, pipe galleries, etc., to Architect/Engineer for approval. Use clamps and fittings designed for use with the strut system.

H. Pipe Supports Between Anchors and Pipe Expansion Loops
1. Provide supports between pipe anchors designed to cause minimal resistance to piping movement. Provide roller hanger supports or slide plates between anchors.
2. Provide supports near the L bends of pipe thermal expansion loops. No more than 12 inches from either side of the horizontal elbow.

2.03 UPPER ATTACHMENTS

A. Beam Clamps
1. Use beam clamps where piping is to be suspended from building steel. Select clamp type on the basis of load to be supported, and load configuration.
2. Use center loaded beam clamps where specified. For steel clamps provide B-Line B3050, or B3055. For malleable iron or forged steel beam clamps with cross bolt provide B-Line B3054 or B3291-B3297 Series as required to fit beams.

B. Concrete Inserts
1. Use cast in place spot concrete inserts where applicable; either steel or malleable iron body, B-Line B2500 or B3014. Select spot inserts to allow for lateral adjustment and to have means for attachment to forms. Select inserts to suit threaded hanger rod sizes, B-Line N2500 or B3014N series.
2. Use continuous concrete inserts where applicable. Provide 12 gauge channels, ASTM A1011 SS Grade 33 structural quality carbon steel, complete with Styrofoam inserts and end caps with nail holes for attachment to forms. Provide continuous concrete inserts with a load rating of 2,000 lbs/ft. in concrete, B-Line B22I, 32I, or 52I. Select channel nuts suitable for strut and rod sizes.
3. Provide Drop-In, shell type anchors with an internally threaded, all-steel shell with expansion cone insert and flush embedment lip. Manufacture anchors from plated carbon steel, 18-8 stainless steel and 316 stainless steel. Install anchors with carbide tipped hammer drill bits made in accordance to ANSI B212.15-1994 specifications. Test anchors to ASTM E488 criteria and listed by ICC (formerly ICBO) and SBCCI. Provide anchors listed by the following agencies as required by the local building code: UL, FM. Select inserts to suit threaded hanger rod sizes, Redhead Multi-Set.

2.04 ACCESSORIES

A. Hanger Rods shall be threaded both ends or continuous threaded rods of circular cross section. Use adjusting locknuts at upper attachments and hangers. No wire, chain, or perforated straps are allowed.

B. Provide shields that are 180 degree galvanized sheet metal, 12 inch minimum length, 18 gauge minimum thickness, designed to match outside diameter of the insulated pipe, B-Line B3151.

C. Pipe protection saddles shall be formed from carbon steel, 1/8 inch minimum thickness, sized for insulation thickness. Saddles for pipe sizes greater than 12 inch shall have a center support rib.

2.05 FINISHES

A. Indoor Finishes

1. Coat hangers and clamps for support of bare copper piping with copper colored epoxy paint, B-Line Dura-Copper®. Use additional PVC coating of the epoxy painted hanger where necessary.
2. Zinc plate hangers for other than bare copper pipe in accordance with ASTM B633 OR provide an electro-deposited green epoxy finish, B-Line Dura-Green®.
3. Provide pre-galvanized strut channels in accordance with ASTM A653 SS Grade 33 G90 or provide an electro-deposited green epoxy finish, B-Line Dura-Green®.

B. Outdoor and Corrosive Area Finishes
1. Hot dip galvanize hangers and struts located outdoors after fabrication in accordance with ASTM A123. Provide all hanger hardware as hot dip galvanized or stainless steel. Zinc plated hardware is not acceptable for outdoor or corrosive use.
2. Provide hangers and strut manufactured of type 304 stainless steel with stainless steel hardware where located in corrosive areas.

PART 3 - EXECUTION

3.01 PIPE HANGERS AND SUPPORTS

A. Adequately support pipe by pipe hanger and supports specified in PART 2 PRODUCTS. Allow for forces imposed by expansion joints, satisfy structural requirements and maintain proper clearances with respect to adjacent piping, equipment and structures. Size hangers for insulated pipes sized to accommodate insulation thickness.

B. Keep the different types of hangers to a minimum and provide hangers that are neat, without complicated bolting and with the number of parts of each hanger and its anchor kept to a minimum.

C. Make accurate weight balance calculations to determine the required supporting forces at each hanger or support location and the pipe weight load at each equipment connection.

D. Provide pipe hangers capable of supporting the pipe in all conditions of operation selected to allow free expansion and contraction of the piping, and prevent excessive stress resulting from transferred weight being induced into the pipe or connected equipment.

E. Painted or shop prime all hangers and supports that are not galvanized.

F. Support horizontal steel piping in accordance with MSS SP-58 and NYS 2025 Mechanical Code, excerpts of which follow below:

NOMINAL PIPE SIZE (INCHES)	ROD DIAMETER (INCHES)	MAXIMUM SPACING (FEET)
1/2 to 1-1/4	3/8	7
1-1/2	3/8	9
2	3/8	10
2-1/2	1/2	11
3	1/2	12
3-1/2	1/2	12
4	5/8	12
5	5/8	12
6	3/4	12
8	3/4	12
10	7/8	12
12	7/8	12
14	1	12
16	1	12

G. Support horizontal copper tubing in accordance with MSS SP-58 and NYS 2025 Mechanical Code, excerpts of which follow below:

NOMINAL PIPE SIZE (INCHES)	ROD DIAMETER (INCHES)	MAXIMUM SPACING (FEET)
1/2 to 3/4	3/8	5
1	3/8	6
1-1/4	3/8	7
1-1/2	3/8	8
2	3/8	8
2-1/2	1/2	9
3	1/2	10
3-1/2	1/2	11
4	1/2	12
5	1/2	12
6	5/8	12
8	3/4	12

H. Provide means of preventing dissimilar metal contact such as plastic coated hangers, copper colored epoxy paint, or non adhesive isolation tape- B-Line Iso-pipe. Galvanized felt isolators sized for copper tubing may also be used, B-Line B3195CT.

I. Install hangers to provide a minimum of 1/2 inch space between finished covering and adjacent work.

J. Place a hanger within 12 inches of each horizontal elbow.

K. Support vertical piping independently of connected horizontal piping. Support vertical pipes at every floor. Wherever possible, locate riser clamps directly below pipe couplings or shear lugs.

L. Where several pipes can be installed in parallel and at the same elevation, provide trapeze hangers as specified in section 2.02 C. Space trapeze hangers according to the smallest pipe size, or install intermediate supports according to schedules in this Section.

M. Do not support piping from other pipes, ductwork or other equipment that is not building structure.

N. Where horizontal piping movements are greater than ½ inch, or where the hanger rod angularity from the vertical is greater than four degrees from the cold to hot position of the pipe, offset the hanger pipe and structural attachments in such a manner that the rod is vertical in the hot position.

O. In any part of the building which is steel-framed, attach hangers to the building structural steel beams. Where hangers do not correspond with the building structural steel beams, provide supplemental steel members continuously welded or bolted to the building structural steel beams. Provide two (2) coats of primer on the supplemental steel. In any parts of the building which is a concrete structure, attach hangers to the concrete structure by installing anchors into the concrete.

3.02 CONCRETE INSERTS

A. Secure pipe hangers attached to concrete structure and slabs with embedded inserts, anchor bolts or concrete fasteners. Use a safety factor of 5 in selection of all inserts and expansion bolts unless there are seismic requirements (See “Seismic Restraint” specification if applicable). In which case, the larger of the two loadings shall govern the design.

B. Provide inserts for placement in formwork before concrete is poured.

C. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

D. Where concrete slabs form finished ceilings, provide inserts to be flush with slab surface.

E. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inch.

END OF SECTION

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PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This Section describes the marking and identification materials for identifying mechanical equipment, ductwork and piping systems.

B. Mark and identify all mechanical equipment, ductwork and piping systems described herein, and as shown and specified in the Contract Documents.

1.02 REFERENCES

A. ANSI A13.1 - Scheme for the Identification of Piping Systems.

B. Z53.1 - Safety Color Code for Marking Physical Hazards.

C. OSHA 29 CFR 1910 - Subpart J, General Environmental Controls

1.03 SUBMITTALS

A. 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 manufacturer's catalog literature for each required product.
      b. Tags: Submit samples of tags, attachments, labeled, and identified.
   2. Identification Scheme
      a. Submit the scheme of identification codes.
      b. Valve Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
      c. 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 VALVE TAGS

A. Provide valve tags for all valves installed for this project. Valve tags shall be constructed of brass with stamped letters and service designation tag size minimum 1-1/2 inches (38 mm) diameter with smooth edges, brass S hook.

B. Valve tags shall be permanently stamped and marked with a service designation, normal valve position, and an identifying number as large as possible. Each valve shall have a separate and distinct number coordinated with the service designations shown on the Drawings and the Owners existing valve numbering system. Coordinate with the Architect/Engineer and Owner before finalizing the valve tag numbering system.

2.03 PIPE MARKERS

A. All accessible piping installed indoors for this project, insulated and uninsulated shall be identified with wraparound pipe markers. Pipe markers shall be factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. “Accessible” piping shall include exposed piping, and piping located above lay-in ceilings. Markers shall include system name, flow arrow, and color code and pipe diameter.

B. All piping installed outdoors for this project, insulated and uninsulated, shall be identified with wraparound pipe markers. Pipe markers shall be factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. The marker shall be printed with weather-resistant ink.

C. Where pipes are too small or not readily accessible for application of pipe markers, a brass identification tag at least 1 ½ inches in diameter, with depressed ½ inch high black letters and numerals, shall be securely fastened at locations specified for pipe markers.

D. See pipe marker schedule for size requirements of pipe markers.

2.04 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.

2.05 DUCT WORK IDENTIFICATION

A. Provide full air distribution system identification at each side of a wall penetration, in a mechanical room, at all changes in direction and at no more than 50 foot intervals. Provide arrows identifying direction of flow.

B. Fire damper or Smoke damper access points shall be permanently identified on the exterior by a label having letters not less than 0.5 inch in height reading: SMOKE DAMPER or FIRE DAMPER.

C. Identification shall be preprinted labels.

D. Letter Size: 1-1/2 inches in height.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Apply piping system markers and valve tags in the following locations:
   1. Adjacent to each valve and fitting.
   2. At each branch location and riser take-off
   3. At each side of a pipe passage through floors, walls, ceiling and partitions.
   4. At each pipe passage to and from underground areas.
   5. Every 20 feet on all horizontal and vertical pipe runs.

B. Provide arrow markers showing direction of flow incorporated into or adjacent to each piping system marker. Use double-headed arrows if flow is in both directions.

C. Apply all piping system markers where view is unobstructed; markers and legends shall be clearly visible from operating positions.

D. Apply all tags and piping system markers in accordance with the manufacturer's instructions. Do not attach tags to valve handle such that the normal or emergency operation of the valve will be hindered.

3.02 VALVE CHART

A. Provide valve chart identifying each valve's number size of valve and service.

B. Frame the chart and locate the schedule in the Mechanical Equipment Room. (Aluminum Frame with plastic window).

C. Provide a compact disc that has the valve schedule in a spreadsheet format. The spreadsheet software to be used for the schedule shall be identified by the Owner.

3.03 LAY IN CEILING TILES AND ACCESS DOORS

A. Provide a lettered and numbered nameplate for each access door indicating the mechanical equipment that the door provides access too.

B. Where VAV boxes, hot water reheat coils, or other mechanical devices are installed above a lay-in ceiling tile system, provide and install color coded thumb tabs to mark the location of the equipment above the ceiling.

3.04 SCHEDULES

A. Pipe Marker Letter Size Schedule:

Outside diameter of insulation or pipe Inches	Letter height Inches	Color field Inches
3/4 to 1-1/4	1/2	8
1-1/2 to 2	3/4	8
2-1/2 to 6	1 - 1/4	12
8 to 10	2 - 1/2	24
Over 10	3 - 1/2	24

END OF SECTION

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PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This section specifies requirements for testing, adjusting, and balancing of all air and hydronic fluid 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. Only one complete set of draft reports will be returned.
         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.
               (3) Hydronic 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 and pump 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, valves, 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 and control valves 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 and hydronic equipment, air outlets (supply, return and exhaust), manual valves, automatic valves 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 fans and pumps 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. Examine the hydronic systems to see that they are free from abnormal obstructions, and that all piping, valves and equipment have been properly made fully operational. Determine that all equipment and control systems are performing correctly by functional testing.

G. Where existing systems are to be modified or added to ensure that all strainers and 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 and water distribution systems have been satisfactorily completed.

F. Actuate all safety devices in a manner that clearly demonstrates their workability and operation.

G. Cut insulation, ductwork and piping 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 and hydronic systems.

I. Include a schematic diagram locating the air inlets, outlets, fans, equipment, dampers and regulating devices for air systems, and a schematic diagram for location of balancing valves, flow indicators, equipment, and devices for hydronic 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

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.

L. Hydronic Systems

1. Perform the testing, adjusting and balancing of hydronic systems in accordance with the detailed procedures outlined in the referenced standards; and including but not limited to the following:
    a. Preliminary procedure prior to balancing:
        1) Examine water in system and determine if water has been treated and cleaned.
        2) Check expansion tank to determine that it is not air bound and the system is completely full of water.

3) Purge all air vents of water systems, check automatic air vents and determine if they are operating properly. Repair or replace any air vents that are not operating properly.
4) Coordinate with control manufacturer for required cooling and heating temperature controls and corresponding, automatic valve operation settings.
5) Open all normally open valves to full open position. Set automatic valves to full coil flow.
6) Complete air balance before final water balance begins.
7) Check water pumps for pump rotation and for proper flow rate delivery against manufacturer's pump curves.
8) Set all balancing valves for required flow delivery at mains and branch mains to cooling and heating elements.
9) Upon completion of flow readings and adjustments of balancing valves, mark all settings and record data, so that they can be restored to their correct "balanced" position, if disturbed later.

b. Include the following as part of the final balancing:
1) After required cooling and heating temperature controls and automatic valve operation settings are made, recheck pump flow requirements and readjust system as required.
2) Record pressure drop through coil at set flow rate of coil for full cooling and for full heating. Set pressure drop across bypass valve to match coil pressure drop.
3) Record and check the following items at each cooling and heating element:
4) Inlet water temperatures and static pressure at connections.
5) Leaving water temperatures and pressure drop of each coil.
6) Flow rate through coil with control valve stroked manually wide open.
7) Record operating suction and discharge pressures of each pump and final total dynamic head and rated amperage versus actual amperage of pump motors.
8) Record entering and leaving water temperatures and flow through all equipment and devices.
9) Check and record all flow rates at all locations in the piping system with flow meters.
10) Upon completion of air and hydronic systems testing, patch insulation, ductwork and housings, using materials identical to those removed.
11) Perform final testing, adjusting and balancing during summer season for air conditioning systems and during winter season for heating systems, including operation when outside conditions are within 5 degrees F wet bulb temperature of maximum summer design condition, and within 10 degrees F dry bulb temperature of minimum winter design condition.
12) Retest, adjust, and balance systems subsequent to system modifications. Resubmit test results.

END OF SECTION

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PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This section describes the insulation, jackets, and accessories for piping as scheduled in Part 3 of this Section and as shown on the Drawings.

1.02 RELATED REQUIREMENTS

A. Section 230702 - Firestopping for HVAC

B. Section 232000 - Pipe, Valves, and Fittings

C. Section 232300 - Refrigerant Piping

1.03 REFERENCES

A. National Fire Protection Association (NFPA):
   1. NFPA 255 - Surface Burning Characteristics of Building Materials.

B. New York Codes and Standards (current adopted):
   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. Underwriters Laboratories, Inc. (UL):
   1. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials.

E. American Society for Testing and Materials (ASTM):
   1. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
   2. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
   3. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
   4. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement.
   5. ASTM C335 - Standard Test Method for Steady-State Heat Transfer Properties of Horizontal Pipe Insulation.
   6. ASTM C449 - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement.
   7. ASTM C518 - Standard Test Method for Steady-State Heat Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
   8. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation.
   9. ASTM C534 - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
   10. ASTM C547 - Standard Specification for Mineral Fiber Preformed Pipe Insulation.
   11. ASTM C 552 - Standard Specification for Cellular Glass Thermal Insulation
   12. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
   13. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
   14. ASTM C585 - Standard Practice for Inner and Outer Diameters of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing.
   15. ASTM C 591 - Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.
   16. ASTM C 610 - Standard Specification for Molded Expanded Perlite Block and Pipe Thermal Insulation.
   17. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
   18. ASTM C921 - Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.

19. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation
20. ASTM D1056 - Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber.
21. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics.
22. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
23. ASTM E96 - Standard Test Method for Water Vapor Transmission of Materials.

1.04 DEFINITIONS

A. Greenguard: Greenguard Environmental Institute

B. IAQ: Indoor Air Quality

C. EPA: Environmental Protection Agency.

D. WHO: World Health Organization

E. ASJ: All Service Jacket

F. SSL: Self-Sealing Lap

G. FSK: Foil-Scrim-Kraft; jacketing

H. PSK: Poly-Scrim-Kraft; jacketing

I. PVC: Polyvinyl Chloride

J. FRP: Fiberglass Reinforced Plastic

K. Cold Service Piping/ Surfaces: Pipes or surfaces where the normal operating temperature is 60 degrees F or lower.

L. Hot Service Piping/ Surfaces: Pipes or surfaces where the normal operating temperature is 105 degrees F or higher.

1.05 SUBMITTALS

A. 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. Piping Insulation Product Data Submittal
      a. Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
      b. Provide manufacturer's installation instructions that ensure acceptable workmanship and installation standards will be achieved.

1.06 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturer: Company specializing in manufacturing products specified with minimum 3 years documented experience.
   2. Installer: Company specializing in performing the Work of this Section with minimum 3 years documented experience.

B. Materials:
   1. Flame spread/smoke developed rating of 25/50 or less in accordance with ASTM E84, NFPA 255 and UL 723.
   2. Insulation for duct, pipe and equipment for above grade exposed to weather outside building shall be certified as being self-extinguishing for 1" thickness in less than 53 seconds when tested in accordance with ASTM D1692.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site, labeled with manufacturer’s identification, product density, and thickness.

B. Follow manufacturer’s recommended storage and handling practices.

1.08 ENVIRONMENTAL REQUIREMENTS

A. Maintain ambient conditions required by manufacturers of each product (tapes, adhesives, mastics, cements, insulation, etc.).

B. Maintain temperature before, during, and after installation for a minimum of 24 hours.

C. Supply fiberglass products that assure excellent IAQ (Indoor Air Quality) performance through Greenguard Certification.

D. Mold: Carefully inspect any insulation that has been exposed to water. If it shows any sign of mold growth remove it from the Site. If the material is wet but shows no sign of mold, dry rapidly and thoroughly. If it shows signs of facing degradation from wetting remove it from the Site.

PART 2 - PRODUCTS

2.01 FIBER GLASS INSULATION

A. Approved Manufacturers:
   1. Knauf Insulation
   2. Johns Manville Corporation
   3. Owens Corning Corporation
   4. CertainTeed Corporation

B. Fiber glass insulation meeting ASTM C547, ASTM C585, and ASTM C795; rigid molded, noncombustible.

C. Factory applied vapor barrier jacket: ASJ/SSL conforming to ASTM C1136 Type I and ASTM E96, secured with self-sealing longitudinal laps and butt strips.

2.02 FIBER GLASS INSULATION JACKETS AND ACCESSORIES

A. Field-Applied Jackets and Fitting Covers
   1. PVC - 25/50 or Indoor/Outdoor, UV-resistant fittings, jacketing and accessories, white or colored. Fitting cover system consisting of pre-molded, high-impact PVC materials with fiber glass inserts. Approved Manufacturer: Proto Corporation.
      a. Thickness: 10 mil.
      b. Closures: stainless steel tacks, matching PVC tape, or PVC adhesive per manufacturer's recommendations.
   2. ASTM B209 formed aluminum, 0.016-inch thick in smooth, corrugated, or embossed finish with factory-applied moisture barrier. Approved Manufacturer: Childers.
      a. Overlap: 2-inch minimum.
      b. Fittings: 0.016-inch thick die-shaped with factory-applied moisture barrier.
      c. Metal jacket bands: 3/8-inch wide, 0.015-inch thick aluminum or 0.010-inch thick stainless steel.
   3. ASTM A666, Type 304 stainless Steel, 0.010-inch thick in smooth, corrugated, or embossed finish with factory-applied moisture barrier. Approved Manufacturer: Childers.
      a. Overlap: 2-inch minimum.
      b. Fittings: 0.016-inch thick die-shaped with factory-applied moisture barrier.
      c. Metal jacket bands: 3/8-inch wide, 0.010-inch thick stainless steel.
   4. Laminated Self-Adhesive Water and Weather Seals - Permanent acrylic self-adhesive System; weather resistant, high puncture and tear resistance; meeting or exceeding requirements of UL 723; applied in strict accordance with manufacturers' recommendations.

B. Fitting Insulation
   1. Pre-formed fiberglass, preformed perlite, mitered fiberglass, mitered perlite or calcium silicate in lieu of PVC systems. Protect fittings with field-applied fitting covers.

C. Tapes
   1. Vapor barrier type, self-sealing, non-corrosive, fire-retardant. Approved Manufacturer: Compac Corporation

2.03 ELASTOMERIC INSULATION

A. Approved Manufacturers:
   1. Armacell LLC
   2. K-Flex USA, Inc.

B. Flexible, tubular (Type 1) or sheet/roll form (Type 2) closed-cell elastomeric insulation complying with ASTM C534, Grade 1 - Standard (temperature range(-)297°F to 220°F; use molded tubular material wherever possible.

2.04 ELASTOMERIC INSULATION ACCESSORIES

A. Adhesives:
   1. Air dried, waterproof vapor barrier contact adhesive, compatible with insulation for joining of seams and butt joints.

B. Finishes:
   1. Provide a weather and UV resistant protective finish for outdoor applications in accordance with the manufacturer's recommendations.

2.05 HIGH DENSITY JACKETED INSULATION INSERTS FOR HANGERS AND SUPPORTS

A. For use with Fiberglass Insulation:
   1. Cold Service Piping:
      a. Polyurethane Foam: Minimum density 4 pcf, K of 0.13 at 75 degrees F, minimum compressive strength of 125 psi.
   2. Hot Service Piping:
      a. Calcium Silicate: Minimum density 15 pcf, K of 0.50 at 300 degrees F; ASTM C 533.
      b. Perlite: Minimum density 12 pcf, K of 0.60 at 300 degrees F; ASTM C 610.

B. For Use with Flexible Elastomeric Foam Insulation:
   1. Provide to prevent thermal bridging and formation of condensation.
      a. Provide insulated piping supports at clamping points to prevent crushing and cross section area reduction of insulation.
      b. Load bearing PET or closed cell EPDM core.
      c. UV degradation resistant exterior
      d. Outside diameter shall match insulation sizes
      e. Armacell ArmaFix EcoLight, Aeroflex Arefix, or equal

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that all piping is tested and approved prior to insulation installation.

B. Verify that all surfaces are clean, dry and without foreign material before applying insulation materials.

3.02 INSTALLATION (GENERAL)

A. Install all materials using skilled labor regularly engaged in this type of work. Install all materials in strict accordance with manufacturer's recommendations, building codes, and industry standards.

B. Locate insulation and cover seams in the least visible location. Extend all surface finishes in such a manner as to protect all raw edges, ends and surfaces of insulation.

C. On cold surfaces where a vapor retarder must be maintained, apply insulation with a continuous, unbroken moisture and vapor seal. Insulate and vapor seal all hangers, supports, anchors, or other projections secured to cold surfaces to prevent condensation.

D. Insulated pipes conveying fluids below ambient temperature; insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.

E. For hot piping conveying fluids 140°F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.

F. For hot piping conveying fluids over 140°F, insulate flanges and unions at equipment.

G. Maintain continuous pipe insulation through walls, ceiling or floor openings, or sleeves except where firestop or firesafing materials are required.

H. Install insulation neatly, accurately and without voids, in accordance with manufacturer's instructions and NIAC National Commercial and Industrial Insulation Standards.

I. Insulate fittings, valves and flanges using premolded covers with precut insulation inserts.

J. Insulate piping using insulation of type and thickness scheduled in this Section.

K. Install metal shields between hangers or supports and the piping insulation. Install rigid insulation inserts as required between the pipe and the insulation shields. Fabricate inserts to be of equal thickness to the adjacent insulation and vapor seal as required. Insulation inserts shall be no less than the following lengths:

1½" to 2½" IPS	10" long
3" to 6" IPS	12" long
8" to 10" IPS	16" long
12" and over IPS	22" long

L. Pipe exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor) to be finished with PVC jacket and fitting covers, aluminum jacket, or stainless steel jacket.

3.03 INSTALLATION (FIBER GLASS)

A. Provide a continuous vapor retarder on piping operating below ambient temperatures. Seal all joints, seams and fittings.

B. Firmly butt and secure ends with appropriate butt-strip material. On high-temperature piping, double layering with staggered joints when recommended by the insulation manufacturer. When double layering, the inner layer should not be jacketed.

C. Insulated pipes conveying fluids below ambient temperature:
   1. Provide vapor barrier jackets, factory-applied or field-applied; secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
   2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.

D. Insulated pipes conveying fluids above ambient temperature:
   1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
   2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.

E. Exterior Applications:
   1. Jacket piping and fittings exposed to the elements using aluminum or stainless steel jackets with a factory applied moisture barrier. Hold firmly in place with a friction type Z lock or a minimum 2" overlap joint. Seal all joints completely along the longitudinal seam and install so as to shed water. Seal all circumferential joints by use of preformed butt strips; minimum 2" wide or a minimum 2" overlap. Overlap butt strips to the adjacent jacketing a minimum ½-inch and completely weather seal. Install a 6" to 10" unsealed slide joint every 25 to 30 lineal feet to allow for the thermal expansion of the pipe and jacketing. In addition, apply a thin bead of silicone grease in the overlap to prevent water migration while allowing the joint to slide. Install an unsealed slide joint where distance between fittings exceeds 8 lineal feet.

2. Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness ad adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum or stainless steel jacket with seams located on bottom side of horizontal piping.

F. Cold Piping Insulation:
1. On below freezing applications and in high abuse areas protect the ASJ jacket with a PVC vapor retarding outer jacket. Seal exposed ends of the insulation with a vapor retarder mastic installed per the manufacturer's recommendations. Apply vapor seals at butt joints at every fourth pipe section joint and at each fitting to isolate any water incursion.
2. On chilled water systems operating in conditions of: RH of 90% and above, follow the same guidelines as described above for below freezing applications.

3.04 INSTALLATION (ELASTOMERIC)

A. Piping:
1. Install pipe insulation by slitting tubular sections and applying onto piping or tubing. Alternately, slide unslit sections over the open ends of piping or tubing. Adhere and seal all seams and butt joints using adhesive.
2. Push insulation onto the pipe, never pull. Stretching of insulation may result in open seams and joints.
3. Tape the ends of the tubing before slipping the insulation over the new pipes to prevent dust from entering the pipe.
4. Clean cut all edges. Do not leave rough or jagged edges of the insulation. Use proper tools such as sharp non-serrated knives.
5. On cold piping, adhere insulation directly to the piping at the high end of the run using a two-inch strip of adhesive on the inner diameter of the insulation and on the pipe. Coat all exposed end cuts of the insulation with adhesive. Adhere all penetrations through the insulation and termination to the substrate to prevent condensation migration.
6. Use sheet insulation on all pipes larger than 6-inch diameter. Do not stretch insulation around the pipe. On pipes larger than 12-inch diameter, adhere insulation directly to the pipe on the lower 1/3 of the pipe. On pipes greater than 24-inch diameter, completely adhere insulation.
7. Stagger seams when applying multiple layers of insulation.

B. Valves, Flanges and Fittings:
1. Insulate all fittings with the same insulation thickness as the adjacent piping. Adhere all seams and mitered joints with adhesive. Sleeve screwed fittings and adhere with a minimum 1" overlap onto the adjacent insulation.
2. Insulate valves, flanges, strainers, and Victaulic couplings using donuts covered with sheet or oversized tubular insulation.

C. Hangers:
1. Support piping system using high density inserts with sufficient compressive strength. Apply elastomeric foam insulation with the same or greater thickness than the pipe insulation to pipe supports. Seal all joints with adhesive.
2. Standard and split hangers - Insulate piping supported by ring hangers with the same insulation thickness as the adjacent pipe. Seal all seams and butt joints with adhesive. Sleeve ring hangers using oversized tubular insulation. On cold piping, extend insulation up the hanger rod a distance equal to four times the insulation thickness. Insulation tape may be used to a thickness equal to the adjacent insulation thickness.
3. Clevis hangers or other pipe support systems - Install saddles under all insulated lines at unistrut clamps, clevis hangers, or locations where insulation may be compressed due to the weight of the pipe. Insert and adhere wooden dowels or blocks of a thickness equal to the insulation to the insulation between the pipe and the saddle.
4. Pre-insulated pipe hangers can be used to prevent compression of insulation at standard split, clevis hangers or other pipe support systems. Adhere a pair of non-skid pads to the

clamps to minimize the movement. In addition, to prevent loosening of the clamps, use an antivibratory fastener, such as a nylon-locking nut.

D. Exterior Applications:
   1. Paint all outdoor exposed piping with two coats of UV resistant finish. Prior to applying the finish, wipe the insulation with denatured alcohol. Do not tint the finish.
   2. Locate seams for all outdoor exposed piping on the lower half of the pipe.

3.05 PIPING INSULATION MATERIAL SCHEDULE

SYSTEM OR SERVICE	LOCATION	INSULATION TYPE	JACKET
HEATING HOT WATER	INSIDE	FIBER GLASS	ALL SERVICE JACKET
CONDENSATE DRAINS	INSIDE	ELASTOMERIC	
HVAC REFRIGERANT LINES	INSIDE	ELASTOMERIC	
HVAC REFRIGERANT LINES	OUTSIDE	ELASTOMERIC	EXTERIOR COATING
STEAM (LPS) TO 15 PSIG.	INSIDE	FIBER GLASS	ALL SERVICE JACKET
STEAM CONDENSATE	INSIDE	FIBER GLASS	ALL SERVICE JACKET

3.06 MINIMUM PIPING INSULATION THICKNESS (IN.)

FLUID OPERATING TEMP. RANGE (°F)	SYSTEMS IN TEMP. RANGE (°F)	INSULATION CONDUCTIVITY		NOMINAL PIPE OR TUBE SIZE (IN.)				
		CONDUCTIVITY BTU*IN./(H*SQ. FT.*°F)	MEAN RATING TEMP (°F)	<1	1 TO < 1-1/2	1-1/2 TO < 4	4 TO < 8	=8
> 350		0.32-0.34	250	4.5	5.0	5.0	5.0	5.0
251-350		0.29-0.32	200	3.0	4.0	4.5	4.5	4.5
201-250		0.27-0.30	150	2.5	2.5	2.5	3.0	3.0
141-200		0.25-0.29	125	1.5	1.5	2.0	2.0	2.0
105-140		0.21-0.28	100	1.0	1.0	1.5	1.5	1.5
40-60		0.21-0.27	75	0.5	0.5	1.0	1.0	1.0
< 40		0.20-0.26	50	0.5	1.0	1.0	1.0	1.5

END OF SECTION

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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. Penetrations in floor-ceiling assemblies.
   2. Penetrations in roof-ceiling assemblies.
   3. Penetrations in walls and partitions.
   4. Penetrations in smoke barriers.
   5. Construction enclosing compartmentalized areas.

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:

B. Firestopping for HVAC Product Data Submittal
   1. Product Data: For each type of through-penetration firestop system product indicated.
   2. System Drawings: Submit documentation from a qualified third-party testing agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.
   3. Product Certificates: Certificate of conformance signed by manufacturers of through-penetration firestop system products certifying that products comply with requirements.

1.04 QUALITY ASSURANCE

A. Provide through-penetration firestop systems that comply with the following requirements and those specified in “Performance Criteria” Article:
   1. Firestopping tests are performed by a qualified, testing and inspection agency. A qualified testing and inspection agency is UL, or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
   2. Through-penetration firestop system products bear classification marking of qualified testing and inspection agency.

B. Engage an experienced installer who is certified, licensed or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install firestop products per specified requirements. A manufacturer’s willingness to sell its through-penetration firestop system products to Contractor or to an installer engaged by Contractor does not in itself confer qualifications on buyer.

C. Obtain through-penetration firestop systems for each type of penetration and construction condition indicated from a single manufacturer.

D. Conduct conference at Project site to comply with requirements in Division 01.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturer’s labels identifying product and manufacturer, date of manufacture; lot number; shelf life, if applicable; qualified testing and inspection agency’s classification marking; and mixing instructions for multicomponent materials.

B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants or other causes.

1.06 PROJECT CONDITIONS

A. Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limitations recommended by manufacturer.

B. Do not install through-penetration firestop systems when substrates are wet due to rain, frost, condensation, or other causes.

C. Do not use materials that contain flammable solvents.

1.07 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core-drilled holes or cut openings to accommodate through-penetration firestop systems.

C. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.

PART 2 - PRODUCTS

2.01 FIRESTOPPING, GENERAL

A. Provide through-penetration firestop systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.

B. Provide components for each through-penetration firestop system that are needed to install fill materials. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.

2.02 PERFORMANCE CRITERIA

A. Fire Test Requirements:
   1. Underwriters Laboratories, Inc. (UL):
      a. UL 1479, “Fire Tests of Through Penetration Firestops”.
      b. UL 263, “Fire Tests of Building Construction and Materials”.
      c. UL 723, “Surface Burning Characteristics of Building Materials”.
   2. American Society of Testing and Materials (ASTM):
      a. ASTM E814, “Fire Tests of Through Penetration Fire Stops”.
      b. ASTM E119, “Fire Tests of Building Construction and Materials”.
      c. ASTM E84, “Surface Burning Characteristics of Building Materials”.

B. References:
   1. Underwriters Laboratories (UL); “Fire Resistance Directory.”
      a. Through Penetration Firestop Systems (XHEZ)
      b. Fill, Void or Cavity Materials (XHHW)
      c. Firestop Devices (XHJI)
      d. Forming Materials (XHKU)
   2. All major building codes:
      a. International Building Code published by ICC.
   3. National Fire Protection Association (NFPA); “NFPA 101: Life Safety Code”.

C. Performance Requirements:
   1. Provide products that upon curing, do not re-emulsify, dissolve, leach, breakdown or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture characteristic during and after construction.
   2. Provide firestop sealants sufficiently flexible to accommodate motion such as pipe vibration, water hammer, thermal expansion and other normal building movement without damage to the seal.
   3. Pipe insulation shall not be removed, cut away or otherwise interrupted through wall or floor openings. Provide products appropriately tested for the thickness and type of insulation utilized.

4. Penetrants passing through fire-resistance rated floor-ceiling assemblies contained within chase wall assemblies shall be protected with products tested by being fully exposed to the fire outside of the chase wall. Systems within the UL Fire Resistance Directory that meet this criterion are identified with the words “Chase Wall Optional.”
5. Provide through-penetration firestop systems subjected to an air leakage test conducted in accordance with the Standards, UL 1479 for penetration firestop systems, with published L-Ratings for ambient and elevated temperatures as evidence of the ability of the firestop system to restrict the movement of smoke.

2.03 MANUFACTURERS

A. Subject to compliance with through-penetration firestop systems (XHEZ) listed in Volume 2 of the UL Fire Resistance Directory, provide products of the following manufacturers as identified below:
   1. Acceptable Manufacturer: Specified Technologies Inc., Email: specseal@stifirestop.com, Website: www.stifirestop.com.
   2. Approved Equals by Hilti, 3M, and Johns Manville.

B. Single Source: Obtain firestop systems for each type of penetration and construction condition indicated only from a single manufacturer.

2.04 MATERIALS

A. General: Use only through-penetration firestop system products that have been tested for specific fire-resistance-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.

B. Latex Sealants: Single component latex formulations that upon cure do not re-emulsify during exposure to moisture, the following products are acceptable:
   1. Specified Technologies, Inc. (STI) SpecSeal Series SSS Intumescent Sealant
   2. Specified Technologies, Inc. (STI) SpecSeal Series LCI Intumescent Sealant
   3. Specified Technologies, Inc. (STI) SpecSeal Series LC Endothermic Sealant

C. Firestop Devices: Factory-assembled steel collars lined with intumescent material sized to fit specific outside diameter of penetrating item, the following products are acceptable:
   1. Specified Technologies, Inc. (STI) SpecSeal Series SSC Firestop Collars
   2. Specified Technologies, Inc. (STI) SpecSeal Series LCC Firestop Collars

D. Firestop Putty: Intumescent, non-hardening, water resistant putties containing no solvents, inorganic fibers or silicone compounds, the following products are acceptable:
   1. Specified Technologies, Inc. (STI) SpecSeal Series SSP Firestop Putty

E. Wrap Strips: Single component intumescent elastomeric strips faced on both sides with a plastic film, the following products are acceptable:
   1. Specified Technologies, Inc. (STI) SpecSeal Series RED2 Wrap Strip
   2. Specified Technologies, Inc. (STI) SpecSeal Series BLU2 Wrap Strip

F. Firestop Pillows: Re-enterable, non-curing, mineral fiber core encapsulated with an intumescent coating contained in a flame retardant poly bag, the following products are acceptable:
   1. Specified Technologies, Inc. (STI) SpecSeal Series SSB Firestop Pillows

G. Mortar: Portland cement based dry-mix product formulated for mixing with water at Project site to form a non-shrinking, water-resistant, homogenous mortar, the following products are acceptable:
   1. Specified Technologies, Inc. (STI) SpecSeal Series SSM Firestop Mortar

H. Silicone Sealants: Moisture curing, single component, silicone elastomeric sealant for horizontal surfaces (pourable or nonsag) or vertical surface (nonsag), the following products are acceptable:
   1. Specified Technologies, Inc. (STI) SpecSeal SIL300 Silicone Firestop Sealant
   2. Specified Technologies, Inc. (STI) SpecSeal SIL300SL Self-Leveling Silicone Firestop Sealant

I. Composite Sheet: Intumescent material sandwiched between a galvanized steel sheet and steel wire mesh protected with aluminum foil, the following products are acceptable:
   1. Specified Technologies, Inc. (STI) SpecSeal CS Composite Sheet

J. Cast-In-Place Firestop Device: Single component molded firestop device installed on forms prior to concrete placement with totally encapsulated, tamper-proof integral firestop system and smoke sealing gasket. Device shall allow for a concrete floor thickness of minimum 2-1/2 inches up to 36 inches without the use of field applied extension tubing. The following products are acceptable:
   1. Specified Technologies, Inc. (STI) SpecSeal CID Cast-In Firestop Device

K. Fire-Rated HVAC Retaining Angles: Steel angle system with integral intumescent firestop gasket for use on steel HVAC ducts, the following products are acceptable:
   1. Specified Technologies, Inc. (STI) SpecSeal FyreFlange Firestop Angles

PART 3 - EXECUTION

3.01 PREPARATION

A. Examination of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.

B. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, scale, laitance, rust, release agents, water repellents, and any other substances that may inhibit optimum adhesion.

C. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.

D. Do not proceed until unsatisfactory conditions have been corrected.

3.02 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

A. General Requirements: Install through-penetration firestop systems in accordance with “Performance Criteria” Article and in accordance with the conditions of testing and classification as specified in the published design.

B. Manufacturer’s Instructions: Comply with manufacturer’s instructions for installation of through-penetration firestop systems products.
   1. Seal all openings or voids made by penetrations to ensure an air and water-resistant seal.
   2. Consult with mechanical engineer, project manager, and damper manufacturer prior to installation of through-penetration firestop systems that might hamper the performance of fire dampers as it pertains to duct work.
   3. Protect materials from damage on surfaces subjected to traffic.

3.03 FIELD QUALITY CONTROL

A. Inspections: Owner shall engage a qualified independent inspection agency to inspect through-penetration firestop systems.

B. Keep areas of work accessible until inspection by authorities having jurisdiction.

C. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.

3.04 ADJUSTING AND CLEANING

A. Remove equipment, materials and debris, leaving area in undamaged, clean condition.

B. Clean all surfaces adjacent to sealed openings to be free of excess through-penetration firestop system materials and soiling as work progresses.

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.
   2. Equipment supports.
   3. Pipe curb assemblies, pipe chase housings, or pipe portals.
   4. Pipe mounting pedestals.

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 EQUIPMENT SUPPORTS

A. General: Provide equipment supports capable of supporting superimposed live and dead loads, including equipment loads and other construction to be supported. 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. Fabricate units to minimum height of 8 inches, unless otherwise indicated.

F. Sloping Roofs: Where slope of roof deck exceeds 1/4 inch per foot, fabricate support units with height tapered to match slope to level tops of units.

2.05 PIPE CURB ASSEMBLIES, PIPE CHASE HOUSINGS, OR PIPE PORTALS

A. Manufacturers:
1. Custom Curb, Inc.
2. Pate Co. (The).
3. Roof Products & Systems (RPS) Corporation.
4. ThyCurb, Inc.
5. Sigrist.

B. The pipe curb assembly or pipe portal shall include a prefabricated roof curb, a laminated acrylic coated ABS (Acrylonitrile Butadiene Styrene) plastic curb cover with prepunched mounting holes and molded sealing ring on the collared opening, and an EPDM compression molded rubber cap for use with a variety of piping combinations. Each cap shall have a stainless-steel clamp for each pipe penetration. The maximum pipe size shall be 12-inch diameter.

C. Curb covers shall be resistant to ozone and ultraviolet rays and shall have a serviceable temperature range of -40 degrees F to +250 degrees F. The molded sealing ring on the collared opening and the groove in the rubber cap shall be installed to assure a weather-tight pressure and mechanical seal. The protective rubber caps shall have a serviceable temperature range of –60 degrees F to +250 degrees F and shall be resistant to ozone and ultraviolet rays. The conical shaped steps of the nipple shall provide a weatherproof seal around the penetration. The stainless steel snaplock clamps shall provide added protection to guarantee the seal.

D. The roof curb shall include 18-gauge steel construction with integral base plate, continuously welded corner seams, factory-installed wood nailer, and 1.5-inch, 3 lb. rigid fiberglass insulation.

2.06 PIPE MOUNTING PEDESTALS

A. The pipe mounting pedestal shall include an equipment rail (standard 24-inch long for single pipe support), a single 24-inch long steel slide channel attached to “U” shaped mounting brackets and secured to side of equipment rail with lag bolts supplied. The pipe roller assembly shall have galvanized 18-inch long continuous threaded rods to give 12-inch vertical adjustments, galvanized removable pipe retainer bracket, cast iron pipe rollers and lateral adjust spacer bracket for 12-inch horizontal adjustment.

2.07 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.

2.08 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.

2.09 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. Note: Marine Grade for Waterfront (salt laden).
   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 (current adopted):
   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. Conforming to ASTM C1071 Type 1 and NFPA 90A & 90B.

B. Noise Reduction Coefficient (NRC): ASTM C423 Type A Mounting, 0.40 or higher for ½" product, 0.60 or higher for 1" product.

C. Density: 1.5 or 2.0 PCF per application / thickness

D. Rated for a maximum air velocity of 6,000 Feet per minute.

E. Approved Products:
1. 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

2.05 SHEET WATERPROOFING MEMBRANE

A. Prefabricated, self-adhering, sheet-type waterproofing membrane shall be FlexClad-400 by MFM Building Products Corp. or approved equal.

B. Description:
1. Top Layer: Stucco-embossed, UV-resistant aluminum weathering surface.
2. Middle Layer: Multiple layers of high-density cross-linked polymer film.
3. Bottom Layer: Uniform layer of rubberized asphalt adhesive, protected by disposable silicone release paper.

C. Color: As selected by Architect/Engineer.

D. Material Thickness: ASTM D1970/D1970M, 40 mils Nominal

E. Flexibility: ASTM D1970/D1970M, Pass.

F. Vapor Permeance: ASTM E96/E96M, 0 perms.

G. Nail Sealability: ASTM D1970/D1970M, Pass.

H. Heat Aging: ASTM D 794, Pass.

I. Tear Resistance: ASTM D 1424, Average: 660 grams.

J. Ultimate Elongation MD: ASTM D412, 434 percent.

K. Ultimate Elongation CMD: ASTM D412, 246 percent.

L. Low Temperature Flexibility: 1,000,000 Cycles at -10 Degrees F, 1,200 Cycles at -20 Degrees F, No cracking.

M. Flame Spread Index: ASTM E84, 0.

N. Smoke Density Index: ASTM E84, 5.

O. Wind-Driven Rain: SFBC TAS-110-95, 100 mph, No leakage or failure.

P. UV Stability: Excellent.

Q. Accessories: MFM Spray Adhesive

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that all ductwork is tested and approved prior to insulation installation.

B. Verify that all surfaces are clean, dry and without foreign material before applying insulation materials.

3.02 DUCTWORK REQUIRING INSULATION

A. Insulate Ductwork as specified in the DUCTWORK INSULATION SCHEDULE.
   1. Insulate any additional ductwork or plenums indicated to be insulated on the Drawings.

3.03 INSTALLATION (GENERAL)

A. Install all materials using skilled labor regularly engaged in this type of work. Install all materials in strict accordance with manufacturer's recommendations, building codes, and industry standards.

B. Locate insulation and cover seams in the least visible location. Extend all surface finishes in such a manner as to protect all raw edges, ends and surfaces of insulation.

C. On cold surfaces where a vapor retarder must be maintained, apply insulation with a continuous, unbroken moisture and vapor seal. Insulate and vapor seal all hangers, supports, anchors, or other projections secured to cold surfaces to prevent condensation.

D. Install insulation neatly, accurately and without voids, in accordance with manufacturer's instructions and NIAC National Commercial and Industrial Insulation Standards.

E. Install ductwork hanger supports on the outside of the insulation. Where vertical ducts are supported to the building structure, insulate the ductwork supports to prevent condensation.

F. Insulate ductwork using insulation of the type and thickness scheduled at the end of this Section.

G. If specified insulation board thickness does not cover ductwork standing seams and reinforcing angles, insulate them by adhering a grooved strip of fiberglass board with a thickness at least 1 ½ inches greater than the height of the seam or angle covered over the standing seam or angle.

3.04 ACOUSTIC DUCT LINER

A. Apply Duct Lining in strict accordance with the latest edition of SMACNA's "HVAC Duct Construction Standard Metal & Flexible" and NAIMA's "Fibrous Glass Duct Liner Standard".

B. Select length of mechanical fasteners in accordance with the manufacturer's recommendation as listed on each product. Install mechanical fasteners perpendicular to the duct surface, and such that the pin does not compress the liner more than 1/8 inch relative to the nominal thickness of the insulation.

C. Adhesive shall conform to ASTM C916. Apply adhesive to the sheet metal with a 90% minimum coverage. Coat all exposed edges of the duct liner with the same adhesive. Repair all rips and tears using an adhesive that conforms to ASTM C916.

D. Cover all internal duct areas with duct liner. Firmly butt transverse joints with no gaps and coat with adhesive. Overlap and compress longitudinal corner joints.

E. 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 SHEET WATERPROOFING MEMBRANE

A. Surface Preparation:
   1. Prepare surfaces in accordance with manufacturer’s instructions.
   2. Ensure tops of ducts have sufficient slope to eliminate ponding water.
   3. Ensure bottoms of ducts have foil-faced rigid insulation boards installed.
   4. Ensure surfaces are clean and dry.
   5. Remove dirt, dust, oil, grease, hand oils, processing lubricants, moisture, frost, and other contaminants that could adversely affect adhesion of waterproofing membrane.
   6. Prime metal, concrete, and masonry surfaces with primers approved by waterproofing membrane manufacturer.

B. Application:
   1. Apply waterproofing membrane in accordance with manufacturer’s instructions on all exterior insulated ductwork and at locations indicated on the Drawings.
   2. Apply membrane to clean, dry, primed metal ductwork and foil-faced rigid insulation boards. Do not apply over wet or non-rigid insulation.
   3. Apply membrane in accordance with manufacturer’s air, material, and surface temperature requirements.
   4. Apply firm, uniform pressure with hand roller to entire membrane to ensure proper adhesion. Concentrate pressure at seams and on underside of ductwork.
   5. Apply membrane to ducts in accordance with manufacturer’s instructions.
   6. Apply membrane shingle fashion to shed water over, not against laps.
   7. Do not terminate membrane on bottom of duct.
   8. Apply minimum 3-inch laps and minimum 6-inch end laps for ductwork applications.
   9. Embed membrane to bottom of ducts over 24 inches wide in light continuous layer of adhesive applied to insulation face.

10. Apply membrane to bottom of insulated ducts over 36 inches wide using mechanical attachment, in addition to adhesive, in accordance with manufacturer's instructions. Install pints on 12-inch centers with rows staggered.
11. Apply adhesive to areas where special adhesion requirements exist, including duct bottoms, flashings, transitions, joints, elbows, valves, tees, and other fittings.

C. Protection:
1. Protect applied waterproofing membrane and fabric flexible duct connections from damage during construction.

3.08 DUCTWORK INSULATION SCHEDULE

A. Fiber Glass Insulation Schedule:

Ductwork System	Type	Minimum R-Value
Supply Ducts and Plenums, Concealed	Fiberglass Duct Wrap	6
Return Ducts and Plenums, Concealed	Fiberglass Duct Wrap	6
Supply and Return Ducts and Plenums, Exposed in the Space Served	Uninsulated	NA
Supply and Return Ducts and Plenums, Exposed Other Than in the Space Served	Fiberglass Rigid Board	6
Outdoor Air Intake Ducts, Indoors	Fiberglass Rigid Board	6
Ducts Located Outdoors	Fiberglass Rigid Board	8
Ductwork Upstream and Downstream of Air Handling Units and Supply and Return Fans, Located Indoors	Internal Acoustic Duct Lining	Note 1, 2
Ductwork Upstream and Downstream of Air Handling Units and Supply and Return Fans, Located Outdoors	Internal Acoustic Duct Lining	Note 1, 2
General Exhaust Ducts Except as Noted	Uninsulated	NA

Notes:
1. Ductwork to be provided with 1-inch internal acoustic lining in addition to externally applied insulation in accordance with the table above.
2. Unless noted otherwise on drawings, duct liner shall be continuous, extending from air handling unit/fan sections out for a linear distance of 20'.

END OF SECTION

PART 1 - GENERAL

1.01 COMMISSIONING CONTRACT

A. The Owner will employ an independent Commissioning Authority (CA). The mechanical contractor shall support all commissioning efforts as defined 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. Indoor Air Handling Units

2. Unit Ventilators
3. Return / Exhaust Fans
4. Air-Cooled Condensing Units
5. Variable Refrigerant Flow Systems
   a. Outdoor Condensing Units
   b. Heat Pumps (Indoor Units).
   c. Branch Selector Boxes
6. Energy Recovery Ventilators
   a. Electric Duct heaters
7. Cabinet Heaters with Outside Air Dampers
8. Control Valves for miscellaneous HVAC System (including Fin Tube, Convectors, etc.).
9. Dampers for miscellaneous HVAC Systems (including Outside AIr/Exhaust Air/Relief Air/Return Air).
10. 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 panels	BMS	BMS	BMS	Electrical Contractor
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

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PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. The work specified as part of this Section consists of the integration of equipment controls supplied as part of manufactured items, materials and equipment required by the Drawings and under Divisions 23 and 26 to achieve operational and coordinated Sequences of Operation as Specified. Work shall include management of the system start up and operational check out, coordination of functions of controllers supplied as part of equipment packages, sizing of control valves and damper operators for dampers, interconnection of systems, provision and installation of all accessory devices required for complete system operation including dampers, control valves and actuators not provided as part of equipment, coordination of start up and testing and demonstration of the operation of Sequences of Operation to the Owner and his representatives.

1.02 RELATED SECTIONS

A. The General Conditions of the Contract, Supplementary Conditions, and General Requirements are a part of these Specifications and shall be used in conjunction with this Section as a part of the Contract Documents. Consult them for further instructions pertaining to this work. The Contractor is bound by the provisions of Division 00 and Division 01.

B. The following Sections constitute related work:
   1. Section 230010 - General Mechanical Requirements
   2. Equipment and Systems specified under Division 23
   3. Division 26

1.03 QUALITY ASSURANCE

A. System Installer Qualifications
   1. The Integrator shall have a minimum of five years experience in the integration of systems of a similar nature to those of this Project.
   2. The Integrator shall have an office within 50 miles of the project site and provide 24-hour response in the event of a customer call.

B. Codes and Standards: Meet requirements of all applicable standards and codes, except when more detailed or stringent requirements are indicated by the Contract Documents, including requirements of this Section.
   1. Underwriters Laboratories: Products shall be UL-916-PAZX listed.
   2. National Electrical Code - NFPA 70.

C. All products used in this installation shall be new, currently under manufacture, and shall have been applied in similar installations for a minimum of 2 years. This installation shall not be used as a test site for any new products unless explicitly approved by the Owner's representative in writing prior to bid date. Spare parts shall be available for at least 5 years after completion of this Contract.

1.04 SUBMITTALS

A. Submit 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 Middle 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. Air Handling Units, Condensing Units, and Return/Exhaust Fans

B. Unit Ventilators

C. Cabinet Unit Heaters with Outside Air Dampers

D. Exhaust Fans - General
E. Variable Refrigerant Flow Systems
F. Energy Recovery Ventilator
G. Electric Duct Heating Coils
H. Duct Smoke Detectors
I. Freezestat
J. Motor Starters or Variable Frequency Drives
K. Condensate Overflow Protection
L. CO2 Sensors and Demand Control Ventilation
M. CO2 Sensors
N. Demand Control Ventilation
O. A2L (R-454B or R32) Refrigerant Systems and Leak Detection

3.03 AIR HANDLING UNITS (AC) WITH CONDENSING UNITS (CU) AND RETURN/EXHAUST FANS (RF)

A. General
   1. The air handling unit's supply fan, associated return-exhaust fan, and any other associated exhaust fans shall be indexed for occupied/unoccupied modes of operation through the ATC/DDC panel.

B. Unoccupied Mode
   1. During the unoccupied mode of operation, the air-handling unit's supply and return fans shall cycle on as required to maintain setback temperatures. The outside-air and exhaust-air dampers shall be fully closed. The return air damper shall be fully open. The associated exhaust fans shall be off.
   2. In the heating mode, the space sensor through the ATC panel shall cycle the units' supply and return fan with the hot water coil control valve fully open to maintain an unoccupied heating setback temperature of 55 degrees F. (adjustable).
   3. In the cooling mode, the space sensor through the ATC panel shall cycle the units' supply and return fan and energize the DX mechanical cooling (CU) to maintain an unoccupied cooling setback temperature of 85 degrees F. (adjustable).
   4. The controls shall allow keeping the unit off during the unoccupied cooling mode, instead of a cooling step to the temperature setpoint.

C. Night Setback / Morning Warm-up Heating Mode
   1. When the air handling unit is in the night setback/morning warm-up heating mode, the supply and return fans will operate continuously, the outdoor air damper will be closed, the DX cooling shall be disabled, the return damper will be fully open, and the heating valve will modulate to maintain the maximum heating discharge air temperature set point. Once the morning warm-up setpoint is reached, the air-handling unit shall return to the occupied mode. The associated exhaust fans shall be disabled.

D. Occupied Mode
   1. During the occupied mode of operation, the air-handling unit's supply and return fans shall run continuously. The outside, return, and relief air dampers shall drive to their minimum outside air positions. The associated exhaust fans shall run continuously.

E. Heating Cycle with Hot Water Control Valve
   1. When the space temperature setpoint drops below the heating set point of 70 degrees F. (adjustable), the hot water heating control valve shall modulate to maintain the setpoint temperature.

F. Enthalpy Economizer Cycle

1. The economizer cycle shall be comparative enthalpy. When the outdoor air enthalpy/temperature is below the return air enthalpy/temperature, the outdoor, return, and relief air dampers shall modulate to provide a discharge air temperature that is governed by the room thermostat. There shall be a low limit discharge air sensor which shall prevent the mixed air temperature from dropping below 55 degrees F.
2. During the economizer cycle, the DX mechanical cooling shall remain disabled.

G. DX Cooling Cycle
1. On a call for cooling, the room thermostat shall stage the DX mechanical cooling as required to maintain 78 degrees F. (adjustable).
2. Whenever outside air temperature is above 70 degrees F. (adjustable), the outside, return, and relief air dampers shall drive to their minimum outside air positions. The hot water heating coil control valve shall fully close.

H. Filter Status
1. Provide a differential pressure switch at each of the filter banks. The switch shall be set as per the filter manufacturer's rating for a dirty filter. Whenever the filter exceeds this rating, the filter switch shall indicate a dirty filter alarm to the ATC system.

I. Fan Status
1. Provide a differential pressure switch or a current sensor at each supply and return/exhaust fan. The switch/sensor shall provide fan flow status and fan failure to the ATC system.

J. Night Setback Override
1. Provide an override push-button on the face of the space thermostat that, when manually depressed, shall return the unit to the occupied mode of operation for up to 4 hours (adjustable). After the time duration, the unit shall return to the unoccupied mode of operation.

3.04 UNIT VENTILATORS (UV)

A. The unit ventilators shall be controlled in accordance with ASHRAE Cycle II. The units shall be indexed for occupied/unoccupied modes of operation through the ATC panel. Provide for each unit an ATC panel, wall mounted sensor with override push button, low limit supply air sensor, freezestat, modulating hot water or steam control valve (as required - see drawings), a spring return modulating outside/return air damper actuator, and supply & exhaust fan relays/contacts (as required).
1. Where required:
a. Prove an air-cooled condensing unit interlock (DX cooling system).
2. Note: Unit ventilator shall be provided with cooling coil. Connection to cooling coil to be provided in the future.

B. When the unit ventilator is indexed to the occupied heating mode, the supply fan shall run continuously. The associated relief/exhaust fans shall run continuously. The outside air damper will open to its minimum position. On a call for heat, the heating control valve will modulate open to maintain the heating space temperature. On a call for cooling, the heating valve will modulate fully closed. Once the heating valve closes fully, the outside air damper will modulate open for free cooling (economizer cycle). If the discharge air temperature begins to drop below 60 degrees F., the outside air damper shall modulate back to the minimum position, and the heating control valve will modulate open. A low limit discharge air sensor shall prevent unit discharge air from dropping below 60 degrees F. (adjustable).

C. Morning Warm-Up shall operate in the following sequence before indexing the unit ventilator into the occupied heating mode. If the actual space temperature is three or more degrees F. (adjustable) below the occupied space temperature setpoint, when occupied mode is initiated, the unit will begin the morning warm-up cycle. During morning warm-up, the controller shall provide maximum heating with the outside air damper fully closed until the temperature at the space sensor is within the morning warm-up dead band. (Normally within three degrees of the space sensor setpoint). When warm-up is achieved, the unit will operate in the occupied mode.

D. When the unit ventilator is indexed to the unoccupied heating mode, the supply fan will remain off. The associated exhaust fans will remain off. The outside air damper will close. The heating control valve will open fully if the outside air temperature is below 40 degrees F. (adjustable). On a drop in space temperature below the unoccupied setpoint, the supply fan will cycle on with the heating control valve fully open until the room temperature exceeds the unoccupied setpoint.

E. Provide a dirty filter switch at each of the filter banks. The switch shall be set as per the filter manufacturer's rating for a dirty filter. Whenever the filter exceeds this rating, the filter switch shall indicate a dirty filter alarm to the ATC system.
   1. Alternate: Provide dirty filter alarm based on run hours.

F. Provide an airflow switch or a current sensor at each supply and each associated exhaust fan. The switch/sensor shall provide fan status and fan failure to the ATC system.

G. The unit ventilator control panel shall have a fail-safe operation that can be triggered by several occurrences:
   1. Freezestat
   2. Failure of the space sensor or
   3. Discharge air sensor

H. Upon detection of any of the above faults, the ATC panel shall go through the following sequence:
   1. Outside air damper shall close.
   2. The hot water or steam heating valve shall open.
   3. Supply air fans shall be off.

3.05 CABINET UNIT HEATERS (CUH) WITH OUTSIDE AIR DAMPERS

A. The cabinet heaters (with outside air dampers) shall be indexed for occupied/unoccupied modes of operation through the associated controller. Provide for each unit a controller or ATC panel, wall-mounted sensor with override push button, low limit supply air sensor, freezestat, modulating (hot water or steam as indicated on the drawings) control valve, a spring return two-position outside air damper actuator, and supply fan relays/contacts (as required).

B. When the cabinet heater is indexed to the occupied heating mode, the supply fan shall run continuously. The outside air damper will open to its minimum position. On a call for heat, the heating valve will modulate open to maintain the heating space temperature. On a call for cooling, the heating valve will modulate fully closed. A low limit discharge air sensor shall prevent unit discharge air from dropping below 60 degrees F. (adjustable).

C. When the cabinet heater is indexed to the unoccupied heating mode, the supply fan will remain off. The outside air damper will close. The heating control valve will open fully. On a drop in space temperature below the unoccupied set point, the supply fan will cycle on with the heating control valve fully open until the room temperature exceeds the unoccupied set point.

D. Provide a dirty filter switch at each of the filter banks. The switch shall be set as per the filter manufacturer's rating for a dirty filter. Whenever the filter exceeds this rating, the filter switch shall indicate a dirty filter alarm to the ATC system. Contractor's option: provide a dirty filter alarm using run hours (adjustable).

E. Provide an airflow switch or a current sensor at each supply and each associated exhaust fan. The switch/sensor shall provide fan status and fan failure to the ATC system.
   1. Alternate: Provide dirty filter alarm based on run hours.

F. The cabinet heater control panel shall have a fail-safe operation that can be triggered by several occurrences:
   1. The freezestat.
   2. A failure of the space sensor or discharge air sensor.

G. Upon detection of any of the above faults, the ATC panel shall go through the following sequence:
   1. The outside air damper shall close.
   2. The hot water valve shall open.
   3. The supply air fan shall be off.

3.06 EXHAUST FANS (EF) - GENERAL

A. For HVAC unit replacements, it is the intent to reuse the existing exhaust/relief air systems where applicable for minimum or maximum/economizer exhaust.

B. The exhaust fans shall be indexed for occupied - unoccupied modes of operation through the ATC system. During the occupied cycle, the respective "minimum" exhaust fans shall run continuously. During the unoccupied cycle, the respective exhaust fans shall remain off. The exhaust fans shall be interlocked with their respective HVAC units' occupied - unoccupied modes of operation.

C. Provide a differential pressure switch or current sensor at each of the exhaust fans. The switch/sensor shall provide fan flow status and fan failure to the ATC system.

3.07 SEQUENCE OF OPERATION - VARIABLE REFRIGERANT FLOW (VRF) SYSTEMS

A. General:
   1. The variable refrigerant flow (VRF) heat recovery system shall serve the administration offices and special education offices. The system shall be interlocked with the new rooftop energy recovery ventilator (ERV) and electric duct heater (EDH) to provide tempered outside air to the associated indoor units/spaces. The VRF system is composed of outdoor condensing units (ODU) connected to indoor units (IDUs) with branch selector boxes (BSBs).

B. DX Cooling Operation:
   1. The unitary controller will call for cooling when measured room temperature is 1.8FDB above setpoint and adjust refrigerant flow and capacity based on differential from setpoint. The unit will remain in an active call for cooling until the measured room temperature is 1.8FDB below setpoint.
   2. The indoor fan will operate based on user selected fan speed setting at the unitary controller and will allow for High, Medium, and Low selection. The fan speed will remain constant in the cooling mode regardless of the cooling cycle being called for.
   3. (User fan speed control should be disabled in applications where OA is ducted into the terminal unit)

C. Heat Pump Heating Operation:
   1. The unitary controller will call for heating when measured room temperature is 1.8FDB below setpoint and adjust refrigerant flow and capacity based on differential from setpoint. The unit will remain in an active call for heating until the measured room temperature is 1.8FDB above setpoint.
   2. The indoor fan will operate based on user selected fan speed setting at the unitary controller and will allow for High, Medium, and Low selection. The fan speed will remain constant during heating/and or cooling operation.

D. Mode Changeover:
   1. The VRF system and mode changeover shall be configured through the touch screen controller.

E. Heat Recovery Zone:
   1. The flow or branch selector unit/boxes shall be a key component of Variable Refrigerant Flow (VRF) heat recovery HVAC systems, enabling simultaneous heating and cooling of different zones by directing hot gas or cold liquid refrigerant to specific indoor units. Positioned between the outdoor unit and multiple indoor units, the boxes act as refrigerant "traffic controllers". They are distinguished by having three pipes from the outdoor unit and two pipes to each zone or a set of zones, with the flow determined by the commands from the indoor unit's thermostats.

F. BACnet Interface
   1. A BACnet interface module shall provide the VRF system interface with the building's ATC/DDC system.

3.08 SEQUENCE OF OPERATION - ENERGY RECOVERY VENTILATOR (ERV)

A. The ERV shall be configured via the factory provided controller to start operation when an indoor unit on its floor is turned on and will stop operation when all indoor units on its floor are set to off. The ERV will be in economizer bypass between 59 and 66 degrees F outdoor air temperature.

B. The ERV shall have integral motorized outside and exhaust air dampers.

C. The ERV unit shall have a wall-mounted digital timeclock and a transformer with an isolation relay.

D. The ERV shall have an energy recovery enthalpy core.

E. The ERV system has an electric duct heating coil to maintain a minimum supply air temperature of 70 degrees F (adjustable) entering the VRF system indoor heat pumps.

3.09 SEQUENCE OF OPERATION - ELECTRIC DUCT HEATER (EDH)

A. The electric duct heater manufacturer shall provide a complete packaged control system.

B. The discharge air or 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. Electric duct heaters shall be interlocked with energy recovery ventilator (ERV) indicated on the drawings.

D. The integral differential pressure airflow switch shall de-energize the heater control circuit upon loss of airflow.

E. Automatic and manual thermal resets shall be provided.

F. A door interlocked disconnect switch shall also be provided.

G. Pilot lights on the heater terminal box shall include heater on, low airflow, and each stage on.

3.10 DUCT SMOKE DETECTORS / FIRE ALARM

A. A duct smoke detector shall be furnished by the electrical contractor and installed in the ductwork by the mechanical contractor. The electrical contractor shall provide wiring from the duct smoke detector to the associated unit’s motor starter and to the building fire alarm system. Whenever products of combustion are sensed, the unit's fans will shut down.

B. Where indicated on the drawings, the electrical contractor shall provide wiring from the building’s fire alarm system to a set of contacts at the HVAC unit’s control panel to indicate a fire alarm condition and for secondary shutdown.

C. Where indicated on the drawings, the mechanical contractor shall provide wiring from an additional set of contacts from the duct smoke detector to the HVAC unit’s control panel to indicate a fire alarm condition and for secondary shutdown.

3.11 FREEZESTAT

A. A two-pole freezestat shall be installed on the leaving side of all heating coils. One set of contacts is wired in series with the unit duct smoke detector for fan shutdown. A second set of contacts closes when the device is tripped, sending an alarm signal to the control panel.

3.12 MOTOR STARTERS OR VARIABLE FREQUENCY DRIVES

A. All safety devices shall be wired so they stop the motor with the hand-off-auto switch in the hand as well as the auto position. This will normally mean breaking the common wire from the hand-off-auto switch to the starter’s holding coil through the safety devices.

3.13 CONDENSATE OVERFLOW PROTECTION

A. All units with cooling coils shall require a condensate level alarm (unless the drawings specifically show a secondary drain or auxiliary drain pan with a separate drain as describe in the International Mechanical Code Section 307, Condensate Disposal). The controls shall be capable of monitoring a field supplied and installed condensate level sensor. Whenever the sensor detects a high condensate level condition through the condensate level switch, the controls shall disable any active mechanical cooling and generate an alarm.

3.14 CO2 SENSORS AND DEMAND CONTROL VENTILATION

A. Demand Control Ventilation shall comply with the "Manual of Planning Standards, 2026, The University of the State of New York, The State Education Department" including:
   1. Part 6: Heating, Ventilating, and Air Conditioning Requirements, S604 Demand Control Ventilation.

3.15 CO2 SENSORS

A. Provide CO2 sensors for assembly areas or areas indicated on the drawings (conference rooms, classrooms, assembly areas, fellowship, lounge, cafeteria, etc.) where occupancy can greatly vary during the day. Wall mounted CO2 sensor shall have a maximum range of 0-2000 ppm. When the CO2 level exceeds 850 ppm (adjustable), the unit shall go into the occupied mode and outside air shall be provided. Outdoor air levels are typically assumed to be 400 ppm. As CO2 levels go up, occupants can become uncomfortable, unproductive, and tired. ASHRAE Standard 62 recommends enough outside air be brought in to keep CO2 levels below 1,000 ppm maximum.

3.16 DEMAND CONTROL VENTILATION

A. Demand Control Ventilation shall be provided the HVAC systems. DCV is an energy-saving control strategy that reduces the rate at which outdoor air is delivered to a zone during periods of partial occupancy.

B. DCV is a feedback control method to maintain indoor air quality that automatically adjusts the ventilation rate provided to a space in response to changes in conditions such as occupant number or indoor pollutant concentration. The control strategy is mainly intended to reduce the energy use by heating, cooling, and ventilation systems compared to buildings that use open-loop controls with constant ventilation rates.

C. References:
   1. ISO ICS 91.140.30: Ventilation and Air-Conditioning Systems.
   2. ASHRAE 62.1 & 62.2: The Standards for Ventilation and Indoor Air Quality.
   3. ASHRAE 90.1: Energy Standard for Buildings Except Low-Rise Residential Buildings.
      a. Sections 6.4.3.8, 6.5.3.8, and 6.5.3.7.

D. Methods of Estimating Occupancy:
   1. Gas detection - CO2 Sensors.
   2. Motion or Occupancy Sensors.
   3. Timed Schedules.

3.17 A2L (R-454B OR R32) REFRIGERANT SYSTEMS AND LEAK DETECTION

A. The combination of A2L refrigerant with indoor HVAC units (serving VRF or VRV systems) and shutoff valves is designed to provide proactive safety measures against potential refrigerant leaks. Because R-454B or R-32 is mildly flammable (an A2L refrigerant), the VRF/VRV systems shall incorporate safety features that include leak detection and automatic shutoff valves to prevent high concentrations of the gas in occupied spaces.

B. How shutoff valves work with A2L refrigerant leak detection:
   1. In an A2L refrigerant VRF/VRV system, leak detection sensors shall be installed in each indoor unit. When a leak is detected, the system initiates a series of automated safety responses.
      a. System shutdown: If a sensor detects that the refrigerant concentration has exceeded a safety threshold (e.g., 5,000 ppm, as recommended by the manufacturer and applicable codes), the indoor unit will shut down automatically.
      b. Alarms: The system shall trigger audible and visual alarms (e.g., a buzzer and warning light) to alert occupants of the leak.
      c. Automatic shutoff valves: The system shall activate automatic shutoff valves to isolate the section of the piping network where the leak was detected. This minimizes the amount of refrigerant released into the building while keeping the rest of the system operational. Shutoff valves are not limited to indoor units, branch selector boxes, and condensing units.

C. Integration with BMS: A refrigerant leak detection shall be communicated to the building management system (BMS), providing real-time concentration data and status updates for centralized monitoring. The alarm also notifies the main VRF controller and the BMS, which are programmed to execute specific safety protocols.

D. Emergency Countermeasures
   1. Activating ventilation: In addition to closing the shutoff valves, the alarm can trigger relays to automatically turn on exhaust fans to ventilate the affected area (DOAS unit exhaust fan).
   2. Pumping back refrigerant: Where applicable, some sophisticated systems can automatically pump refrigerant from the indoor side of the leak back to the outdoor unit for containment.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This Section describes the pipe, valves, fittings, and joining materials for use with the piping systems described in this Section and as shown on the Drawings.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Section 230529 - Pipe Hangers and Supports

C. Section 230555 - Mechanical System Identification

D. Section 230700 - Pipe Insulation

E. Section 232007 - Piping Specialties

1.03 ABBREVIATIONS

A. The following are standard abbreviations:
   1. CWP: Cold working pressure.
   2. EPDM: Ethylene-propylene-diene-terpolymer rubber.
   3. NRS: Nonrising stem.
   4. OS&Y: Outside screw and yoke.
   5. PTFE: Polytetrafluoroethylene plastic.
   6. SWP: Steam working pressure.
   7. TFE: Tetrafluoroethylene plastic.
   8. NPS: Nominal Pipe Size

1.04 SUBMITTALS

A. 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. Piping Product Data Submittal
      a. Product Data: For each type of valve indicated: Include body, seating, and trim materials; valve design; pressure and temperature classifications; end connections; arrangement; dimensions; and required clearances. Include list indicating valve and its application. Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories.
      b. Product data on pipe, fittings, gaskets, and bolts. Include dimensions, specifications, and manufacturer. Provide pipe and valve application schedule.
      c. Provide product data, including but not be limited to dimensions, specifications, manufacturer, installation and operation instructions, temperature and pressure ratings, end connections, and required clearances on piping specialties included in this Specification.
      d. Welder Certifications - Furnish the names of pipe welders and welding operators employed by the Contractor to perform the Work who have been qualified to use the welding procedures which have been qualified in accordance with the specified pressure piping codes or AWS or NFPA standards.
   2. Piping Shop Drawings
      a. Where deviations from the Drawings and Specifications are proposed for any reason, submit shop drawings identifying proposed deviations showing layout of all piping, fittings, materials, dimensions, and fabrication and installation details. Submit a comparison table of the specified features and ratings of the specified item and those of the proposed deviation to allow a direct comparison.
      b. The review of deviations will be for pressure drop only. The review will not address clearances or accessibility. No dimensional or coordination check will be made.
      c. The Contractor has the sole responsibility to review the Drawings, coordinate piping fabrication, and provide clearances and access for installation, maintenance and

balancing of this Work, and Work of other trades. Unless specifically dimensioned, Drawings indicate approximate locations only. The Contractor has the sole responsibility to locate and route the piping.

d. Submit all layout shop drawings on not less than ¼ inch equals 1 foot scale drawings.

1.05 REFERENCES

A. Division 01 - Quality Control: Requirements for references and standards.

B. AGA Z21.22 - Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems.

C. ANSI C111 - Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings

D. ASME B16.3 - Malleable Iron Threaded Fittings.

E. ASME B16.5 - Steel Pipe Flanges and Flanged Fittings

F. ASME B16.9 - Factory-Made Wrought Steel Buttwelding Fittings

G. ASME B16.15 - Cast Bronze Threaded Fittings

H. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.

I. ASME B16.22 - Wrought Copper and Bronze Solder Joint Pressure Fittings.

J. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings - DWV.

K. ASME B16.24 - Cast Copper Alloy Pipe Flanges and Flanged Fittings.

L. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV.

M. ASME B16.39 - Pipe Unions, Malleable Iron Threaded

N. ASME-B31.1 - Power Piping.

O. ASME B31.2 - Fuel Gas Piping.

P. ASME B31.5 - Refrigeration Piping.

Q. ASME B31.9 - Building Service Piping.

R. ASME B36.10M - Welded and Seamless Wrought Steel Pipe

S. ASME SEC IV - Construction of Heating Boilers.

T. ASME SEC IX - Welding and Brazing Qualifications.

U. ASTM A47 - Ferritic Malleable Iron Castings

V. ASTM A53 - Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.

W. ASTM A74 - Cast Iron Soil Pipe and Fittings.

X. ASTM A105 - Forgings, Carbon Steel, for piping components.

Y. ASTM A126 - Gray Iron Castings for Valves, Flanges, and Pipe Fittings

Z. ASTM A181 - Forgings, Carbon Steel, for General Purpose Piping

AA. ASTM A197 -Cupola Malleable Iron

BB. ASTM A234/A234M - Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.

CC. ASTM A307 - Carbon Steel Bolts and Studs, 60,000 psi Tensile

DD. ASTM B32 - Solder Metal.

EE. ASTM B42 - Seamless Copper Pipe.

FF. ASTM B62 - Composition Bronze or Ounce Metal Castings

GG. ASTM B75 - Seamless Copper Tube

HH. ASTM B88 - Seamless Copper Water Tube.

II. ASTM B306 - Copper Drainage Tube (DWV).

JJ. ASTM B584 - Copper Alloy Sand Castings for General Applications

KK. ASTM C564 - Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

LL. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings.

MM. AWS A5.8 - Specification for Brazing Filler Material

NN. AWWA C651 - Disinfecting Water Mains.

OO. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves.

PP. NFPA 30 - Flammable and Combustible Liquids Code

QQ. NFPA 54 - National Fuel Gas Code.

RR. NSF 61 - Domestic Water Pipe, Valves, and Fittings.

SS. Mechanical Code of New York State-Latest Edition

TT. Plumbing Code of New York State-Latest Edition

UU. Fuel Gas Code of New York State-Latest Edition

VV. FM - Factory Mutual Compliance

WW. UL - Underwriter's Laboratory Compliance

1.06 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:
   1. Protect internal parts against rust and corrosion.
   2. Protect threads, flange faces, grooves, and weld ends.
   3. Set angle, gate, and globe valves closed to prevent rattling.
   4. Set ball and plug valves open to minimize exposure of functional surfaces.
   5. Set butterfly valves closed or slightly open.
   6. Block check valves in either closed or open position.

B. Use the following precautions during storage:
   1. Maintain valve end protection.
   2. Store valves indoors and maintain at higher than ambient dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use hand wheels or stems as lifting or rigging points.

D. Protect all flange faces with wood, plastic or soft metal to prevent damage to parts.

E. Protect all pipe threads from damage with plastic plugs or caps.

F. Mark and identify all piping materials in accordance with the Reference Standards specified herein.

PART 2 - PRODUCTS

2.01 GENERAL

A. When two or more valves of the same type are used in the same service, furnish all valves of this type from the same manufacturer.

B. Specific manufacturer’s model numbers are cited in the following Piping Material Schedules to establish the desired quality and performance for each type valve or material. Equivalent products by other approved manufacturers are also acceptable. Approval shall be subject to review by the Architect/Engineer.

2.02 LOW PRESSURE STEAM AND CONDENSATE (INCLUDING VENTS, RELIEF AND DRAIN LINES)

Item	Pipe Size	Description	Manufacturer/ Model No.
Piping	All sizes	Schedule 40, seamless steel, ASTM A 53 Grade B (all condensate and	Wheatland

Item	Pipe Size	Description	Manufacturer/ Model No.
		blowdown piping shall be schedule 80 seamless steel)	
Joints	2 inches & smaller 2 ½ inches & larger	Threaded Connections Welded Connections	
Fittings	2 inches & smaller 2 ½ inches & larger	125#, cast iron, threaded, ASTM A126 Standard Weight, Seamless steel, butt welded, ASTM A234	Anvil Weldbend
Flanges	2 ½ inches & larger	150#, forged steel, weld neck, bore to match pipe ID, ASTM A181	Weldbend
Bolts	All Sizes	Alloy Steel, Hex Head Bolts and Nuts, ASTM A307 Grade B	
Unions	2 inches & smaller	150#, malleable iron, brass trim, threaded ends ASTM A197, ASME B16.3	Anvil
Gaskets	All Sizes	Spiral wound metallic gaskets	Flexitallic Style LS/LSI
Gate Valves	2 inches & smaller 2 ½ inches & larger	Class 125, threaded connections, rising stem, union bonnet, solid wedge, bronze body and wedge, non-asbestos packing and ductile iron hand wheel. MSS-SP80, ASTM B62 Class 125, flanged connections, OS & Y, cast-iron body and bonnet, bronze trim, solid-wedge disc, 200 psig CWP rating. ASTM A-126 Class B	Nibco T-124 Nibco F-617-O
Swing Check Valves	2 inches & smaller 2 ½ inches & larger	Class 125, Y-pattern swing type, threaded connections, bronze body with TFE seat disc. MSS-SP80, ASTM B 62 Class 125, swing-type, flanged connections, cast iron body with bronze trim, non asbestos gasket. MSS-SP71, ASTM A-126 Class B	Nibco T413-Y Nibco F918-B
Globe Valves	2 inches & smaller	Class 150, threaded connections, bronze body, bonnet, and seat, TFE disc, copper-silicone bronze stem,	Nibco T-235-Y

Item	Pipe Size	Description	Manufacturer/ Model No.
		union-ring bonnet, 300 psig CWP rating. ASTM B-62	
	2 ½ inches & larger	Class 125, flanged connections, cast-iron body and bonnet with bronze trim, 200 psig CWP rating. ASTM A-126 Class B	Nibco F-718-B
Ball Valves	2 inches & smaller	Two-Piece, Full-Port, threaded connections, bronze body, type 316 stainless-steel vented ball and stem, reinforced TFE seats, 150 psig SWP and 600-psig CWP ratings. MSS SP-110, ASTM B 584 Alloy C84400, ASME B1.20.1	Nibco T-585-70-66
Butterfly Valves	2 ½ inches & larger	Single flange, full lug, 720 psig CWP and 50 psig SWP rating, permanently lubricated 300-series stainless-steel bushings with graphite and modified PTFE seats, graphite packing and gasket, one-piece duplex stainless-steel stem and stainless-steel disc. Valves NPS 6 and smaller shall have lever-lock operator; valves NPS 8 and larger shall have weatherproof gear operator. MSS SP-88, API 609, ANSI B 1634A, ANSI B16.5	Nibco LCS7822-3/5

2.03 HEATING HOT WATER PIPING

Item	Pipe Size	Description	Manufacturer/ Model No.
Pipe	2 inches and smaller	Type L, hard drawn copper tubing, ASTM B88	Mueller Industries Wheatland
	2 ½ inches and larger	Schedule 40, seamless steel, ASTM A 53 Grade B	
Joints	2 inches and smaller	Lead-free solder, ASME B32; Water Soluble Flux, ASTM B-813	J.W. Harris-Bridgit
	2 ½ inches and larger	Welded Connections	
Fittings	2 inches and smaller	Cast copper alloy or wrought copper ASME B16.18 or ASME B16.22	Nibco

Item	Pipe Size	Description	Manufacturer/ Model No.
	2 ½ inches and larger	Standard Weight, Seamless steel, butt welded, ASTM A234	Weldbend
Flanges	2 ½ inches and larger	150#, forged steel, weld neck, bore to match pipe ID, ASTM A181	Weldbend
Bolts	All sizes	Alloy Steel, Hex Head Bolts and Nuts, ASTM A307 Grade B	
Unions	2 inches & smaller	Wrought copper, solder unions, ASME B16.22	Nibco
Dielectric Unions	2 1/2 inches & smaller	Dielectric Type, Copper to Steel	Watts Regulator Series 3000
Gaskets	All Sizes	Spiral wound metallic gaskets	Flexitallic Style LS/LSI
Ball Valves	2 inches & smaller	Two-Piece, full-Port, threaded connections, bronze body, chrome-plated brass/bronze ball, TFE seats, separate packnut with adjustable stem packing, anti-blowout stem, 150 psig SWP and 600-psig CWP ratings. MSS SP-110, ASTM B584 Alloy C84400	Nibco T-585-70
Check Valves	2 inches & smaller 2 ½ inches & larger	Class 125, Y-pattern swing type, soldered connections, bronze body with TFE seat disc. MSS-SP80, ASTM B 62 Class 125, swing-type, flanged connections, cast iron body with bronze trim, non asbestos gasket. MSS-SP71, ASTM A-126 Class B	Nibco S413-Y Nibco F918-B
Butterfly Valves	2 ½ inches & larger	Full-lug type with ductile-iron body, one-piece Type 416 stainless-steel stem, copper bushing, aluminum-bronze disc, and molded-in EPDM seat. Valve sizes 2 ½” through 6” shall have lever lock operator; valve sizes 8” and larger shall have weatherproof gear operator. MSS SP-67	Nibco LD-2000-3/5
Balancing Valves	2 inches & smaller	Provide ball or globe style with flow balancing and shut-off capabilities, memory stops, and minimum two metering ports. Female sweat, NPT threaded, or press connections to	Armstrong CBV B&G Circuit

Item	Pipe Size	Description	Manufacturer/ Model No.
		match system piping. Bronze, brass or steel construction consistent with system temperature and pressure. Minimum design pressure and temperature shall be 175 psig at 250 deg F. Provide with upstream strainer.	Setter IMI STAS/AT AD
Balancing Valves	2 ½ inches & larger	Valve shall be of cast iron construction with 125 psi ANSI flanged connections suitable up to 175 psi working pressure. Valves 2-1/2”-3” pipe shall have a brass ball with glass and carbon filled TFE seat rings. Valves 4”-12” shall be fitted with a bronze seat, replaceable bronze disc with EPDM seal insert, and stainless steel stem. Valves to have memory stop feature to allow valve to be closed for service and then reopened to set point without disturbing balance position. All valves to have calibrated nameplate to assure specific valve setting. Valves to be leak-tight at full rated working pressure. Design pressure and temperature shall be 175 psig at 250 deg F. Provide with upstream strainer.	Bell and Gossett Circuit Setter

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. Unless otherwise shown, route piping in the most direct manner parallel to building lines in accordance with the Drawings. Group piping whenever practical at common elevations.

B. Accurately align, support and connect piping without forcing.

C. Locate piping so that access to and clearance around equipment, and minimum piping headroom of 6'-8" is maintained, except where otherwise shown.

D. Space piping so that insulation and flanges, if any, have at least 1 inch clearance after maximum movement.

E. Where pipe elevations are not shown, pitch supply and return lines to positive drain points and/or coils.

F. Provide accessible flanges or union connections on the supply and return connections of terminal equipment and other items which must be disconnected for maintenance. Where unions are furnished as an integral part of the equipment, additional unions are not required unless required for access to or removal of components. Arrange equipment piping connections so that maintenance can be made without removing large sections of pipe or relocating the equipment.

G. In Domestic Water Systems, connect branch lines to the top of the line. For all other liquid systems, connect branch lines to the bottom or lower half of the line, preferably the bottom.

H. Connect branch lines in steam service and compressed air to the top or upper half of the line, preferably the top.

I. Use fittings for all changes of direction. Bending of steel pipe is not permissible.

J. Clean all piping materials before installation to remove grease, loose dirt, mill scale and other foreign matter.

K. Provide air vents at all high points of water piping, and valved drains at all low points of water piping for complete venting, draining and flushing of the piping system. Locate and provide air vents at multiple high points that are necessary to prevent air binding in the piping system. Install additional air vents and drains if directed by the Architect/Engineer, at no cost to the Owner. As a minimum provide drains and air vents
   1. In each section of piping separated by valves.
   2. On all coils.
   3. For each riser, where riser or runout to riser has a valve installed.
   4. In low point of piping to each down fed convector or radiator.

L. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Provide loops, pipe offsets and anchors.

M. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

N. Install gate or ball valves for shut-off and to isolate equipment, parts of systems, or vertical risers.

O. Sleeve pipes passing through partitions, walls and floors.

P. Identify piping under provisions of “Mechanical System Identification” Specification.

Q. Provide escutcheons at all locations where piping installed exposed to view penetrates wall, partitions, floors and ceilings.

R. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors, unless indicated to be exposed to view.

S. Install flexible connectors at inlet and discharge connections of pumps and other vibration producing equipment.

T. Install strainers on the supply side of each control valve, pressure regulating valve, solenoid valve, trap, and elsewhere as indicated.

U. For pressurized liquid piping systems installed horizontally make reductions in pipe sizes using eccentric reducer fitting installed with the level side up to allow air venting.

V. For all nipples up to and including six inches in length provide extra-heavy shoulder type. For all nipples over six inches in length provide corresponding material, quality and thickness as the pipe on which they are used. Do not use close nipples. Provide nipples with designation mark of the manufacturer conforming to the ASTM pipe specifications for system served.

W. Make connections to all cooling and heating units with single or multiple cooling or heating coils in accordance with the manufacturer’s instructions and labeling on equipment

X. For pressures over 15 psig, use nipples and caps instead of plugs for permanent closures. Plugs in equipment provided by equipment manufacturers are acceptable.

Y. Do not install piping above electrical panels. Route piping around panels.

3.02 STEAM AND CONDENSATE PIPING SYSTEMS

A. Install drip legs with steam traps at low points and natural drainage points in the steam system, such as at the ends of mains, bottoms of risers, and ahead of pressure regulators, control valves, isolation valves, pipe bends, and expansion joints.

B. On straight runs with no natural drainage points, install drip legs with steam traps at intervals not exceeding 150 feet where pipe is pitched down in the direction of the steam flow and a maximum of 100 feet where the pipe is pitched up so that condensate flow is opposite of steam flow.

C. Size drip legs same diameter as the main up to 6 inches. In steam mains 6 inches and larger, provide drip legs half the size of the distribution line but never less than 6 inches. The length of the drip leg; 1-1/2 times the diameter of the distribution line but not less than 18 inches.

D. Equip drip legs and dirt pockets with capped gate valves to allow removal of dirt and scale.

E. In piping systems installed horizontally, make reductions in pipe sizes using eccentric reducer fitting installed with the level side down.

F. Install steam supply piping at a uniform grade of 1/4 inch in ten feet downward in the direction of flow or toward the trap when a trap is present.

G. Install condensate return piping at a uniform grade of 1/2 inch in ten feet downward in the direction of flow.

H. Install automatic air vents at the end of all steam mains and headers, and on large equipment steam spaces to facilitate start-up and heat transfer. Locate the air vent at a high point of the piping system or equipment, or where the air collects. Pipe the outlet to a safe place, cut the pipe end at a 45 degree angle. Install an isolation valve upstream of automatic air vents.

3.03 THREADED CONNECTIONS

A. Ream pipe ends to remove burrs.

B. Use only standard ANSI taper threads. Threads shall be full, sharp, clean, and free of fins and burrs.

C. Apply joint sealing tape or paste to male threads only. Do not use paste on compressed air lines. When sealing fuel oil piping, use a thread-sealing compound suitable for oil when making up joints. When sealing natural gas piping, use a thread-sealing compound suitable for natural gas when making up joints.

D. Do not use close or short nipples of a size where the length of unthreaded pipe is less than the width of a pipe wrench.

E. Thredolets or similar code-approved fittings may be used for branch connections.

F. Provide unions at all threaded valve locations to facilitate the removal of the valve.

G. Joint Sealing Compound; Hercules, RectorSeal or approved equal.

3.04 WELDED CARBON STEEL CONNECTIONS

A. Perform welding using qualified welders and procedures following specified reference standards.

B. Do not use mitered welds for elbows.

C. Welded branch connections may be used in place of welding tees provided that requirements of the applicable ASME Code for pressure piping, B31.1 and/or B31.9 are met.

D. Weldolets or similar code-approved fittings may be used for branch connections.

E. Qualifications of welders, welding procedures, performance of welders and welding operators are required complying with the requirements of ASME B31.9 and ASME Boiler and Pressure Vessel Code, Section IX. Keep records and certifications required by code on file and available for inspection.

F. Whenever welding is done close to walls, floors or building structure, thoroughly clean the surfaces of weld splatter. Remove weld splatter from the surface of all welds, pipe and pipe supports.

G. Provide long radius pattern for welding elbows unless otherwise shown on the Drawings.

H. Examine and inspect welded pipe joints as follows:
   1. Visually examine all welded pipe joints for imperfections using qualified representatives. Submit qualifications to the Architect/Engineer.
   2. Make available to the Architect/Engineer records of visual examinations upon request.
   3. Remove weld defects by grinding or chipping and repair or replace joints in accordance with approved procedures.

4. Make shop and field welded joints available to the Owner for nondestructive inspection and examination upon request.

3.05 FLANGED CONNECTIONS

A. Arrange flange bolt holes to straddle the pipe vertical and horizontal centerlines, and match the orientation of mating flanges.

B. Install piping to equipment without strain.

C. Provide gaskets at all flanged connections suitable for the design and temperature of the fluid contained, and in accordance with Part 2 of this Section.

D. Mate flat face flanges together and raised face flanges together.

3.06 COPPER TUBING CONNECTIONS

A. Provide soldered or brazed in accordance with Part 2 of this Section.

B. Make soldered and brazed connections in accordance with the procedures in the current edition of the Copper Tube Handbook of the Copper Development Association.

C. Qualifications of brazers, brazing procedures, and performance of brazers and brazing operators are required in compliance with the requirements of ASME B31.1, ASME B31.9, and the Boiler and Pressure Vessel Code, Section IX. Keep records and certifications required by the code on file and available for inspection.

D. Make solder joints on all copper water piping with 95/5 solder. Absolutely no lead-based solder will be accepted.

E. Clean joints thoroughly before soldering.

F. Remove excess solder and flux with a cloth or brush to leave a uniform clean fillet.

G. For refrigeration copper tubing connections, comply with ASME B31.5. Make brazed joints on all refrigeration piping.

3.07 CONNECTIONS OF DISSIMILAR METALLIC MATERIALS

A. Isolate connections between dissimilar metallic materials using dielectric connections. Use dielectric unions or flanges that provide a complete isolation of the two ends, including bolts for flanges, using materials suitable for the design pressure, temperature and fluid contained.

3.08 VALVES

A. Provide valves of the same size as the pipe in which they are installed, unless shown otherwise on the Drawings. At pumps, match valve size to pipe size and not pump connection size.

B. Install valves with the stem on or above the horizontal. Install valves with the stem horizontal if requirements of headroom, access or chain operation must be met.

C. Pack valves and adjust glands before final acceptance.

D. Install valve extension stems or chain operators where the center of valve hand wheels is more than 6 feet-6 inches above the floor and valve is 2 ½" and larger. Prove chain hooks where required to prevent fouling of chains on equipment and to clear walkways. Terminate chains approximately 3 feet-6 inches above the floor. Provide worm gear operators or impact hand wheels for all valves 6 inches and larger.

E. Extended Stems: Where insulation is indicated or specified, provide extended stems arranged to receive insulation and a protective sleeve that allows operation of the valve without breaking the vapor seal or disturbing the insulation.

F. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

G. Locate valves for easy access and provide separate support where necessary.

H. Install check valves for proper direction of flow and as follows:
   1. Swing Check Valves: In horizontal position with hinge pin level.

2. Lift Check Valves: With stem upright and plumb

I. Install butterfly valves with stems horizontal to allow support for the disc and the cleaning action of the disc.

J. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

K. Install balancing valves with lengths of straight pipe upstream and downstream of valve as per manufacturer's instructions such that calibrated accuracy is maintained As a minimum provide straight lengths as per the following table;

REQUIRED STRAIGHT LENGTHS

Valve Size	Upstream (In Pipe Diameters)	Downstream (In Pipe Diameters)
½"-3"	3	1
4"-12"	5	2

L. Chain wheel Actuators- Valve actuation assembly with sprocket rim, brackets, and chain.
1. Sprocket rim with Chain guides: Ductile Iron (Aluminum for applications exposed to weather), of type and size required for valve.
2. Brackets: Type, number, size, and fasteners required to securely mount actuator on valve.
3. Chain: Stainless steel, of size required to fit sprocket rim.
4. Manufacturers:
   a. Babbitt Steam Specialty Co.
   b. Roto Hammer Industries

3.09 CONTROL VALVE INSTALLATION

A. Install all control valves so that the stem position is not more than 60 degrees from the vertical up position.

B. Install valves in accordance with the manufacturer's recommendations.

C. Install control valves so that they are accessible and serviceable, and such that actuators may be serviced and removed without interference from structure or other pipes, ducts and/or equipment.

D. Install isolation valves at control valves such that control valve body may be serviced without draining the supply/return side piping system. Install unions at all connections to screwed type control valves.

3.10 PRESSURE TESTING, FLUSHING AND CLEANING

A. Pressure test piping systems in accordance with applicable codes and as described herein.

B. Pressure testing - Schedule pressure testing so that it may be witnessed by the Architect/Engineer, Owner, or their representative. Perform tests in accordance with the following procedures:
1. Before testing, complete the installation of each pipe line, including final supports, hangers and anchors. Perform testing before insulation or paint is applied for examination during the test. Clean piping and equipment of metal cuttings and foreign matter as they are installed.
2. Codes - Pressure test piping to assure integrity of material and workmanship in accordance with the applicable ASME Code for pressure piping (B31) and New York State Code.
3. Protection of Equipment - Protect equipment, instruments and piping specialties which are not included in the test by either disconnecting from the piping and blanking off the end of the pipe with a blind flange, plug or cap, or isolating by insertion of a line blind or spool piece as required. Disconnect pneumatic control lines and close all openings.
4. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
5. Piping may be tested in sections or circuits as required for the progress of the work.
6. Provide all systems to be pressurized with the appropriate gauges, certified calibrated by the manufacturer, and pressure-relieving devices.

7. Install relief valve set at a pressure no more than 1/3 higher than the test pressure, to protect against damage by expansion of liquid or other source of overpressure during the test. Do not allow test pressure to exceed maximum pressure for any vessel, pump, valve, or other component in system under test.
8. Records - Provide records of all tests showing line designation, test pressure, ambient temperature, date of test, retests and signature of witness.

C. Hydrostatic Test Procedures - Perform hydrostatic testing in accordance with ASME B31.9.
1. Perform test using the pressure indicated under “Pressure Testing Schedule”
2. After hydrostatic test pressure has been applied for at least two hours, examine piping, joints, and connections for leakage while maintaining test pressure. Repeat hydrostatic test until there are no leaks.
3. Repair leaks as specified under “Repair of Line Leaks”

D. Service Testing - Perform service testing in accordance with ASME B31.9.
1. For gases and steam and condensate service not over 15 psig, and for nontoxic, noncombustible, nonflammable liquids at pressures not over 100 psig and temperatures not over 200 degrees F a system test with the service fluid is acceptable. This exemption does not apply to natural gas piping.
2. Bring the piping system up to operating pressure gradually with visual examination at a pressure between one-half and two-thirds of design pressure. Make a final examination at operating pressure.
3. Repair leaks as specified under “Repair of Line Leaks”
4. Repeat service test until there are no leaks.

E. Repair of Line Leaks - Comply with the following procedures for repair of leaks. In each case retest after repairs are made.
1. Soldered/Brazed Joints - Remove solder/brazing alloy and reapply with proper flux.
2. Flanged Joints - Check to determine flange end alignment and that all bolts are uniformly tightened with the required torque. If leak persists, depressurize the line, remove gasket, examine flange end face, and insert new gasket.
3. Threaded Joints - Tighten joint to a required torque. If leak does not stop, replace pipe and/or fittings. Do not use pipe dope, cement or seal weld to stop pipe leaks.
4. Gasketed Joints - Remove existing gasket and insert new gasket.
5. Welded Steel Joints - Repair pipe in accordance with applicable ASME B31 code.
6. Leaks in Material - Leaks located in pipe or fitting material require the replacement of that section of pipe or fitting and a repeat of the entire system using the complete procedure required for that system. Caulking, welding or epoxy is not permitted. Repair all damage caused by leaks.

F. Flushing - Complete pressure testing requirements prior to flushing. Performance of the flushing may be witnessed by the Architect/Engineer, Owner, or their representative, provide ample notification to all parties in advance of flushing any system. Perform system flushing in accordance with the following procedures:
1. Flush all main and branch steam and liquid piping systems after pressure testing is complete with new potable water while draining the system at all low points. Isolate all connected equipment and flush individually.
2. Flushing for piping and equipment will be considered complete when water samples taken at all low points indicate clear discharge-with no visible solids. If not clear, continue flushing and sampling until discharge is clear.

G. Cleaning - Complete flushing requirements prior to cleaning. Performance of the cleaning may be witnessed by the Architect/Engineer, Owner, or their representative, provide ample notification to all parties in advance of cleaning any system. Perform system cleaning in accordance with the following procedures:
1. Clean all steam and condensate lines by blowing them out with live steam. Discharge steam and condensate from each main and branch safely to atmosphere for a minimum of five minutes.

2. Clean domestic water lines by flushing with water until effluent is visibly as clean as the flushing medium.
3. Clean hot water/chilled water lines as described below:
   a. When flushing discharge is clear, fill piping systems with water and sufficient approved alkaline cleaning material to remove dirt, oil and grease. Include all connected equipment in the cleaning.
   b. Vent system and place in operation, with automatic controls operating at set point temperature or an operating temperature designated by the Architect/Engineer. Circulate the solution through the system for a minimum of 4 consecutive hours.
   c. After 4 hours, drain system and flush with clean water until the pH at the farthest drain matches the clean water input. Keep strainers unplugged during the cleaning operations. Refill system with clean water.
4. Clean temporary pump strainers and strainers at coils, etc. every 2 hours periodically during cleaning procedures. Do not remove temporary strainers until all cleaning steps are completed and the operation of the system indicates that the system is free of all foreign matter.
5. Blow out all piping and equipment after cleaning and final flushing is completed and the system is drained with clean dry instrument air for a minimum of 15 minutes or until all water is expelled from the system. Upon completion seal the system by closing all drains and vents.
6. Following the Architect/Engineer approval of the above flushing and cleaning procedures, immediately fill each system and chemically treat and monitor in accordance with the "Chemical Treatment Systems" specifications.

H. Pressure Testing Schedule:

Service	Test Type	Design Operating Pressure (psig)	Test Pressure (psig)
Steam Piping	Hydrostatic		1.5 times maximum working pressure, but not less than 100 psi
Condensate Piping	Hydrostatic		1.5 times maximum working pressure, but not less than 100 psi
Heating Hot Water Supply & Return	Hydrostatic		1.5 times maximum working pressure, but not less than 100 psi

3.11 PIPE FREEZING

A. Where pipe freezing is required because of the lack of isolation valves, completely freeze piping using a jacket of liquid nitrogen. Provide the services of a company specializing in pipe freezing to perform the Work. Submit to the Architect/Engineer evidence that the company has performed this work for at least 5 years.

B. Approved Manufacturer's:
   1. Freeze Tech, Inc.
   2. Pro Tapping, Inc.

3.12 HOT TAPPING

A. Provide a hot tapping tool for cutting holes in piping under pressure without interrupting system operation and without release or loss of fluid.

B. Provide hot taps to permit new tie-ins to existing piping systems, insertion of flow meters, and permanent or temporary bypasses.

C. Hot tap rating, ½ through 48 inch line size: 1500 psig maximum operating pressure at 100 degrees F and 750 degrees F maximum operating temperature at 700 psig.

D. Provide the following information on the line to be tapped to the hot tap vendor before starting the Work:
   1. Line size, wall thickness, and pipe material.
   2. Fluid in line, and operating pressure and temperature.
   3. Dimensional information and restrictions, if any.
   4. Tap size and orientation (if other than 90 degrees perpendicular to run of the pipe, give full details).

E. Provide the services of a company specializing in hot taps to perform the Work. Submit to the Architect/Engineer evidence that the company has performed this work for at least 5 years.

F. Approved Manufacturer's:
   1. Topaz, Inc.
   2. Pro Tapping, Inc.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Pipe, pipe fittings, valves, and connections for piping systems.

B. Condensate Drain.

1.02 RELATED SECTIONS

A. Section 230529 - Pipe Hangers and Supports

B. Section 230555 - Mechanical System Identification

C. Section 230700 - Piping Insulation.

1.03 REFERENCES

A. Section 014500 - Quality Control: Requirements for references and standards.

B. ASTM D1784 - Rigid Vinyl Compounds.

C. ASTM D1785 - PVC Plastic Pipe, Schedule 40

D. ASTM D2466 - PVC Plastic Fittings, Schedule 40

E. ASTM D2665 - PVC Drain, Waste, and Vent Pipe and Fittings

F. ASTM D2564 - Solvent Cements for PVC Pipe and Fittings

G. ASTM D2321 - Underground Installation of Thermoplastic Pipe (non-pressure applications)

H. ASTM F1668 - Procedures for Buried Plastic Pipe

I. ASTM F1866 - Fabricated PVC DWV Fittings

J. NSF Standard 14 - Plastic Piping Components and Related Materials.

K. NSF Standard 61 - Drinking Water System Components - Health Effects.

1.04 SUBMITTALS FOR REVIEW

A. 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. Condensate Drain Piping Product Data Submittal

a. Product Data: Provide data on pipe materials, pipe fittings, and accessories. Provide manufacturers catalog information.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with State of New York and Town code.

B. Identify pipe with marking including size, ASTM material classification and ASTM specification.

1.06 DELIVERY, STORAGE, AND PROTECTION

A. Section 016500 – Product Delivery, Storage, and Handling: Transport, handle, store, and protect products.

B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Section 014536 – Environmental Quality Control: Moisture control affecting products on site.

PART 2 - PRODUCTS

2.01 CONDENSATE DRAIN PIPING (DIAMETER LESS THAN OR EQUAL TO 1")

A. Copper Type L Pipe and Fitting System.

B. Pipe and fittings shall be manufactured from Type L Copper.

C. Pipe and fittings shall be manufactured as a system and be the product of one manufacturer.

D. Pipe and fittings shall conform to National Sanitation Foundation (NSF) Standard 61 or the health effects portion of NSF Standard 14.

E. Testing with or transport/storage of compressed air or gas in Copper pipe or fittings shall not be permitted.

F. The system is intended for pressure drainage applications where the temperature will not exceed 140°F.

2.02 CONDENSATE DRAIN PIPING (DIAMETER GREATER THAN 1")

A. Type L copper solid wall pipe and type L copper fitting system.

B. Pipe and fittings shall be manufactured as a system and be the product of one manufacturer.

C. Pipe and fittings shall conform to National Sanitation Foundation (NSF) Standard 14.

D. Testing with or transport/storage of compressed air or gas in copper pipe or fittings shall not be permitted.

E. The system is intended for non-pressure drainage applications where the temperature will not exceed 140°F.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Section 013100 - Project Management and Coordination: Verification of existing conditions before starting work.

3.02 PREPARATION

A. Ream pipe and tube ends. Remove burrs.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions and the requirements of the Plumbing Code of New York State.

B. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls. Effect changes in size with reducing fittings.

C. Install piping to maintain headroom, conserve space, and not interfere with use of space.

D. Group piping whenever practical at common elevations.

E. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to fittings. Refer to Section 230700.

F. Provide access where valves and fittings are not exposed.

G. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

H. Sleeve pipes passing through partitions, walls and floors.

I. Identify piping under provisions of Section 230555.

3.04 APPLICATION

A. Install unions downstream at equipment or apparatus connections.

3.05 ERECTION TOLERANCES

A. Section 014500 - Quality Control: Tolerances.

B. Establish invert elevations, slopes for drainage to ¼ inch per foot minimum. Maintain gradients.

3.06 FIELD QUALITY CONTROL

A. Drainage System: Test plug all system openings with the exception of the system's highest point. Fill system with water to the point of overflow and subject the highest point to 10-foot head of

water. The system shall be considered tight if the pressure is held for not less than 30 minutes without signs of leakage.

END OF SECTION

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PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This section describes the pipe specialties for piping systems including, but not limited, to the following:
   1. Drain Valves
   2. Strainers
   3. Air Vents
   4. Escutcheons
   5. Dielectric Connections

1.02 REFERENCES

A. ASME - Boilers and Pressure Vessel Codes, SEC 8-D-Rules for Construction of Pressure Vessels.

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. Piping Specialties Product Data Submittal
      a. Product Data: Submit product data for manufactured products and assemblies required for this project. Include component sizes, rough-in requirements, service sizes and finishes. Include produce description, model and dimensions.
      b. Submit manufacturer's instructions for maintenance and repair.
      c. Submit a valve and specialty application schedule.

1.04 OPERATION AND MAINTENANCE DATA

A. Maintenance Data: Include installation instructions, assembly views, lubrication instructions and replacement parts list.

1.05 RELATED WORK

A. Section 232000 - Pipe, Valves and Fittings

1.06 QUALIFICATIONS

A. Companies specializing in making products specified with at least 5 years of experience and products that have been on the market for at least 3 years.

PART 2 - PRODUCTS

2.01 DRAIN VALVE

A. Provide drain valves, ball type with ¾ inch hose connector, at all low points of water systems, on strainers, and in all locations as shown on the Drawings. Provide minimum 3/4 inch drain size. Provide caps or plugs with chain at all drain and fill valves.

2.02 STRAINERS

A. General:
   1. Provide strainers ahead of all pumps, automatic control valves, as specified for piping installations, as shown on the Drawings, and as required for proper functioning of equipment.

B. Steam and Water Strainers
   1. “Y” type or “Basket” type, as shown on the Drawings.
   2. Provide a strainer screen blow down valve the full size of the blow-off tapping for each strainer. Provide gate valves for steam service and ball valve with ½ inch hose end for water service.
   3. Stainless steel strainer screens with perforations as follows:

Pipe Size (Inches)	Water Service Perforations (Inches)	Steam Service Perforations (Inches)
Thru 4	1/16 (except at cooling tower pumps shall be 1/8)	1/32
Over 4	1/8	3/64

1. Select the length of the nipple connecting the blow-off valve to the strainer basket flange so that the blow-off valve is clear of the insulation.
2. Select strainers with bodies compatible with connected piping from the following schedule for the service intended.

Size	Manufacturer	Strainer Type	Model No.	Description
2 inches & smaller	Mueller Steam Specialty	Y	11 M	Cast iron body, threaded ends, ANSI Class 250
2 inches & smaller	Mueller Steam Specialty	Y	358 S	Bronze body, soldered ends, ANSI Class 125, for copper pipe
2 ½ inches & larger	Mueller Steam Specialty	Y	758	Cast iron body, flanged ends, ANSI Class 125
2 inches & smaller	Mueller Steam Specialty	Basket	125	Cast iron body, screwed ends, ANSI Class 125
2 inches & smaller	Mueller Steam Specialty	Basket	125 B	Bronze body, screwed ends, ANSI Class 150, for copper pipe
2 ½ inches & larger	Mueller Steam Specialty	Basket	166	Cast iron body, flanged ends, ANSI Class 250

2.03 AIR VENTS

A. Automatic Air Vents:
   1. Float actuated high capacity air vent designed to purge free air from the system and provide shutoff at pressures up to 150 psig at a maximum temperature of 250 degrees F. Design to prevent air from entering the system if system pressure drops below atmospheric pressure and to purge free air at pressures up to 150 psig during normal system operation.
   2. Cast iron and fitted with components of stainless steel, brass, and EPDM.
   3. Provide a shutoff ball valve before the automatic air to isolate the air vent from the system.
   4. Approved Manufacturer: ITT Bell & Gossett Model 107A.

B. Manual Air Vents:
   1. ½ inch ball valves with ½ inch hose ends.

2.04 ESCUTCHEONS

A. Provide escutcheons with spring-catch fasteners at all locations where insulated or uninsulated piping, installed exposed to view, penetrates wall, partitions, floors, and ceilings.

B. Plain pattern, chrome-plated brass for all piping except galvanized steel.

C. Galvanized around galvanized steel pipe.

D. Deep recess to cover sleeves at floor penetrations.

2.05 DIELECTRIC CONNECTIONS

A. Approved Manufacturer: Watts Regulator Series 3000 Dielectric Unions and Flange Systems

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION

A. Install work in accordance with manufacturer's instructions and as shown on the Drawings.

B. Furnish and connect to all valves, brass tags, polished or lacquered, with stamp lettering or numbers filled in with black paint. Identify each zone.

C. See "Pipe, Valve and Fitting" Specification for more information.

D. Secure escutcheons to the pipe or insulation and flush with the building surface.

E. Clean the valves and place them in final operating position

3.02 STRAINER INSTALLATION

A. Installed strainers so they are readily accessible

B. Remove start-up strainer screen from suction diffusers and strainers and install permanent screens prior to balancing water systems.

3.03 AIR VENT INSTALLATION

A. Provide automatic air vents with ¼ inch copper drip lines to the nearest floor or roof drain.

B. Install air vents where shown on the Drawings and at the high points of all systems and at other locations as required to allow complete venting of air from the system.

3.04 DIELECTRIC CONNECTIONS

A. Isolate connections between dissimilar metallic materials. Use dielectric unions or flanges that provide a complete isolation of the two ends, including bolts for flanges, using materials suitable for the design pressure, temperature and fluid contained.

END OF SECTION

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PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This Section describes steam specialties, including vacuum breakers for steam and condensate piping systems.

1.02 REFERENCES

A. ASME - Boilers and Pressure Vessel Codes, SEC 8-D-Rules for Construction of Pressure Vessels.

B. ASME B31.1 - Power piping.

C. ASME B31.9 - Building Services piping.

1.03 SUBMITTALS

A. 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. Steam Specialties Product Data Submittal
      a. Product Data: Provide product data for manufactured products and assemblies required for the Work. Include component sizes, rough-in requirements, service sizes, and finishes. Include product description, model, and dimensions.
      b. Submit the manufacturer's instructions for maintenance and repair.

1.04 OPERATION AND MAINTENANCE DATA

A. Maintenance Data: Include installation instructions, assembly views, lubrication instructions, and a replacement parts list.

1.05 RELATED WORK

A. Section 232000 - Pipe, Valves, and Fittings

PART 2 - PRODUCTS

2.01 VACUUM BREAKERS

A. Steam Systems (Atmospheric Return)
   1. Provide Vacuum Breakers on all modulating or on/off heat exchangers and coils, except in vacuum return systems. Installed in the supply side between the control valve and equipment and be of hardened ball check valve design with all working parts manufactured from stainless steel. Construction; Brass or stainless steel bodies as required for the application, suitable for operating conditions of 210 psig (or 304 psig) saturated steam.
   2. Approved manufacturers: - Spirax/Sarco Model VB.
   3. Install in a vertical position with cap at the top at the highest point of the circuit. Provide n isolating valve upstream of device.

B. Steam Systems (Vacuum Return)
   1. Provide swing check valves of the type specified for the piping system between the coil and the vacuum return line. Provide isolation valves and union upstream and downstream of the device.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION

A. Install Work in accordance with manufacturer’s instructions and as shown on the Drawings.

END OF SECTION

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PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Pipes, Valves, and Fittings: Section 232000.

1.02 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. Steam Traps Product Data Submittal
      a. Product Data: Manufacturer's catalog sheets, specifications, and installation instructions for each type of trap.
      b. Submit the manufacturer's instructions for maintenance and repair.

PART 2 - PRODUCTS

2.01 TRAPS - GENERAL

A. Unless otherwise indicated, size combination float and thermostatic, inverted bucket and impulse traps of capacity to continuously discharge 2-1/2 times the normal condensate rate of particular equipment or apparatus being served.

B. Combination float and thermostatic, and inverted bucket traps with integral strainers may be submitted for approval, in lieu of a separate trap and strainer, if the integral strainer and trap meet individual trap and strainer specifications.

2.02 COMBINATION FLOAT AND THERMOSTATIC TRAPS

A. Product Requirements: Design for 125 psig steam pressure, when used in systems up to 30 psig inclusive, and 175 psig steam pressure for systems operating from 31 psig to 125 psig inclusive. Base maximum ratings on 1/2 psi differential through the trap. Size orifices rated for the operating steam pressure. Wearing parts shall be renewable.

B. Materials: Cast iron body and cover; copper or stainless steel float; brass or stainless steel valve mechanisms; stainless steel valve seats and stainless steel or bronze valve heads. Air vent of the balanced pressure type with bronze, monel, or stainless steel bellows; stainless steel or hard bronze valve head and seat.

C. Applications: Steam heating coils, heat exchangers, steam main, and riser drip legs.

2.03 THERMOSTATIC TRAPS

A. Class 125, bronze angle-pattern body with integral union tailpiece and screw-in cap; balanced-pressure, stainless-steel or Monel bellow element; and renewable, hardened stainless-steel head and seat.

B. Application: Steam fin tube and convectors.

2.04 THERMOSTATIC RADIATOR TRAPS

A. Design and Materials: Balanced pressure volatile liquid filled bellows type, designed to operate at 25 psig steam pressure. Furnish bronze bodies with finished terminals and brass union; thermostatic seamless tubing bellows of phosphor bronze, monel metal or stainless steel, with a minimum of seven folds, stainless steel valve head and seat.

B. Application: Steam radiators.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install traps in accordance with the manufacturer's printed installation instructions.

B. Unless otherwise indicated, install gate valve, strainer, and union upstream from the trap; install union, check valve, and gate valve downstream from trap.

C. When steam trap discharge is elevated, provide a check valve after the trap.

D. Install dirt pockets/ drip legs at all drops and risers of steam condensate lines.

E. Provide steam trap tagging, identification and schedule in accordance with valve tagging specification.

F. When freezing is a possibility, install thermodynamic steam traps in the vertical position otherwise thermodynamic traps may be installed in the horizontal position.

G. When freezing is a possibility, install float and thermostatic steam traps with a Liquid Expansion Steam Trap below the drain tapping of the trap as recommended by the manufacturer.

H. Provide piping upstream and downstream of steam traps (from drip leg connection or equipment outlet connection to condensate return main connection) at least 1 pipe size greater than trap size.

I. Combination Float and Thermostatic Traps:
   1. Use to trap equipment controlled by a modulating valve. Do not install inverted bucket traps for this service.
   2. Use where indicated, to drip the end of each steam main, and at other points where indicated, for steam systems with operating pressures up to and including 15 psig.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Requirements of the following Division 23 Sections apply to this section:
   1. Section 230010 - General Mechanical Requirements.
   2. Section 230529 - Pipe Hangers And Supports
   3. Section 230555 - Mechanical System Identification
   4. Section 230700 - Pipe Insulation

1.02 SUMMARY

A. This Section includes refrigerant piping used for air conditioning applications. This Section includes:
   1. Piping, tubing, fittings, and specialties.
   2. Special duty valves.
   3. Refrigerants.

B. Products installed but not furnished under this Section include pre-charged tubing, refrigerant specialties, and refrigerant accessories furnished as an integral part of or separately with packaged air conditioning equipment.

1.03 SUBMITTALS

A. 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. Refrigerant Piping Product Data Submittal
      a. Product data for the following products:
         1) Each type of valve specified.
         2) Each type of refrigerant piping specialty specified.
      b. Maintenance data for refrigerant valves and piping specialties, for inclusion in the Operating and Maintenance Manual specified in Division 01 and Division 23.
   2. Refrigerant Piping Shop Drawings
      a. Shop Drawings showing layout of refrigerant piping, specialties, and fittings including, but not necessarily limited to, pipe and tube sizes, valve arrangements and locations, slopes of horizontal runs, wall and floor penetrations, and equipment connection details. Show interface and spatial relationship between piping and proximity to equipment.
   3. Brazer's Certifications
      a. Brazer's Certificates signed by Contractor certifying that brazers comply with requirements specified under "Quality Assurance" below.

1.04 QUALITY ASSURANCE

A. Qualify brazing processes and brazing operators in accordance with ASME "Boiler and Pressure Vessel Code," Section IX, "Welding and Brazing Qualifications".

B. Regulatory Requirements: Comply with provisions of the following codes:
   1. ANSI B31.5: ASME Code for Pressure Piping - Refrigerant Piping.
   2. ANSI/ASHRAE Standard 15: Safety Code for Mechanical Refrigeration.

C. 2025 Mechanical Code of New York State

1.05 SEQUENCING AND SCHEDULING

A. Coordinate the installation of roof piping supports, and roof penetrations.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include, but are not limited to, the following:

B. Refrigerant Valves and Specialties:
   1. Alco Controls Div, Emerson Electric
   2. Danfoss Electronics, Inc
   3. EATON Corporation, Control Div
   4. Henry Valve Company
   5. Parker-Hannifin Corporation, Refrigeration and Air Conditioning Division
   6. Sporlan Valve Company

2.02 PIPE AND TUBING MATERIALS

A. General: Refer to Part 3, Article "PIPE APPLICATIONS" for identification of systems where the below specified pipe and fitting materials are used.

B. Copper Tubing: ASTM B 280, Type ACR, hard-drawn straight lengths, and soft-annealed coils, seamless copper tubing. Tubing shall be factory cleaned, ready for installation, and have ends capped to protect cleanliness of pipe interiors prior to shipping.

C. Copper Tubing: ASTM B 88, Type L, hard-drawn straight lengths, and soft-annealed coils, seamless copper tubing.

2.03 FITTINGS

A. Wrought-Copper Fittings: ANSI B16.22, streamlined pattern for hard drawn and soft copper.

2.04 JOINING MATERIALS

A. Brazing Filler Metals: AWS A5.8, Classification BAg-1 (Silver)

2.05 VALVES

A. General: Complete valve assembly shall be UL-listed and designed to conform to ARI 760.

B. Globe: 450 psig maximum operating pressure, 275 deg. F maximum operating temperature; cast bronze body, with cast bronze or forged brass wing cap and bolted bonnet; replaceable resilient seat disc; plated steel stem. Valve shall be capable of being repacked under pressure. Valve shall be straight through or angle pattern, with solder-end connections.

C. Check Valves - Smaller Than 7/8 inch: 500 psig maximum operating pressure, 300 deg. F maximum operating temperature; cast brass body, with removable piston, Teflon seat, and stainless steel spring; straight through globe design. Valve shall be straight through pattern, with solder-end connections.

D. Check Valves - 7/8 inch and Larger: 450 psig maximum operating pressure, 300 deg. F maximum operating temperature; cast bronze body, with cast bronze or forged brass bolted bonnet; floating piston with mechanically retained Teflon seat disc. Valve shall be straight through or angle pattern, with solder-end connections.

E. Solenoid Valves: 250 deg. F temperature rating, 400 psig working pressure; forged brass, with Teflon valve seat, two-way straight through pattern, and solder end connections. Provide manual operator to open valve. Furnish complete with NEMA 1 solenoid enclosure with 1/2 inch conduit adapter, and 24 volt, 60 Hz. normally closed holding coil.

F. Hot Gas Bypass Valve: adjustable type, sized to provide capacity reduction beyond the last step of compressor unloading; and wrought copper fittings for solder end connections.

2.06 REFRIGERANT PIPING SPECIALTIES

A. General: Complete refrigerant piping specialty assembly shall be UL-listed and designed to conform to ARI 760.

B. Strainers: 500 psig maximum working pressure; forged brass body with monel 80-mesh screen, and screwed cleanout plug; Y-pattern, with solder end connections.

C. Moisture/liquid Indicators: 500 psig maximum operation pressure, 200 deg. F maximum operating temperature; forged brass body, with replaceable polished optical viewing window, and solder end connections.

D. Filter-driers: 500 psig maximum operation pressure; steel shell, flange ring, and spring, ductile iron cover plate with steel capscrews, and wrought copper fittings for solder end connections. Furnish complete with replaceable filter-drier core kit, including gaskets. Standard capacity desiccant sieves to provide micronic filtration.

E. Flanged Unions: 400 psig maximum working pressure, 330 deg. F maximum operating temperature; two brass tailpiece adapters for solder end connections to copper tubing; flanges for 7/8 inch through 1-5/8 inch unions shall be forged steel, and for 2-1/8 inch through 3-1/8 inch shall be ductile iron; four plated steel bolts, with silicon bronze nuts and fiber gasket. Flanges and bolts shall have factory-applied rust-resistant coating.

F. Flexible Connectors: 500 psig maximum operating pressure; seamless tin bronze or stainless steel core, high tensile bronze braid covering, solder connections, and synthetic covering; dehydrated, pressure tested, minimum 7 inch in length.

2.07 REFRIGERANTS

A. Refrigerant No. 454B, in accordance with ASHRAE Standard 34.

B. Refrigerant No. 32, in accordance with ASHRAE Standard 34.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine rough-in for refrigerant piping systems to verify actual locations of piping connections prior to installation.

3.02 PIPE APPLICATIONS

A. Use Type L, or Type ACR drawn copper tubing with wrought copper fittings and brazed joints above ground, within building. Use Type K, annealed temper copper tubing for 2 inch and smaller without joints, below ground and within slabs. Mechanical fittings (crimp or flair) are not permitted.

B. Install annealed temper tubing in pipe duct. Vent pipe duct to the outside.

C. If other than Type ACR tubing is used, clean and protect inside of tubing as specified in Article "CLEANING" below.

3.03 PIPING INSTALLATIONS

A. General: Install refrigerant piping in accordance with ASHRAE Standard 15 - "The Safety Code for Mechanical Refrigeration."

B. Install piping in as short and direct arrangement as possible to minimize pressure drop.

C. Install piping for minimum number of joints using as few elbows and other fitting as possible.

D. Arrange piping to allow normal inspection and servicing of compressor and other equipment. Install valves and specialties in accessible locations to allow for servicing and inspection.

E. Provide adequate clearance between pipe and adjacent walls and hanger, or between pipes for insulation installation. Use sleeves through floors, walls, or ceilings, sized to permit installation of full thickness insulation.

F. Insulate suction lines. Liquid line are not required to be insulated, except where they are installed adjacent and clamped to suction lines, where both liquid and suction lines shall be insulated as a unit.

G. Do not install insulation until system testing has been completed and all leaks have been eliminated.

H. Install branch tie-in lines to parallel compressors equal length, and pipe identically and symmetrically.

I. Install copper tubing in rigid or flexible conduit in locations where copper tubing will be exposed to mechanical injury.

J. Slope refrigerant piping as follows:
   1. Install horizontal hot gas discharge piping with 1/2" per 10 feet downward slope away from the compressor.
   2. Install horizontal suction lines with 1/2 inch per 10 feet downward slope to the compressor, with no long traps or dead ends which may cause oil to separate from the suction gas and return to the compressor in damaging slugs.
   3. Liquid lines may be installed level.

K. Install traps and double risers where indicated, and where required to entrain oil in vertical runs.

L. Use fittings for all changes in direction and all branch connections.

M. Install exposed piping at right angles or parallel to building walls. Diagonal runs are not permitted, unless expressly indicated.

N. Install piping free of sags or bends and with ample space between piping to permit proper insulation applications.

O. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors, unless indicated to be exposed to view.

P. Install piping tight to slabs, beams, joists, columns, walls, and other permanent elements of the building. Provide space to permit insulation applications, with 1 inch clearance outside the insulation. Allow sufficient space above removable ceiling panels to allow for panel removal.

Q. Locate groups of pipe parallel to each other, spaced to permit applying insulation and servicing of valves.

R. Exterior Wall Penetrations: Seal pipe penetrations through exterior walls using sleeves and mechanical sleeve seals. Pipe sleeves smaller than 6 inch shall be steel; pipe sleeves 6 inch and larger shall be sheet metal.

S. Fire Barrier Penetrations: Where pipes pass through fire rated walls, partitions, ceilings, and floors, maintain the fire rated integrity. Refer to Division 7 for special sealers and materials.

T. Make reductions in pipe sizes using eccentric reducer fittings installed with the level side down.

U. Install strainers immediately ahead of each expansion valve, solenoid valve, hot gas bypass valve, compressor suction valve, and as required to protect refrigerant piping system components.

V. Install moisture/liquid indicators in liquid lines between filter/driers and thermostatic expansion valves and in liquid line to receiver.

W. Install moisture/liquid indicators in lines larger than 2-1/8 inch OD, using a bypass line.

X. Install unions to allow removal of solenoid valves, pressure regulating valves, expansion valves, and at connections to compressors and evaporators.

Y. Install flexible connectors at the inlet and discharge connection of compressors.

3.04 HANGERS AND SUPPORTS

A. General: Hanger, supports, and anchors are specified in Division 23 Section "PIPE HANGERS AND SUPPORTS." Conform to the table below for maximum spacing of supports:

B. Install the following pipe attachments:
   1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet in length.

C. Support horizontal copper tubing in accordance with MSS SP-69 Tables 3 and 4, excerpts of which follow below:

NOMINAL PIPE SIZE (Inches)	ROD DIAMETER (Inches)	MAXIMUM SPACING

		(Feet)
1/2 to 3/4	3/8	5
1	3/8	6
1-1/4	3/8	6
1-1/2	3/8	8
2	3/8	8

D. Support vertical runs at each floor.

3.05 PIPE JOINT CONSTRUCTION

A. Brazed Joints: Comply with the procedures contained in the AWS "Brazing Manual."

B. WARNING: Some filler metals contain compounds which produce highly toxic fumes when heated. Avoid breathing fumes. Provide adequate ventilation.

C. CAUTION: When solenoid valves are being installed, remove the coil to prevent damage. When sight glasses are being installed, remove the glass. Remove stems, seats, and packing of valves, and accessible internal parts of refrigerant specialties before brazing. Do no apply heat near the bulb of the expansion valve.

D. Fill the pipe and fittings during brazing, with an inert gas (i.e., nitrogen or carbon dioxide) to prevent formation of scale.

E. Heat joints using oxy-acetylene torch. Heat to proper and uniform brazing temperature.

3.06 VALVE INSTALLATIONS

A. General: Install refrigerant valves where indicated, and in accordance with manufacturer's instructions.

B. Install globe valves on each side of strainers and driers, in liquid and suction lines at evaporators, and elsewhere as indicated.

C. Install a full sized, 3-valve bypass around each drier.

D. Install solenoid valves ahead of each expansion valve and hot-gas bypass valve. Install solenoid valves in horizontal lines with coil at the top.

E. Electrical wiring for solenoid valves is specified in Division 26. Coordinate electrical requirements and connections.

F. Thermostatic expansion valves may be mounted in any position, as close as possible to the evaporator.

G. Where refrigerant distributors are used, mount the distributor directly on the expansion valve outlet.

H. Install the valve in such a location so that the diaphragm case is warmer than the bulb.

I. Secure the bulb to a clean, straight, horizontal section of the suction line using two bulb straps. Do not mount bulb in a trap or at the bottom of the line.

J. Where external equalizer lines are required make the connection where it will clearly reflect the pressure existing in the suction line at the bulb location.

K. Install pressure regulating and relieving valves as required by ASHRAE Standard 15.

3.07 EQUIPMENT CONNECTIONS

A. The Drawings indicate the general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment to allow servicing and maintenance.

3.08 FIELD QUALITY CONTROL

A. Inspect, test, and perform corrective action of refrigerant piping in accordance with ASME Code B31.5, Chapter VI.

B. Repair leaking joints using new materials, and retest for leaks.

3.09 CLEANING

A. Before installation of copper tubing other than Type ACR tubing, clean the tubing and fitting using following cleaning procedure:
   1. Remove coarse particles of dirt and dust by drawing a clean, lintless cloth through the tubing by means of a wire or an electrician's tape.
   2. Draw a clean, lintless cloth saturated with trichloroethylene through the tube or pipe. Continue this procedure until cloth is not discolored by dirt.
   3. Draw a clean, lintless cloth, saturated with compressor oil, squeezed dry, through the tube or pipe to remove remaining lint. Inspect tube or pipe visually for remaining dirt and lint.
   4. Finally, draw a clean, dry, lintless cloth through the tube or pipe.

3.10 ADJUSTING AND CLEANING

A. Verify actual evaporator applications and operating conditions, and adjust thermostatic expansion valve to obtain proper evaporator superheat requirements.

B. Clean and inspect refrigerant piping systems in accordance with requirements of Division-23 General Mechanical Requirements

C. Adjust controls and safeties. Replace damaged or malfunctioning controls and equipment with new materials and products.

3.11 COMMISSIONING

A. Charge system using the following procedure:
   1. Install core in filter dryer after leak test but before evacuation.
   2. Evacuate refrigerant system with vacuum pump; until temperature of 35 deg F is indicated on vacuum dehydration indicator.
   3. During evacuation, apply heat to pockets, elbows, and low spots in piping.
   4. Maintain vacuum on system for minimum of 5 hours after closing valve between vacuum pump and system.
   5. Break vacuum with refrigerant gas, allow pressure to build up to 2 psi.
   6. Complete charging of system, using new filter dryer core in charging line. Provide full operating charge.
   7. Train Owner's maintenance personnel on procedures and schedules related to start-up and shut-down, troubleshooting, servicing, and preventative maintenance of refrigerant piping valves and refrigerant piping specialties.

B. Review data in Operating and Maintenance Manuals. Refer to Division 01 section "Project Closeout."

C. Schedule training with Owner with at least 7 days advance notice.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This Section describes the galvanized steel, flexible, and aluminum ductwork for HVAC duct systems in accordance with SMACNA Duct Construction Standards, except as otherwise specified.

B. The construction material for each ductwork system shall be as listed in the “Ductwork Material Schedule” at the end of this Section.

C. This Section also describes the fittings, access doors, hangers and supports, manual volume dampers, and sealants for each ductwork system as required.

1.02 RELATED WORK

A. Section 230594 - Balancing of Air Systems

1.03 REFERENCES

A. ASHRAE - Handbook Fundamentals; Latest Edition.

B. SMACNA - HVAC Duct Construction Standards, Metal and Flexible (latest issue)

C. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

D. ASTM B209 - Specifications for Aluminum and Aluminum-Alloy Sheet and Plate.

E. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.

F. UL 555 S - Fire Dampers & Smoke Dampers.

G. NFPA 96 - Standard for Commercial Cooking Operations

H. New York State Mechanical Code.

1.04 REGULATORY REQUIREMENTS

A. Construct ductwork to NFPA 90A, 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. Heating and Cooling coils.
   7. Fan Plenums.
   8. In-Line Fans (suction and discharge sides)
   9. 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 ALUMINUM DUCTWORK

A. Construct ducts of minimum No. 20 gauge aluminum sheet meeting ASTM B209, Series 3000 Alloy.

B. Construct ductwork as per “GALVANIZED STEEL RECTANGULAR DUCTS AND FITTINGS” section above unless otherwise noted in this section.

C. At shower room locations, pitch horizontal ductwork minimum ¼ inch per foot such that low point is at shower room.

2.11 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 HEAVY DUTY FLEXIBLE CONNECTIONS

A. Heavy Duty Flexible Connections shall be used in high pressure (greater than 2 in. w.c.), high temperature (greater than 150 degree F) air applications or where the gas is highly corrosive and the duct connector must be leak proof.

B. Flexible Connectors shall be flanged. If installed outdoors, all metallic components shall be stainless steel construction. Provide flexible connector materials of construction as recommended by the manufacturer for the pressure, temperature, and gas that is being used in air handler system.

C. Approved Manufacturers:
   1. Mercer Rubber Company or Engineer approved equivalent.

2.13 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.

2.14 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. Do not support ductwork from furring, hung ceilings, metal floor deck, metal roof deck or from another duct or pipe.

C. Do not hang lighting fixtures or piping from ductwork.

D. Do not use perforated band iron.

E. Support ductwork at each change in direction.

F. Where duct connects to or terminates at masonry openings or at floors where concrete curbs are not used, provide a continuous 1 ½ inch by 1 ½ inch by 3/16 inch galvanized steel angle support around the ductwork. Bolt and seal the supports to the building construction using expansion bolts and caulking compound. Seal shall be watertight at floor or wall and duct such that a spill will no pass down through the opening.

G. Fasten plenums and casings connected to concrete curbs using continuous 1 ½ inch by 1 ½ inch by ¼ inch galvanized steel angle support. Set the angle support in a continuous bead of caulking compound and anchor it to the curb with 3/8 inch diameter anchors on 16 inch centers. Terminate sheet metal at curb and bolt to angle support. Seal sheet metal to curb with a continuous bead of caulking.

H. For insulated ductwork, install hangers on the outside of the insulation. To maintain the insulation value, inset a piece of 1 inch thick, 6 pcf fiberglass board with a foil/scrim/kraft (FSK) jacket at these supports.

3.04 SEALING

A. Where ductwork is not continuously welded, soldered or gasketed, make seams and joints airtight with sealants.

B. Install the sealants in accordance with the sealant manufacturer's instructions and recommendations.

C. Seal all ductwork seams, joints, fastener penetrations and fittings connections with sealants in accordance with SMACNA Seal Classifications as required by SMACNA Duct Pressure Classification. All ductwork, regardless of pressure classification, shall have a minimum Seal Class B.

D. Completely fill all voids when liquid sealing ductwork. Several applications may be necessary to fill voids caused by shrinkage or runout of sealant.

3.05 DUCT-MOUNTED DEVICES AND ACCESS DOORS

A. Install all dampers, coils, airflow measuring stations, humidifiers and other duct-mounted devices, specified in other sections of the specifications or as shown and provide transformations to dimensions as required. Install devices in accordance with manufacturer's recommendations. Install dampers and coils a minimum of 4 feet away from changes 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	

G. Total system leakage shall not exceed 10 percent of the scheduled design capacity of the system when tested as per SMACNA testing methods.

3.08 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
Ductwork Exposed to Weather	Aluminum

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Provide exhaust fans, as specified herein, with accessories and of sizes and capacities as noted herein, and as scheduled and in locations shown on drawings.

B. Products listed in Part 2 of this Section include:
   1. Centrifugal Up / Down Blast Roof Fans
   2. Inline Mixed Air 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 076200: Flashing and Sheet Metal

C. Section 079200: Joint Sealants

D. Section 230010: General Mechanical Requirements

E. Section 230594: Balancing of Air Systems

F. Section 230991: Instrumentation and Controls Integration

G. Section 230993: Sequence of Operations

1.04 REFERENCE CODES AND STANDARDS

A. AMCA 99 - Standards Handbook

B. AMCA 210 - Laboratory Methods of Testing Fans for Rating

C. AMCA 300 - Reverberant Room Method for Sound Testing of Fans

D. ASHRAE Handbook, HVAC Applications Volume “Sound and Vibration Control”

E. UL listed and labeled.

1.05 SUBMITTALS

A. 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 additional information, requirements, and accessories.

2.02 CENTRIFUGAL UP/DOWN BLAST ROOF FANS

A. Roof mounted exhaust fans shall be of the up or down blast direct drive type, as scheduled.

B. The fan housing shall fan housing shall consist of the motor cover, shroud, curb cap and lower windband, and shall be constructed of heavy-gauge aluminum. Housing shall have a rigid internal support structure and leakproof design. The fan shroud shall be one-piece with a rolled bead for extra strength, which directs exhaust air downward. The low windband shall be one piece with formed edges for added strength and the curb cap shall include prepunched mounting holes to ensure correct attachment to the roof.

C. The fan wheel shall be centrifugal, non overload, backward-inclined, constructed of aluminum and shall include a wheel cone carefully matched to the inlet cone for precise running tolerances. Wheels shall be statically and dynamically balanced.

D. 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 1 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 manufactured by Greenheck or Engineer approved equivalent.

2.03 INLINE MIXED AIR FANS (RETURN EXHAUST FANS)

A. Fans shall be Model QSL (standard mixed flow) of the non-overloading design, as manufactured by Twin City Fan & Blower, Minneapolis, Minnesota or Engineer approved equivalent.

B. Performance:

1. Performance ratings shall conform to AMCA Standard 208 (fan energy index), 211 (air performance), and 311 (sound performance). Fans shall be tested in accordance with ANSI/AMCA Standard 210 (air performance) and 300 (sound performance) in an AMCA-accredited laboratory. Fans shall be licensed to bear the AMCA certified ratings seal for both

sound and air, and the fan energy index (FEI). Sound certification shall apply to both inlet and outlet sound power levels.

2. Fans shall be designed for maximum efficiency. Fans shall have a sharply rising pressure characteristic extending through the operating range and continuing to rise well beyond the efficiency peak to assure quiet and stable operation under all conditions. Horsepower characteristics shall be truly self-limiting and shall reach a peak in the normal selection area.
3. Model QSL shall be available UL 705 listed. Fans shall bear a permanently attached nameplate displaying the model and serial number of the unit for future identification.

C. Housing:
1. Housings shall be cylindrical and welded steel throughout. Inlets shall be fully streamlined. Housings shall be suitably braced to prevent vibration or pulsation. The totally enclosed belt guard shall enclose the motor sheave and V-belt drives. Punched inlet and outlet flanges shall be equipped for duct mounting. Extended lube lines shall be provided for ease of lubrication. Model QSL shall include a bolted access door for inspection and maintenance of the impeller.

D. Impeller:
1. Fan impellers shall have die-formed hollow airfoil blades designed for maximum efficiency and quiet and stable operation. Blades shall be continuously-welded to the back plate and impeller cone. Impellers shall be statically and dynamically balanced, and the complete fan assembly, including motor and drive, shall be test-balanced at or near the operating speed at the factory before shipment.

E. Shaft (Arr. 9 Only):
1. Shafts shall be AISI 1040 or 1045 hot-rolled steel, accurately turned, ground, polished, and ring-gauged for accuracy. Shafts shall be sized for the first critical speed of at least 1.43 times the maximum speed.

F. Bearings (Arr. 9 Only):
1. Bearings shall be heavy-duty, grease-lubricated, anti-friction ball or roller, self-aligning, pillow block type, and selected for a minimum L-10 life of 40,000 hours at the maximum fan RPM. Bearings shall be equipped with extended lubrication lines with grease fittings outside of the fan housing.

G. Drive (Arr. 9 Only):
1. Motor sheaves shall be cast iron, variable pitch on applications 10 HP and smaller, and fixed pitch on 15 HP and larger.

H. Arrangement 9:
1. Arrangement 9 signifies a belt-driven drive configuration where the motor is mounted externally on the outside of the fan casing.

I. Finish and Coating:
1. The entire fan assembly, excluding the shaft, shall be properly washed and pretreated before application of a rust-preventative primer, if called out on the order. After the fan is completely assembled, a finish coat of paint shall be applied to the entire assembly if called out on the order. The fan shaft shall be coated with a petroleum-based rust protectant. Aluminum components shall be unpainted.

J. Factory Run Test:
1. All fans with motors and drives mounted by Twin City Fan & Blower shall be completely assembled and test run as a unit at the specified operating speed before shipment. Each impeller shall be statically and dynamically balanced in accordance with ANSI/AMCA 204-96 “Balance Quality and Vibration Levels for Fans” to Fan Application Category BV-3, Balance Quality Grade G6.3. Balance readings shall be taken by electronic-type equipment in the axial, vertical, and horizontal directions on each of the bearings. Records shall be maintained, and a written copy shall be available upon request.

K. Accessories and Options:

1. Access door - bolted.
2. Flanges - inlet/outlet, punched.
3. Guard - belt, OSHA, sealed.
4. Vibration isolators - spring hangers.
5. Mounting brackets - ceiling.
6. Extended lube lines.
7. Variable speed v-belt drive.
8. Disconnect switch, unfused(NEMA 3R), mounted & wired.
9. Mounted TCF motor.
10. Remote VFD for soft start, balancing, & single zone VAV application with associated air handler.
11. Provide the manufacturer's standard warranty.
12. UL 705 listed, AMCA certified.

PART 3 - EXECUTION

3.01 GENERAL

A. Install fans, including all necessary structural supports and bracing as scheduled and located on the contract drawings in accordance with manufacturer’s instructions and approved submittals.

B. Connect duct to fans to allow for straight and smooth air flow.

C. Provide flexible connections (minimum of 4”) between fan and duct.

D. Install fan level: +/- 5 degrees vertical. Final installation shall be free of all leaks from both fan and associated ductwork.

3.02 START-UP, TESTING, DEMONSTRATION

A. Start-up fans after checkout to insure proper alignment and phased electrical connections.

B. Test fans individually and as part of system.

C. Insure supply / exhaust fans and dampers are properly interlocked, operate with control system as required to maintain building pressurization and exhaust per design documents and for proper building operation.

D. Provide all associated start-up and testing reports.

E. Demonstrate operation to Owner and instruct maintenance personnel in operation of equipment.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This Section describes the outdoor air inlets and outlets, blank-offs, and louver infill system, as specified herein, with capacities and sizes as scheduled on the Drawings.

B. Products listed in Part 2 of this Section include:
   1. Outdoor Air / Exhaust Louvers

1.02 RELATED WORK

A. Section 061000: Rough Carpentry

B. Section 076200: Flashing and Sheet Metal

C. Section 079200: Joint Sealants

D. Section 230010: General Mechanical Requirements

E. Section 230594: Balancing of Air and Hydronic Systems

1.03 REFERENCE CODES AND STANDARDS

A. ASHRAE 70 – Method of Testing for Rating the Airflow Performance of Outlets and Inlets.

B. NFPA 90A – Installation of Air Conditioning and Ventilation Systems

C. NFPA 90B – Installation of Warm Air Heating and Air Conditioning Systems

D. AAMA 2604 – High Performance Organic Coatings on Architectural Extrusions and Panels

E. AAMA 2605 - High Performance Organic Coatings on Architectural Extrusions and Panels

F. AMCA 500 - Test Methods for Louvers, Dampers and Shutters

G. AMCA 511 - Certified Ratings Program for Air Control Devices

H. ASTM C1193 - Standard Guide for Use of Joint Seals

I. Mechanical Code of New York State

1.04 SUBMITTALS

A. Submit for review, products utilized under this Contract per the requirements of section 013300-Submittals. Submissions shall include but not be limited to:
   1. Louvered Air Inlets and Outlets Product Data Submittal
      a. General Product Data – Submit catalog cuts and installation instructions for all products specified, including standard color samples.
      b. Louvers:
         1) Submit published manufacturer’s performance data for all of the different types of louvers.
         2) Performance Data – For each size and type, submit the following:
            (a) Free area
            (b) Maximum airflow in cfm
            (c) AMCA 511 performance data
      c. Panels:
         1) Samples:
            (a) Insulated Infill Panels: 12” x 12” size required. Samples shall have included all proposed coatings and be assembled with appropriate spacers and decorative elements.
            (b) Exterior and Interior Finish samples: 3" x 3" samples of the full manufacturers range of Standard Kynar colors offered
         2) Submission Drawings: Indicate thickness, dimension and components of parts. Detail methods, framing and tolerances to accommodate thermal movement.
      d. Framing:
         1) Mullion details, including reinforcement and stiffeners.

2) Joinery details.
3) Weather-stripping details.
4) Thermal-break details.
5) Submit any other components as required for Architect's approval. No fabrication shall be started until such approval is received. Contractor will verify all opening dimensions in the field and be responsible to provide proper size frame to fit all existing openings and note same on Shop Drawings.

1.05 DELIVERY, STORAGE AND HANDLING

A. Protect finish and edge in accordance with panel manufacturer's recommendations.

B. Store materials in accordance with panel manufacturer's recommendations.

1.06 QUALITY ASSURANCE

A. Field measurements shall be taken prior to completion of manufacturing and cutting.

B. Maximum deviation from vertical and horizontal alignment of installed panels is 1/8" (3mm) in 20' (6m) non-commutative

PART 2 - PRODUCTS

2.01 OUTSIDE AIR INTAKE / EXHAUST LOUVERS

A. Louvers - General:
1. Furnish and install louvers of the sizes and capacities as shown on the Drawings.
2. Coordinate color with Owner & Architectural drawings or specification.
3. Options: Refer to schedules

B. Designation LV-X:
1. Stationary 4 inch deep louver with drainable style blades.
2. Frame: heavy gauge 0.081" nominal wall thickness.
3. Blades: drainable design, 0.081" nominal wall thickness, 37½-degree slope on 3-1/4" centers.
4. Fabricate from 6063-T5 extruded aluminum.
5. Wind load rating of 25 PSF at 60"x96" size.
6. Nominal 55% free area at 48"x48".
7. Beginning water penetration of 0.01 oz./sq.ft. at 989 fpm. Maximum pressure drop at 700 FPM shall be 0.08”
8. Finish shall be factory mill finish, 70% PVDF or baked enamel.
9. Greenheck ESD-435 or approved equal.

PART 3 - EXECUTION

3.01 LOUVER INSTALLATION

A. Install louvers in locations shown on the Drawings.

B. Install louvers plumb, level, in plane of wall, and in alignment with adjacent work.

C. Install joint sealants as specified in Section 079200.

D. Coordinate with other work, and provide flashing, sheet metal, gaskets, and all other seal materials appropriate for intended use, and work required to ensure a weather tight building exterior construction and air tight interior seal between sleeve/duct/plenum and building opening as required.

E. Ensure existing sill is pitched towards exterior a minimum of 1/4" per foot. Provide supplementary wood framing and aluminum flashing or built up concrete sill as required.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This Section describes the air terminals as specified herein, with capacities, distribution patterns and connection sizes as scheduled on the Drawings.

B. Products listed in Part 2 of this Section include:
   1. Ceiling Diffusers
   2. Return Grilles
   3. Return 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. 2025 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 (CD-X)

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. Stamped Ceiling Diffusers:
   1. Furnish and install stamped ceiling diffusers of the sizes and capacities as shown on the Drawings.
   2. Manufacture the diffuser from corrosion-resistant steel or extruded aluminum as indicated on the Drawings.
   3. Construct the diffuser with a stamped outer core and with the inner core having a plaque style face. Construct the face with double-skinned inner face panel with a hemmed edge. Manufacture the inner core assembly to be removable using a spring clip arrangement that permits quick, easy installation and removal.
   4. Manufacture diffusers with trim to allow for a face panel flush with the ceiling line into ceiling grids or for surface mount in other ceiling types.
   5. Provide ceiling diffuser with an opposed blade radial volume damper, with an operating arm to adjust the damper without removing the core. Unit collar height: 1 1/4" in height. Provide opposed blade damper if volume damper is not accessible in location shown in ductwork on the drawings.
   6. Provide an equalizing grid for field installation for each diffuser.
   7. Manufacturer: Titus OMNI, Nailor, Price, or approved equal.
   8. Coordinate color with Architect / Owner.

2.02 RETURN GRILLES (RG-X)

A. Furnish and install return grilles of the type and size as shown on the Drawings. Construct the grilles with 35-degree deflection blades spaced at 1/2" and frames that have reinforced mitered corners. Blades shall be parallel to the long dimension.

B. Provide an opposed blade damper operable from the face of the grille for grilles connected to ductwork if volume damper is not accessible or possible in the location shown on the drawings.

C. Manufacture grilles with trim to allow for recessed mounting into ceiling grids or for surface mount in other ceiling types. Provide concealed mounting using concealed mounting straps or concealed screw holes in neck. Countersunk screw holes in the frame face are not acceptable or frame face-mounting screws.

D. Construct the units of extruded aluminum or corrosion resistant steel as shown on the Drawings.

E. Manufacturer: Titus 355RL, Nailor, Price, or approved equal.

F. Coordinate color with Architect / Owner.

2.03 RETURN DIFFUSERS (RD-X)

A. Furnish and install return diffusers of the type and size shown on the contract drawings.

B. Construct the diffusers with heavy gauge steel back pan and steel perforated face. Perforations shall have 3/16" diameter holes on 1/4" staggered centers.

C. Manufacture diffusers with trim to allow for recessed mounting into ceiling grids. Provide concealed mounting using concealed mounting straps or concealed screw holes in neck. Countersunk screw holes into the frame face are not acceptable or frame face-mounting screws.

D. Install opposed blade damper if volume damper is not accessible or possible in the location shown on the drawings.

E. Manufacturer: Titus PAR, Nailor, Price, or approved equal.

F. 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 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2021.

B. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2021.

C. UL 1812 - Ducted Heat Recovery Ventilators; Current Edition, Including All Revisions.

1.02 SUMMARY

A. This section includes Air-to-Air Energy Recovery Ventilators for rooftop installation.

B. Within this document, these units may be referred to as Energy Recovery Ventilator (ERV) for brevity.

1.03 RELATED

A. Drawing and general provisions of the contract, including General Requirements Division 01, Division 23, Division 23 Specifications Sections, and common work requirements for HVAC, apply to work specified in this section.

1.04 SUBMITTALS

A. Product data: For each type or model of Energy Recovery Ventilator, include the following:
   1. Unit performance data for both Supply Air and Exhaust Air, with system operating conditions indicated.
   2. Enthalpy plate performance data for both summer and winter operation.
   3. Motor ratings and unit electrical characteristics.
   4. Dimensioned drawings for each type of installation, showing isometric and plan views, to include the location of attached ductwork and service clearance requirements.
   5. Estimated gross weight of each installed unit.
   6. Filter types, quantities, and sizes
   7. Installation, Operating, and Maintenance manual (IOM) for each model.

B. Shop Drawings: For air-to-air energy recovery ventilators, include plans, elevations, sections, details, and attachments to other work.
   1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
   2. Wiring Diagrams: For power, signal, and control wiring.

C. Operation and maintenance data for the air-to-air energy recovery ventilator

1.05 QUALITY ASSURANCE

A. Source Limitations: Obtain an Air-to-Air Energy Recovery Ventilator with all appurtenant components or accessories from a single manufacturer.

B. For the actual fabrication, installation, and testing of work under this section, use only thoroughly trained and experienced workers completely familiar with the items required and with the manufacturer's current recommended methods of installation.

C. The ERV core shall be warranted to be free of manufacturing defects and to retain its functional characteristics, under circumstances of normal use, for a period of ten (10) years from the date of purchase. The balance-of-unit shall be warranted to be free of manufacturing defects and to retain its functional characteristics, under circumstances of normal use, for a period of two (2) years from the date of installation.

D. The manufacturer shall be able to provide evidence of independent testing of the core by Underwriters Laboratory (UL), verifying a maximum flame spread index (FSI) of 25 and a maximum smoke developed index (SDI) of 50, thereby meeting NFPA 90A and NFPA 90B requirements for materials in a compartment handling air intended for circulation through a duct system. The method of test shall be UL Standard 723.

E. Certifications:
   1. The energy recovery cores used in these products shall be third-party certified by AHRI under its Standard 1060 for Energy Recovery Ventilators. AHRI published certifications shall confirm the manufacturer's published performance for airflow, static pressure, temperature, and total effectiveness, purge air (OACF), and exhaust air leakage (EATR). Products that are not currently AHRI certified will not be accepted. OACF shall be no more than 1.02, and EATR shall be zero when application design criteria reduce the static pressure differential to zero or less.
   2. Entire unit shall be listed under UL 1812 Standard for Ducted Air to Air Heat Exchangers and comply with CSA Standard 22.2.
   3. Units intended for outdoor use shall be rain tested in accordance with UL 1812 Section 67.

F. Every unit to be factory tested before shipping: Motor Dielectric Voltage-Withstand Bench Test, Unit Dielectric Voltage-Withstand Test, Continuity of Internal Control Circuits Test, Unit Amperage Test

1.06 COORDINATION

A. Coordinate size and location of all building penetrations required for installation of each Energy Recovery Ventilator and associated electrical systems.

B. Coordinate sequencing of construction for associated plumbing, HVAC, and electrical supply.

C. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with specifications contained within this document, manufacturers offering products that may be incorporated into the work include, but are not limited to:
   1. RenewAire
   2. Greenheck.
   3. Oxygen8
   4. Approved equal.

B. The manufacturer should be in business for a minimum of 10 years, manufacturing energy recovery ventilators.

2.02 MANUFACTURED UNITS

A. Air-to-Air Energy Recovery Ventilators shall be fully assembled at the factory and consist of a fixed-plate cross-flow heat exchanger with no moving parts, an insulated single wall G90 galvanized 20-gauge steel cabinet, outdoor air hood with bird screen, motorized outside air intake damper, filter assemblies for both intake and exhaust air, enthalpy core, supply air blower assembly, motorized return air damper, exhaust air hood, exhaust air blower assembly and electrical control box with all specified components and internal accessories factory installed and tested and prepared for single-point high voltage connection. The entire unit, except field-installed components, shall be assembled and test-operated at the factory.

2.03 CABINET

A. Materials: Formed single-wall insulated metal cabinet, fabricated to permit access to internal components for maintenance.

B. Outside casing: 20-gauge, galvanized (G90) steel meeting ASTM A653 for components that do not receive a painted finish.

C. Access doors shall be hinged with airtight closed-cell foam gaskets. Door pressure taps, with captive plugs, shall be provided for cross-core pressure measurement, allowing for accurate airflow measurement.

D. Cabinet Insulation: Case walls and doors shall be fully insulated with 1-inch, expanded polystyrene foam insulation faced with a cleanable foil face on all exposed surfaces.

E. Enthalpy core: Energy recovery core shall be of the total enthalpy type, capable of transferring both sensible and latent energy between airstreams. Latent energy transfer shall be accomplished by direct water vapor transfer from one airstream to the other, without exposing transfer media in succeeding cycles directly to the exhaust air and then to the fresh air. No condensate drains shall be allowed. The energy recovery core shall be designed and constructed to permit cleaning and removal for servicing. The energy recovery core shall have a ten-year warranty. Performance criteria are to be as specified in AHRI Standard 1060.

F. Control center/connections: Energy Recovery Ventilator shall have an electrical control center where all high and low voltage connections are made. The control center shall be constructed to permit single-point high voltage power supply connections to the non-fused disconnect.

G. Passive Frost Control: The ERV core shall perform without condensing or frosting under normal operating conditions (defined as outside temperatures above -10 F and inside relative humidity below 40%). Occasional more extreme conditions shall not affect the usual function, performance, or durability of the core. No condensate drains will be allowed.

H. Motorized isolation dampers: Exhaust and supply air motorized dampers shall be factory-installed.

2.04 BLOWER SECTION

A. Blower section construction, Supply Air and Exhaust Air: Blower assemblies consist of a 208-230V / 1 Phase / 60 HZ, ECM motor, and a direct-driven backward-curved blower.

B. Blower assemblies: Shall be statically and dynamically balanced and designed for continuous operation at maximum rated fan speed and horsepower.

2.05 MOTORS

A. Blower motors shall be electronically commutated (EC) motorized impellers with multispeed capability.

B. The impeller type shall be backward-curved.

2.06 UNIT CONTROLS

A. Fan control: Terminal strip for EC motors.

B. Bypass economizer control: Differential enthalpy control, 2 position dampers with 100% airflow through the core or 100% airflow bypassing the core.

C. Sensors: None

D. Timeclock: Digital Time Clock wall mount, with up to 8 on/off cycles per day or 50 per week, 24VAC power, with battery backup protection of program settings against power failure to energize unit.

2.07 FILTER SECTION

A. ERV shall have 2" thick MERV 8 or 13 (as indicated on the equipment schedule) disposable pleated filters located in the outdoor air and exhaust airstreams. All filters shall be accessible from the exterior of the unit.
   1. MERV 13 for outside air
   2. MERV 8 for return air

PART 3 - EXECUTION

3.01 EXAMINATION

A. Before the start of installation, examine the area and conditions to verify the correct location for compliance with installation tolerances and other conditions affecting unit performance. See unit IOM.

B. Examine roughing-in of plumbing, electrical, and HVAC services to verify actual location and compliance with unit requirements. See unit IOM.

C. Proceed with installation only after all unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Installation shall be accomplished in accordance with these written specifications, project drawings, manufacturer's installation instructions as documented in the manufacturer's IOM, Best Practices, and all applicable building codes.

B. Install units with clearances for service and maintenance.

3.03 CONNECTIONS

A. ERV's are to be installed per manufacturers' guidelines and industry Best Practices shall be incorporated, and duct connections are to conform to use material, weight, thickness, gauge, construction, and installation methods as outlined in the SMACNA publications below, and Division 23 of this document, and are to be made subject to the installation requirements shown above.

1. HVAC Duct Construction Standards, Metal and Flexible, 3rd Edition, 2005
2. HVAC Air Duct Leakage Test Manual, 2nd Edition, 2012
3. HVAC Systems - Duct Design, 4th Edition, 2006
4. Rectangular Industrial Duct Construction Standard, 2nd Edition, 2004
5. Round Industrial Duct Construction Standards, 2nd Edition, 1999
6. Thermoplastic Duct (PVC) Construction Manual, 2nd Edition, 1995
7. Electrical installation requirements are specified in Division 26 of this document.

3.04 FIELD QUALITY CONTROL

A. Contractor to inspect field assembled components and equipment installation, to include electrical and piping connections. Report results to the Architect/Engineer in writing. Inspection must include a complete startup checklist to include (as a minimum) the following: Completed Start-Up Checklists as found in the manufacturer's IOM. Insert any other requirements here.

3.05 START-UP SERVICE

A. Contractor to perform startup service. Clean the entire unit, comb coil fins as necessary, and install clean filters. Measure and record electrical values for voltage and amperage. Refer to Division 23 "Testing, Adjusting and Balancing" and comply with provisions therein.

3.06 DEMONSTRATION AND TRAINING

A. Contractor to train the owner's maintenance personnel to adjust, operate, and maintain the entire Make-Up Air unit. Refer to Division 01 Section Closeout Procedures and Demonstration and Training.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. System Description: Outdoor-mounted, air-cooled condensing unit suitable for on-the-ground or rooftop installation. Unit shall consist of a hermetic scroll air-conditioning compressor(s) assembly, an air-cooled coil, propeller-type condenser fans, and a control box. Unit shall be used in a refrigeration circuit matched with a packaged air-handling unit.

B. Air-Cooled Condensing Unit package including:
   1. Charge of refrigerant and oil
   2. Controls and control connections
   3. Refrigerant piping connections
   4. Motor starters
   5. Electrical power connections

1.02 RELATED SECTIONS

A. Section 230993 - Sequence of Operations

B. Section 232300 - Refrigeration Piping.

C. Section 237313 - Indoor and Outdoor Air Handling Units

1.03 REFERENCES

A. ANSI/ASHRAE 15 - Safety Code for Mechanical Refrigeration.

B. ASHRAE 90.1.

C. AHRI 210/240 - Unitary Air-Conditioning Equipment and Air-Source Heat Pump Equipment (units less than 135,000 Btuh).

D. AHRI 360 - Commercial and Industrial Unitary Air Conditioning Equipment testing and rating standard (condensing units greater than 135,000 Btuh).

E. AHRI 340 - Commercial and Industrial Unitary Heat Pump Equipment (heat pumps greater than 135,000 Btuh).

F. ANSI Z21.47/UL1995 - Unitary Air Conditioning Standard for safety requirements.

G. AHRI 270 - Sound Rating of Outdoor Unitary Equipment (units less than 135,00 Btuh).

H. AHRI 370 - Sound Rating of Large Outdoor Refrigerating and Air Conditioning Equipment (equipment above 135,000 Btuh).

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. Air-Cooled Condensing Units Product Data Submittal
      a. Submit unit performance data including: capacity, nominal and operating performance.
      b. Submit Mechanical Specifications for unit and accessories describing construction, components and options.
      c. Submit shop drawings indicating overall dimensions as well as installation, operation and service clearances. Indicate lift points and recommendations and center of gravity. Indicate unit shipping, installation and operating weights including dimensions.
      d. Submit data on electrical requirements and connection points. Include recommended wire and fuse sizes or MCA, sequence of operation, safety and start-up instructions.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.

B. Protect units on site from physical damage. Protect coils.

1.06 WARRANTY

A. Provide parts warranty for one year from start-up or 18 months from shipment, whichever occurs first.

B. Provide 5 year compressor warranty.

1.07 MAINTENANCE SERVICE

A. Furnish complete parts and labor service and maintenance of packaged roof top units for one year from Date of Substantial Completion by contractor.

B. Provide maintenance service with a two month interval as maximum time period between calls. Provide 24 hour emergency service on breakdowns and malfunctions.

C. Include maintenance items as outlined in manufacturer's operating and maintenance data.

D. Submit copy of service call work order or report and include description of work performed.

1.08 REGULATORY REQUIREMENTS

A. Unit shall conform to ANSI Z21.47/UL 1995 for construction of packaged air conditioner.

B. In the event the unit is not UL approved, the manufacturer must, at his/her expense, provide for a field inspection by a UL representative to verify conformance to UL standards. If necessary, contractor shall perform modifications to the unit to comply with UL, as directed by the UL representative, at no additional expense to the Owner.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Provide one of the following manufacturers:
   1. Carrier.
   2. Daikin.
   3. Trane.
   4. Johnson Controls (JCI/York)

2.02 EQUIPMENT

A. Size Range: 6 to 25 Tons

B. Carrier Model Numbers: 38AXZ, Single Circuit (07-25 Models) 38AXD, Dual Circuit (12-28 Models)

C. General:
   1. Factory-assembled, single-piece, air-cooled condensing unit. Contained within the unit enclosure shall be all factory wiring, piping, controls, compressor, holding charge, and special features required before field start-up.
   2. The unit shall use Puron Advance (R-454B) refrigerant.

D. Unit Cabinet:
   1. Unit cabinet shall be constructed of galvanized steel, bonderized and coated with a pre-painted baked enamel finish.
   2. A heavy-gauge roll-formed perimeter base rail with forklift slots and lifting holes shall be provided to facilitate rigging.

E. Condenser Fans:
   1. Condenser fans shall be direct-driven, propeller-type, discharging air vertically upward.
   2. Fan blades shall be balanced.
   3. Condenser fan discharge openings shall be equipped with PVC-coated steel wire safety guards.
   4. Condenser fan and motor shaft shall be corrosion-resistant.

F. Compressor:
   1. Compressor shall be of the hermetic scroll type.
   2. Compressor shall be mounted on rubber grommets.
   3. Compressors shall include overload protection.

4. Compressors shall be equipped with a crankcase heater.
5. Compressor shall be equipped with internal high-pressure and high-temperature protection.

G. Condenser Coils:
1. Standard aluminum fin - copper tube coils:
a. Standard evaporator and condenser coils shall have aluminum lanced plate fins mechanically bonded to seamless internally grooved copper tubes with all joints brazed.
b. Evaporator coils shall be leak tested to 150 psig, pressure tested to 450 psig, and qualified to UL 60335-2-40 burst test at 1775 psig.
c. Condenser coils shall be leak tested to 150 psig, pressure tested to 650 psig, and qualified to UL 60335-2-40 burst test at 1980 psig.

H. Refrigeration Components:
1. Refrigeration circuit components shall include a liquid line service valve, a suction line service valve, a full charge of compressor oil, and a partial holding charge of refrigerant.

I. Controls and Safeties:
1. Minimum control functions shall include:
a. Control wire terminal blocks.
b. Compressor lockout on auto-reset safety until reset from thermostat.
c. Each unit shall utilize the Comfort Alert Diagnostic Board that provides:
1) System Pressure Trip fault code indication
2) Short Cycling fault code indication
3) Locked Rotor fault code indication
4) Open Circuit fault code indication
5) Reverse Phase 3 fault code indication
6) Welded Contactor fault code indication
7) Low Voltage fault code indication
8) Anti-short cycle protection
9) Phase reversal protection
d. Minimum safety devices which are equipped with automatic reset (after resetting first at thermostat), shall include:
1) High discharge pressure cutout.
2) Low-pressure cutout.
e. Designed to integrate with the A2L Refrigerant Leak detection system onboard 40RL products to enable unit shutdown in the event of a leak.

J. Operating Characteristics:
1. See the design drawings and drawing equipment schedule for details.
2. The system shall meet current energy codes for IEER (Btuh/Watt) or greater at standard AHRI conditions.
3. Standard unit(s) shall be capable of operating up to 125°F (52°C) and down to 40°F (4°C).

K. Electrical Requirements:
1. See the design drawings and drawing equipment schedule for details.
2. Unit electrical power shall be a single-point connection.
3. The unit control circuit shall contain a 24-v transformer for unit control.

L. Special Features:
1. Low-Ambient Temperature Control:
a. A low-ambient temperature control shall be available as a factory-installed option or as a field-installed accessory. This low-ambient control shall regulate the speed of the condenser-fan motors in response to the saturated condensing temperature of the unit. The control shall maintain correct condensing pressure at outdoor temperatures down to –20°F (–29°C).
2. Thermostat Controls:

a. Programmable multi-stage thermostat shall have 7-day clock, holiday scheduling, large backlit display, remote sensor capability, and Title 24 compliance.
b. Commercial Electronic Thermostat shall have a 7-day time clock, auto-changeover, multi-stage capability, and a large LCD (liquid crystal display) temperature display.

3. Louvered Hail Guard Package:
   a. Louvered hail guard package shall protect coils against damage from hail and other flying debris.
4. Condenser Coil Grille:
   a. Grille shall add decorative appearance to the unit and protect the condenser coil from large objects and vandalism.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Where required by Code and/or as indicated on drawings and/or schedules:
   1. Install units on vibration isolation.
   2. Provide seismic / shear restrained mounts as indicated.

B. Install units on concrete pad, roof rails, or dunnage as indicated on drawings and/or schedules.

C. Install in accordance with manufacturer's instructions.

D. Provide connection to refrigeration piping system and evaporators

E. Prepare for connection to electrical service. Coordinate all required electrical connections with electrical contractor.

F. Provide connection to control wiring and controls integration as specified by contract.

END OF SECTION

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

A. AMCA 99 - Standards Handbook; 2025.

B. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating; 2016.

C. AMCA 300 - Reverberation Room Methods of Sound Testing of Fans; 2024.

D. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data; 2022.

E. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus; 2019.

F. ASTM C916 - Standard Specification for Adhesives for Duct Thermal Insulation; 2020.

G. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material); 2019.

H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

I. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2021.

J. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2021.

K. UL 1995 - Heating and Cooling Equipment; Current Edition, Including All Revisions.

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. Indoor Air Handling Units

B. This Section includes constant-volume or variable-volume, modular, and/or central station air-handling units with fans, coils, filters, and dampers for indoor installations. See drawings and schedules for required sections, arrangements, and modules.

1.04 SUBMITTALS

A. Product Data: For each type of modular air-handling unit indicated. Include the following:
   1. Certified fan-performance curves with system operating conditions indicated.
   2. Certified fan-sound power ratings.
   3. Certified coil-performance ratings with system operating conditions indicated.
   4. Motor ratings, electrical characteristics, and motor and fan accessories.
   5. Material gauges and finishes.
   6. Filters with performance characteristics.
   7. Dampers, including housings, linkages, and operators.
   8. Wiring Diagrams: Power, signal, and control wiring.

1.05 QUALITY ASSURANCE

A. Source Limitations: Obtain modular air-handling units through one source from a single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. NFPA Compliance: Modular air-handling units and components shall be designed, fabricated, and installed in compliance with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."

D. ARI Certification: Modular air-handling units and their components shall be factory tested according to ARI 430, "Central-Station Air-Handling Units," and shall be listed and labeled by ARI.

E. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section - "Systems and Equipment" and Section - "Construction and Startup."
   1. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

F. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section - "Heating, Ventilating, and Air-Conditioning."

G. Comply with NFPA 70.

1.06 COORDINATION

A. Coordinate installation of equipment supports.

B. Coordinate size and location of structural-steel support members.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Carrier (basis of design)
   2. Daikin.
   3. Trane.
   4. Johnson Controls / York.

2.02 GENERAL

A. Unit shall be a factory-assembled, single-piece central station air handler. Unit may consist of a fan and coil section with factory-installed direct expansion coil, heating coil section, filter section, mixing box or combination filter/mixing box, or access section as indicated on the equipment schedules. Unit base rail shall be 14 gauge galvanized steel.

2.03 CABINETS

A. Unit panels shall be constructed of 20 gauge galvanized steel. Casing panels shall be removable for easy access to the unit. All panels shall be gasketed to ensure a tight seal.

B. Hinged access doors shall be double wall with 1.5 lb dual-density fiberglass between galvanized steel panels.

C. Insulation for casing panels on unit shall be 1-in. minimum thickness dual-density fiberglass insulation with a nominal density of not less than 1.5 lb per cubic foot.

D. Insulation shall be secured to casing with waterproof adhesive.

E. Condensate Drain Pans: Formed sections of stainless-steel sheet complying with requirements in ASHRAE 62. Fabricate pans with slopes in two planes to collect condensate from cooling coils (including coil piping connections and return bends) and humidifiers when units are operating at maximum-catalogued face velocity across the cooling coil.
   1. Double-Wall Construction: Fill the space between walls with foam insulation and seal it moisture-tight.
   2. Drain Connections: Both ends of the pan.
   3. Pan-Top Surface Coating: Elastomeric compound.
   4. Units with stacked coils shall have an intermediate drain pan or drain trough to collect condensate from the top coil.

2.04 FAN SECTIONS

A. Fan sections shall be constructed of galvanized steel and shall have a formed channel base for integral mounting of fan, motor, and casing panels. Fan scroll, wheel, shaft, and bearings are to be rigidly secured to the base unit.

B. Each unit shall have a single fan wheel and scroll. Fans shall be double width, double inlet type, with forward-curved blades. Wheels shall be bonderized steel with baked enamel, or galvanized steel.

C. Fan wheels shall be keyed to the shaft and shall be designed for continuous operation at the maximum rated fan speed and motor horsepower. Fan wheels and shafts shall be selected to operate at least 25% below the first critical speed, and shall be statically and dynamically balanced as an assembly.

D. Fan shafts shall be solid steel, turned, ground and polished.

E. Fan bearings shall be self-aligning, pillow-block regreasable ball type selected for an average life of 200,000 hours at design operation conditions, per ANSI Code B3.15.

F. Fan motor shall be mounted within the fan section casing on slide rails having 2 adjusting screws. Motor shall be NEMA (National Electrical Manufacturing Association) Design B with sizes and electrical characteristics as shown on the equipment schedule.

G. Fan drive shall be designed for a 1.5 service factor and shall be factory mounted and aligned. Belt drive shall be variable or fixed-pitch type.

2.05 COILS

A. Coil Sections: Common or individual, insulated, galvanized-steel casings for heating and cooling coils. Design and construct to facilitate the removal and replacement of coils for maintenance and to ensure full airflow through coils.

B. Heating Hot Water: Continuous circuit coil fabricated according to ARI 410.
   1. Tubes: Copper.
   2. Fins: Aluminum with a maximum spacing of 144 fins per foot.
   3. Fin and Tube Joint: Mechanical bond.
   4. Headers: Cast iron with drain and air vent tappings or Seamless copper tube with brazed joints, prime coated.
   5. Frames: Galvanized-steel channel frame, 0.0625 inch (1.59 mm) or Stainless steel, 0.0625 inch.
   6. Ratings: Design tested and rated according to ASHRAE 33 and ARI 410.
      a. Working-Pressure Ratings: 200 psig (1378.95 kPa), 325 deg F.
   7. Source Quality Control: Test to 300 psig (2068.43 kPa) and to 200 psig (1378.95 kPa) underwater.

C. Refrigerant Coils: Coil designed for use with R-32 or R-454B refrigerant, fabricated according to ARI 410, connected with brazed fittings.
   1. Capacity Reduction: Circuit for face or row or interleaved control.
   2. Tubes: Copper.
   3. Fins: Aluminum with a maximum spacing of 144 fins per foot.
   4. Fin and Tube Joint: Mechanical bond.
   5. Suction and Distributor: Seamless copper tube with brazed joints.
   6. Frames: Galvanized-steel channel frame, 0.0625 inch (1.59 mm) or Stainless steel, 0.0625 inch.
   7. Ratings: Design tested and rated according to ASHRAE 33 and ARI 410.
      a. Working-Pressure Rating: 300 psig (2068.43 kPa).
   8. Source Quality Control: Test to 450 psig (3102.64 kPa) and to 300 psig (2068.43 kPa) underwater.

2.06 DAMPERS

A. Mixing Boxes: Mixing boxes and filter mixing boxes shall have parallel blade, interconnecting outside-air and return-air dampers. Damper blades shall have parallel bends for stiffness and shall be welded to 1/2-in. diameter steel rods rotating in nylon bushings and mounted in rigid galvanized steel frames. Dampers shall be sectionalized to limit blade width to no more than 50-in. to minimize blade warpage and to ensure tight closure. All mixing boxes and filter mixing boxes shall have double-walled hinged access doors.

B. All dampers for mixing boxes and filter mixing boxes shall be rated as low-leakage dampers, having a leakage rate not to exceed 2% of air quantity calculated at 2000 fpm velocity through

damper and 4.0-in. wg pressure difference. Damper blades shall be gasketed and perimeter sealing strips shall be provided.

2.07 FILTER SECTION

A. Each filter section shall be designed and constructed to house the specific type of filter specified on the equipment schedule.

B. Filter Section: Provide filter holding frames arranged for flat or angular orientation, with access doors on both sides of the unit. Filters shall be removable from one side.

C. Pleated Media Panel Filters: Filters shall be 2-inch-thick non-woven fabric, treated with adhesive and continuously laminated to a supported steel wire grid.
   1. Filters shall have a rated average dust spot efficiency of not less than 25 to 35 percent when tested in accordance with ASHRAE 52-76 atmospheric dust spot method.
   2. Anti-microbial coating to inhibit the growth of microbes.

2.08 EXTERNAL SUPPORT KIT (INDOOR UNIT)

A. A galvanized steel support, minimum 10-gauge, shall be provided on the base of the unit. An external support kit may be used for ceiling suspension, external isolation, or a housekeeping pad.

2.09 COMBINATION STARTER/DISCONNECTS

A. NEMA-rated combination starter/disconnect package shall be factory-mounted and wired by the air handling unit manufacturer. The package shall include:
   1. Fused disconnect switch.
   2. Hand-Off-Auto (HOA) selector switch.
   3. Two normally open auxiliary contacts.
   4. Control transformers.
   5. NEMA 1 enclosure.
   6. Power wiring in “liquid-tight” conduit and junction boxes from the starter to the motor.
   7. Fuses and overload heater elements shall be factory-selected for the exact motor used in the air handler.

2.10 A2L REFRIGERANT LEAK DETECTION SYSTEM

A. Leak detection sensor is standard from factory. Sequence + Programming required to be done in field by ATC.

B. The Leak Detection System (LDS) consists of one or more refrigerant detection sensors and is required in ducted HVAC systems that have more than 3.91 lbs of A2L refrigerant charge, per safety standard UL 60335-2-40. For any units with more than 3.91 lbs of charge in a circuit, an LDS will be factory-installed.

C. Features & Benefits:
   1. Leak Detection Sensor per safety standard UL 60335-2-40.
   2. Monitors for leaks and activates mitigation when necessary.
   3. Reduces the risk of improper installation in the field.
   4. Bypasses the added cost of field installation.
      a. If factory-installed manufacturer's BACnet controller is selected, leak detection system sequence of operation must be programmed in the field upon unit installation.
      b. If factory-installed controls are not selected, the leak detection sequence of operation must be programmed by controls contractor.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine roughing-in of steam, hydronic, and condensate drainage piping systems and electrical services to verify actual locations of connections before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install modular air-handling units with the following vibration devices.
   1. Units with Internally Isolated Fans: Secure units to anchor bolts installed in concrete bases.
   2. Floor-Mounted Units: Support on concrete bases using neoprene pads or housed-spring isolators. Secure units to anchor bolts installed in concrete bases.

B. Arrange installation of units to provide access space around modular air-handling units for service and maintenance.

3.03 CONNECTIONS

A. Piping installation requirements are specified in other mechanical Sections. Drawings indicate the general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to the machine to allow service and maintenance.

C. Connect piping to modular air-handling units mounted on vibration isolators with flexible connectors.

D. Heating Hot Water Piping: Comply with applicable requirements in Section 232000.

E. Refrigerant Piping: Comply with applicable requirements in Section 232300.

F. Duct installation and connection requirements are specified in other mechanical Sections. Drawings indicate the general arrangement of ducts and duct accessories. Make final duct connections with flexible connections.

G. Electrical: Comply with applicable requirements in Electrical Sections for power wiring, switches, and motor controls.

H. Ground equipment according to Electrical Section "Grounding and Bonding."

I. Tighten electrical connectors and terminals according to the manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.04 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including piping and electrical connections. Report results in writing.
   1. Leak Test: After installation, fill the water and steam coils with water and test coils and connections for leaks. Repair leaks and retest until no leaks exist.
   2. Charge refrigerant coils with refrigerant and test for leaks. Repair leaks and retest until no leaks exist.
   3. Fan Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Remove malfunctioning units, replace them with new units, and retest.
   4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.05 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

B. Final Checks before Startup: Perform the following:
   1. Verify that shipping, blocking, and bracing are removed.
   2. Verify that the unit is secure on mountings and supporting devices and that connections to piping, ducts, and electrical systems are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
   3. Perform cleaning and adjusting as specified in this Section.

4. Disconnect the fan drive from the motor, verify proper motor rotation direction, and verify free fan wheel rotation and smooth bearing operations. Reconnect the fan drive system, align the belts, and install belt guards.
5. Lubricate bearings, pulleys, belts, and other moving parts with factory-recommended lubricants.
6. Set face-and-bypass dampers to full face flow.
7. Set outside- and return-air mixing dampers to the minimum outside-air setting.
8. Comb coil fins for parallel orientation.
9. Install clean filters.
10. Verify that manual and automatic volume control and fire and smoke dampers in connected duct systems are in the fully open position.

C. Starting procedures for modular air-handling units include the following:
1. Energize motor; verify proper operation of motor, drive system, and fan wheel. Adjust the fan to the indicated rpm. Replace fan and motor pulleys as required to achieve design conditions.
2. Measure and record motor electrical values for voltage and amperage.
3. Manually operate dampers from fully closed to fully open position and record fan performance.

D. Refer to Section "Testing, Adjusting, and Balancing" for modular air-handling system testing, adjusting, and balancing.

3.06 ADJUSTING

A. Adjust damper linkages for proper damper operation.

3.07 CLEANING

A. Clean modular air-handling units internally, on completion of installation, according to the manufacturer's written instructions. Clean fan interiors to remove foreign material, construction dirt, and dust. Vacuum clean fan wheels, cabinets, and coils entering the air face.

B. After completing system installation and testing, adjusting, and balancing modular air handling and air-distribution systems, clean filter housings and install new filters.

3.08 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain modular indoor air-handling units. Refer to Division 01 for Closeout Procedures and Division 01 for Demonstration and Training.

END OF SECTION

PART 1 - GENERAL

1.01 SYSTEM DESCRIPTION

A. VRF (variable refrigerant flow) systems with heat recovery for the Administration Office and Special Education Offices. system components included, but are not limited to the following:
   1. Outdoor Heat Recovery Units (ODU)
   2. Indoor Cassette Units (IDU)
   3. Branch selector boxes (BSB)
   4. Programmable wired wall-mounted controllers/thermostats for each indoor unit.
   5. Touch screen controller for the system.
   6. BACnet interface module for the building's ATC/DDC system tie-ins.

B. The variable capacity, heat pump air conditioning system shall consist of multiple evaporators, refrigerant pipe joints and headers, a two-pipe refrigeration distribution system using PID control, and an air-cooled condensing unit. The condensing unit shall be a direct expansion (DX), air-cooled heat pump, multi-zone air-conditioning system with variable speed inverter-driven compressors using approved refrigerant. The condensing unit shall be capable of connection to an indoor evaporator capacity up to 200% of the condensing unit capacity. All zones shall each be capable of operating separately with individual temperature control.

C. The condensing unit shall be interconnected to the indoor unit models in accordance with the manufacturer's recommendations. The indoor units shall be connected to the condensing unit utilizing manufacturer-approved piping joints and headers to ensure correct refrigerant flow and balancing. T- style joints are not acceptable.

D. Operation of the system shall permit either cooling or heating of all of the indoor units simultaneously. Each indoor unit or group of indoor units shall be able to provide a set temperature independently via a local remote controller, an Intelligent Controller, an Intelligent Manager, or a BMS interface.

E. Outdoor air shall be delivered to the system via an energy recovery ventilator (ERV). The ERV shall incorporate an energy recovery core in order to provide both sensible and latent heat recovery plus heating, cooling, and dehumidification.

1.02 SYSTEM DESCRIPTION

A. Advanced Zoning - A single system shall provide for up to 62 zones.

B. Auto-charging - Each system shall have a refrigerant auto-charging function.

C. Oil Return Heating - Each system shall maintain continuous heating during oil return operation. Reverse cycle (cooling mode) oil return during heating operation shall not be permitted due to the potential reduction in space temperature.

D. Independent Control - Each indoor unit shall use a dedicated electronic expansion valve for independent control.

E. VFD Inverter Control - Each condensing unit shall use a high efficiency, variable speed “inverter” compressor coupled with inverter fan motors for superior part load performance.

F. Compressor capacity shall be modulated automatically to maintain constant suction and condensing pressures while varying the refrigerant volume for the needs of the cooling or heating loads.

G. Indoor units shall use PID to control superheat to deliver a comfortable room temperature condition and optimize efficiency.

H. Simple Wiring - Systems shall use 16/18 AWG, 2-wire, multi-stranded, non-shielded, and non-polarized daisy chain control wiring.

I. Advanced Diagnostics - Systems shall include a self-diagnostic, auto-check function to detect a malfunction and display the type and location.

J. Each condensing unit shall incorporate contacts for electrical demand shedding.

K. Advanced Controls - Each system shall have at least one remote controller capable of controlling up to 16 indoor units.

L. Each system shall be capable of integrating with open protocol BACnet and LonWorks building management systems.

1.03 QUALITY ASSURANCE

A. The units shall be tested by a Nationally Recognized Testing Laboratory (NRTL), in accordance with ANSI/UL 1995 - Heating and Cooling Equipment, and shall bear the Listed Mark.

B. All the wiring shall be in accordance with the National Electrical Code (N.E.C.).

C. The units shall be rated in accordance with the Air-conditioning Refrigeration Institute's (ARI) Standard 210 and bear the ARI Certification label.

D. The system shall be manufactured in an ISO 9001 and ISO 14001 facility, which are standards set by the International Standard Organization (ISO). The system shall be factory-tested for safety and function.

E. The condensing unit shall be factory charged with approved refrigerant.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Equipment shall be stored and handled according to the manufacturer's recommendations.

1.05 WARRANTY

A. Condensing Unit
   1. The manufacturer shall warrant to the customer who is the original owner and user of the products specified above ("Customer") that, under normal use and maintenance for comfort cooling and conditioning applications, such products (the "Products") will be free from defects in material or workmanship. This warranty shall apply to parts only and is limited in duration to one (1) year from the earlier of (a) the date of original installation, whether or not actual use begins on that date, or (b) eighteen (18) months from the date of shipment. Customer must present proof of the original date of receipt and of installation of the Product in order to establish an effective date for this warranty. Otherwise, the effective date will be deemed to be the date of manufacture plus sixty (60) days. Repaired or replacement parts shall be warranted for the balance of the warranty period applicable to the original part following the date on which the repaired or replacement part is provided to the Customer.
   2. For its compressors only, the manufacturer shall provide the above warranty (which is applicable to parts only) for a seven (7) year period. This extended warranty for compressors shall be limited in duration to seven (7) years from the earlier to occur of (a) the date of original installation, whether or not actual use begins on that date, or (b) eighteen (18) months from the date of shipment, and applies to the compressor and compressor parts only. The effective date of this extended warranty shall be established as above.

B. Indoor Unit
   1. The units shall have a manufacturer's warranty for a period of one (1) year from the date of installation. The units shall have a limited labor warranty for a period of one (1) year from the date of installation. The compressors shall have a warranty of seven (7) years from the date of installation. During the stated period, should any part fail due to defects in material and workmanship, it shall be repaired or replaced at the discretion of the manufacturer according to their terms and conditions. All warranty service work shall be performed by a manufacturer's factory-trained service professional.

C. System Installation Requirements
   1. The system must be installed by a factory-trained contractor/dealer. The bidders shall be required to submit training certification proof with the bid documents. The mechanical contractor's installation price shall be based on the system's installation requirements. The mechanical contractor bids with complete knowledge of the HVAC system requirements. Untrained contractors who wish to bid on this project shall contact the manufacturer to arrange training prior to the bid day.

1.06 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. Multiple Evaporator, Direct Expansion, Air-Cooled, Variable Capacity, Split System Product Data Submittal
      a. Submit manufacturer's product data, including capacity of unit, electrical requirements, airflow, sound pressure data, indoor and outdoor unit measurements, weight, control schematics, and wiring diagrams.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Toshiba-Carrier (basis of design).

B. Daikin.

C. Mitsubishi-Trane.

D. Hitachi-Johnson Controls.

E. LG.

2.02 REFRIGERANTS

A. Refrigerant No. 454B, in accordance with ASHRAE Standard 34.

B. Refrigerant No. 32, in accordance with ASHRAE Standard 34.

2.03 OUTDOOR HEAT RECOVERY UNIT (ODU)

A. General: The condensing unit shall be designed specifically for use with a variable refrigerant volume system.
   1. The condensing unit shall be factory assembled and pre-wired with all necessary electronic and refrigerant controls. The refrigeration circuit of the condensing unit shall consist of scroll compressors, motors, fans, condenser coil, electronic expansion valves, solenoid valves, 4-way valve, distribution headers, capillaries, filters, shut-off valves, oil separators, service ports, and refrigerant regulator.
   2. Liquid and suction lines shall be individually insulated between the condensing and indoor units.
   3. The connection ratio of indoor units to the condensing unit shall be permitted up to 200%.
   4. The condensing unit shall be able to support the connection of multiple indoor units.
   5. The system shall automatically restart operation after a power failure. System settings shall be saved in the event of a power loss without the need for reprogramming.
   6. The unit shall incorporate an auto-charging feature.
   7. The condensing unit shall be modular in design and should allow for side-by-side installation with minimum spacing.
   8. The following safety devices shall be included on the condensing unit: high-pressure sensor and switch, low-pressure switch, control circuit fuses, crankcase heaters, fusible plug, overload relay, inverter overload protector, thermal protectors for compressor and fan motors, overcurrent protection for the inverter, and anti-recycling timers.
   9. To ensure the liquid refrigerant does not flash when supplied to the various indoor units, the circuit shall be provided with a sub-cooling feature.
   10. Oil recovery cycle shall be automatic, occurring 2 hours after start of operation and then every 8 hours of operation. Each system shall maintain continuous heating during oil return operation. Reverse cycle (cooling mode) oil return during heating operation shall not be permitted due to the potential reduction in space temperature.
   11. The condensing unit shall be capable of heating operation at 0°F dry bulb ambient temperature without additional low ambient controls or an auxiliary heat source.

B. Unit Cabinet:

1. The condensing unit shall be completely weatherproof and corrosion-resistant. The unit shall be constructed from rust-proofed mild steel panels coated with a baked enamel finish.
2. Unit access panels shall be removable with minimal screws and shall provide full access to the compressors, fan, and control components.
3. Compressors shall be isolated in a compartment and have an acoustic wrap to assure quiet operation.
4. Unit cabinet shall be capable of withstanding a 1500-hour salt spray test per ASTM-B117-16.

C. Fan:
1. The condensing unit shall consist of propeller-type, direct-drive fan motor(s) that have multiple speed operation via a DC (digitally commutating) inverter.
2. The condensing unit fan motor shall have multiple speed operation of the DC (digitally commutating) inverter type.
3. The fan shall be a vertical discharge configuration.
4. The fan motor shall have inherent protection and permanently lubricated bearings and be mounted. Motor shall have thermal overload protection.
5. The fan motor shall be provided with a fan guard to prevent contact with moving parts.
6. Outdoor fans shall be protected by a raised non-metallic protective grille.
7. Night setback control of the fan motor for low noise operation by way of automatically limiting the maximum speed shall be a standard feature.

D. Condenser Coil:
1. The condenser coil shall be manufactured from copper tubes expanded into aluminum fins to form a mechanical bond.
2. The coil configuration shall be 4-sided and fully separated from the machine compartment for more effective heat transfer and sound isolation.
3. The coil fins shall have a factory-applied corrosion resistant blue-fin finish.

E. Compressor:
1. The inverter scroll compressors shall be variable speed (PVM inverter) controlled and capable of changing the speed to follow the variations in total cooling and heating load as determined by the suction gas pressure measured in the condensing unit. In addition, samplings of evaporator and condenser temperatures shall be made so that the high/low pressures detected are read every 20 seconds and calculated. With each reading, the compressor capacity (INV frequency or STD ON/OFF) shall be controlled to eliminate deviation from the target value.
2. Compressors shall be totally enclosed in the machine compartment.
3. The capacity control range shall be as low as 4% to 100%.
4. Each non-inverter compressor shall also be of the hermetically sealed scroll type.
5. Each compressor shall be equipped with a crankcase heater, high-pressure safety switch, and internal thermal overload protector.
6. Oil separators shall be standard with the equipment, together with an intelligent oil management system.
7. The compressor shall be spring-mounted to avoid the transmission of vibration.
8. In the event of compressor failure in a system with multiple compressors, the remaining compressors shall continue to operate and provide heating or cooling as required at a proportionally reduced capacity. The microprocessor and associated controls shall be designed to specifically address this condition.
9. In the case of multiple condenser modules, conjoined operation hours of the compressors shall be balanced by means of the Duty Cycling Function, ensuring sequential starting of each module at each start/stop cycle, completion of oil return, completion of defrost or every 8 hours.

F. Electrical:
1. Refer to equipment schedules located on drawings for power requirements.

2. The control voltage between the indoor and condensing unit shall be 16VDC, non-shielded, stranded 2-conductor cable.
3. The control wiring shall be a two-wire multiplex transmission system, making it possible to connect multiple indoor units to one condensing unit with one 2-cable wire, thus simplifying the wiring installation.
4. The control wiring lengths shall be as shown below.

G. Operating Range:
1. The operating range in cooling shall be 23°F DB ~ 122°F DB.
2. The operating range in heating shall be 0°F DB - 77°F DB / -4°F WB - 60°F WB.

2.04 ROUND FLOW CEILING CASSETTE INDOOR UNITS (3 FEET X 3 FEET)

A. General: Indoor, direct-expansion, low profile in-ceiling fan coil. Unit shall be complete with a coil, fan driven by a DC inverter-motor, PMV (pulse modulating valve), piping connectors, electrical controls, microprocessor control system, integral temperature sensing, condensate lift mechanism with a lift capability of 26", and hanging brackets.

B. Performance: Refer to equipment schedules on drawings.

C. Indoor Unit:
1. The indoor unit shall be completely factory assembled and tested. Included in the unit is factory wiring, piping, an electronic proportional expansion valve, a control circuit board, a fan motor thermal protector, flare connections, a condensate drain pan, a condensate drain pump, a condensate safety shutoff and alarm, self-diagnostics, an auto-restart function, a 3-minute fused time delay, and a test run switch.
2. Indoor unit and refrigerant pipes shall be charged with dehydrated air prior to shipment from the factory.
3. Both refrigerant lines shall be insulated from the outdoor unit.
4. The round flow supply air flow shall be adjustable to different airflow patterns to accommodate various installation configurations, including corner installations.
5. Return air shall be through the concentric panel, which includes a resin net, mold-resistant, antibacterial filter.
6. The indoor units shall be equipped with a condensate pan with antibacterial treatment and a condensate pump. The condensate pump shall provide up to 26" of lift and have a built-in safety shutoff and alarm.
7. The indoor units shall be equipped with a return air thermistor.
8. The indoor unit shall be separately powered. Refer to the equipment schedule on the drawings for power requirements.

D. Unit Cabinet:
1. The cabinet shall be space-saving and shall be located in the ceiling.
2. The unit shall consist of multiple auto-swing positions.
3. The airflow of the unit shall have the ability to shut down outlets with multiple patterns, allowing for simpler installation in irregular spaces.
4. Fresh air intake shall be possible via an optional fresh air intake kit. Refer to the equipment schedule on the drawings for the options selected.
5. A branch duct knockout shall exist for the branch ducting of supply air.
6. The cabinet shall be constructed with sound-absorbing foamed polystyrene and polyethylene insulation.
7. High-efficiency MERV 13 air filters shall be available for each model unit. Refer to the equipment schedule on the drawings for the options selected.

E. Fan:
1. The fan shall be a direct-drive turbo fan type with a statically and dynamically balanced impeller with three fan speeds available.
2. The airflow rate shall be available in three settings.
3. The fan motor shall be equipped as standard with adjustable external static pressure (ESP) settings to allow operation with a MERV 13 filter as necessary.

4. The fan motor shall be thermally protected.

F. Filter:
1. The return air shall be filtered by means of a washable long-life filter with mildew-proof resin and antibacterial treatment.
2. Optional high-efficiency disposable MERV 13 filters shall be available.

G. Coil:
1. Coils shall be of the direct expansion type constructed from copper tubes expanded into aluminum fins to form a mechanical bond.
2. The coil shall be of a waffle louver fin and high heat exchange, rifled bore tube design to ensure highly efficient performance.
3. The coil shall be a 2-row cross fin copper evaporator coil with 17 FPI design, completely factory tested.
4. The refrigerant connections shall be flare connections.
5. A condensate pan with antibacterial treatment shall be located under the coil.
6. A condensate pump shall be located below the coil in the condensate pan with a built-in safety alarm.
7. A thermistor will be located on the liquid and gas line.

H. Electrical:
1. A separate power supply will be required. Refer to the equipment schedule on drawings for electrical requirements.

I. Control:
1. The unit shall have controls provided by the manufacturer to perform input functions necessary to operate the system.
2. The unit shall be compatible with interfacing with a BMS system via optional LonWorks or BACnet gateways. Refer to the equipment schedule on the drawings for the options selected.
3. Units shall have the following functions:
   a. Selectable automatic restart. After power failure the system will restart at the same operating conditions as before the failure.
   b. Temperature sensing controls shall sense return air temperature at the unit or at the remote control.
   c. Indoor coil freeze protection in both cooling and heating (reversing valve failure) modes.
   d. Automatic air sweep control to provide multiple operating modes of the air sweep louvers.
   e. Dehumidification (dry) mode shall provide increased latent removal through total system modulation.
   f. Fan only operation to provide room air circulation when no cooling is required.
   g. Fan speed control shall be user-selectable: high, medium, and low, or microprocessor determined (Auto) based on the differential between the room temperature and the setpoint during all modes of operation.
   h. Indoor coil high temperature protection shall be provided to detect excessive indoor discharge temperature in heating.
   i. Cold blow prevention in heating.
   j. Adjustable compensation for air stratification in heating.

2.05 4-WAY CEILING CASSETTE INDOOR UNITS (2 FEET X 2 FEET)

A. General: Indoor, direct-expansion, low profile in-ceiling fan coil. Unit shall be complete with a coil, fan driven by a DC inverter-motor, PMV (pulse modulating valve), piping connectors, electrical controls, microprocessor control system, integral temperature sensing, condensate lift mechanism with a lift capability of 26", and hanging brackets.

B. Performance: Refer to the equipment schedule on drawings.

C. Indoor Unit:

1. The indoor unit shall be completely factory assembled and tested. Included in the unit is factory wiring, piping, an electronic proportional expansion valve, a control circuit board, a fan motor thermal protector, flare connections, a condensate drain pan, a condensate drain pump, a condensate safety shutoff and alarm, self-diagnostics, an auto-restart function, a 3-minute fused time delay, and a test run switch.
2. Indoor unit and refrigerant pipes shall be charged with dehydrated air prior to shipment from the factory.
3. Both refrigerant lines shall be insulated from the outdoor unit.
4. The round flow supply air flow shall be adjustable to different airflow patterns to accommodate various installation configurations, including corner installations.
5. Return air shall be through the concentric panel, which includes a resin net, mold-resistant, antibacterial filter.
6. The indoor units shall be equipped with a condensate pan with antibacterial treatment and a condensate pump. The condensate pump shall provide up to 26" of lift and have a built-in safety shutoff and alarm.
7. The indoor units shall be equipped with a return air thermistor.
8. The indoor unit shall be separately powered. Refer to the equipment schedule on the drawings for power requirements.

D. Unit Cabinet:
1. The cabinet shall be space-saving and shall be located in the ceiling.
2. The unit shall consist of multiple auto-swing positions.
3. The airflow of the unit shall have the ability to shut down outlets with multiple patterns, allowing for simpler installation in irregular spaces.
4. Fresh air intake shall be possible via an optional fresh air intake kit. Refer to the equipment schedule on the drawings for the options selected.
5. A branch duct knockout shall exist for the branch ducting of supply air.
6. The cabinet shall be constructed with sound-absorbing foamed polystyrene and polyethylene insulation.
7. High-efficiency MERV 13 air filters shall be available for each model unit. Refer to the equipment schedule on the drawings for the options selected.

E. Fan:
1. The fan shall be a direct-drive turbo fan type with a statically and dynamically balanced impeller with high and low fan speeds available.
2. The airflow rate shall be available in high and low settings.
3. The fan motor shall be thermally protected.

F. Filter:
1. The return air shall be filtered by means of a washable long-life filter with mildew-proof resin.

G. Coil:
1. Coils shall be of the direct expansion type constructed from copper tubes expanded into aluminum fins to form a mechanical bond.
2. The coil shall be of a waffle louver fin and high heat exchange, rifled bore tube design to ensure highly efficient performance.
3. The coil shall be a 2-row cross fin copper evaporator coil with 17 FPI design, completely factory tested.
4. The refrigerant connections shall be flare connections.
5. A condensate pan shall be located under the coil.
6. A condensate pump shall be located below the coil in the condensate pan with a built-in safety alarm.
7. A thermistor will be located on the liquid and gas line.

H. Electrical:
1. A separate power supply shall be required. Refer to the equipment schedule on drawings for power requirements.

I. Control:
   1. The unit shall have controls provided by the manufacturer to perform input functions necessary to operate the system.
   2. The unit shall be compatible with interfacing with a BMS system via optional LonWorks or BACnet gateways. Refer to the schedule on drawings for the options selected.
   3. Units shall have the following functions:
      a. Selectable automatic restart. After power failure the system will restart at the same operating conditions as before the failure.
      b. Temperature sensing controls shall sense return air temperature at the unit or at the remote control.
      c. Indoor coil freeze protection in both cooling and heating (reversing valve failure) modes.
      d. Automatic air sweep control to provide multiple operating modes of the air sweep louvers.
      e. Dehumidification (dry) mode shall provide increased latent removal through total system modulation.
      f. Fan only operation to provide room air circulation when no cooling is required.
      g. Fan speed control shall be user-selectable: high, medium, and low, or microprocessor determined (Auto) based on the differential between the room temperature and the setpoint during all modes of operation.
      h. Indoor coil high temperature protection shall be provided to detect excessive indoor discharge temperature in heating.
      i. Cold blow prevention in heating.
      j. Adjustable compensation for air stratification in heating.

2.06 CONCEALED CEILING DUCTED INDOOR UNITS (MEDIUM STATIC, 4.5 TONS & SMALLER)

A. General: Indoor, direct-expansion ducted fan coil. Unit shall be complete with a coil, fan driven by a DC inverter motor, PMV (pulse modulating valve), piping connectors, electrical controls, microprocessor control system, integral temperature sensing, and condensate pump drain-pump, and hanging brackets.

B. Performance: Refer to the equipment schedule on drawings.

C. Indoor Unit:
   1. The indoor unit shall be completely factory assembled and tested. Included in the unit shall be factory wiring, piping, electronic proportional expansion valve, control circuit board, fan motor thermal protector, flare connections, condensate drain pan, condensate drain pump, condensate safety shutoff and alarm, self-diagnostics, auto-restart function, 3-minute fused time delay, and test run switch. The unit shall be equipped with an automatically adjusting external static pressure logic that is selectable during commissioning for adjustment of airflow.
   2. Indoor unit and refrigerant pipes shall be charged with dehydrated air prior to shipment from the factory.
   3. Both refrigerant lines shall be insulated from the outdoor unit.
   4. The indoor units shall be equipped with a return air thermistor.
   5. The indoor unit shall be separately powered. Refer to the equipment schedule on the drawings for power requirements.

D. Unit Cabinet:
   1. The cabinet shall be located in the ceiling and ducted to the supply and return openings.
   2. The cabinet shall be constructed with sound-absorbing foamed polystyrene and polyethylene insulation.

E. Fan:
   1. The fan shall be a direct-drive DC (ECM) type fan, statically and dynamically balanced impeller with three fan speeds available.
   2. The unit shall be equipped with automatically adjusting external static pressure logic selectable during commissioning.

3. The airflow rate shall be available in three settings.
4. The fan motor shall be thermally protected.
5. The fan motor shall be equipped as standard with adjustable external static pressure (ESP) settings.

F. Coil:
1. Coils shall be of the direct expansion type constructed from copper tubes expanded into aluminum fins to form a mechanical bond.
2. The coil shall be of a waffle louver fin and high heat exchange, rifled bore tube design to ensure highly efficient performance.
3. The coil shall be a 3-row cross fin copper evaporator coil with 13 fins-per-inch design, completely factory tested.
4. The refrigerant connections shall be flare connections.
5. A condensate pan shall be located under the coil.
6. A condensate pump shall be located below the coil in the condensate pan with a built-in safety alarm.
7. A thermistor will be located on the liquid and gas line.

G. Electrical:
1. A separate power supply will be required. Refer to the equipment schedule on the drawings for power requirements.

H. Control:
1. The unit shall have controls provided by the manufacturer to perform input functions necessary to operate the system.
2. The unit shall be compatible with interfacing with a BMS system via optional LonWorks or BACnet gateways. Refer to the equipment schedule on the drawings for the options selected.
3. Units shall have the following functions:
   a. Selectable automatic restart. After power failure the system will restart at the same operating conditions as before the failure.
   b. Temperature sensing controls shall sense return air temperature at the unit or at the remote control.
   c. Indoor coil freeze protection in both cooling and heating (reversing valve failure) modes.
   d. Automatic air sweep control to provide multiple operating modes of the air sweep louvers.
   e. Dehumidification (dry) mode shall provide increased latent removal through total system modulation.
   f. Fan only operation to provide room air circulation when no cooling is required.
   g. Fan speed control shall be user-selectable: high, medium, and low, or microprocessor determined (Auto) based on the differential between the room temperature and the setpoint during all modes of operation.
   h. Indoor coil high temperature protection shall be provided to detect excessive indoor discharge temperature in heating.
   i. Cold blow prevention in heating.
   j. Adjustable compensation for air stratification in heating.

2.07 BRANCH SELECTOR BOXES (BSB)

A. General
1. Branch selector boxes (BSB) are provided for heat recovery VRF systems.
2. The BC (Branch Circuit) Controllers shall include multiple branches to allow simultaneous heating and cooling by allowing either hot gas refrigerant to flow to indoor unit(s) for heating or subcooled liquid refrigerant to flow to indoor unit(s) for cooling. Refrigerant used for cooling must always be subcooled for optimal indoor unit LEV performance; alternate branch devices with no subcooling risk bubbles in liquid supplied to LEV and are not allowed.

3. These units shall be equipped with a circuit board that interfaces to the M-NET controls system and shall perform all functions necessary for operation. The unit shall have a galvanized steel finish. The BC Controller shall be completely factory assembled, piped and wired. Each unit shall be run tested at the factory. This unit shall be mounted indoors, with access and service clearance provided for each controller. The sum of connected capacity of all indoor air handlers shall range from 50% to 150% of rated capacity.

B. Unit Cabinet:
   1. The casing shall be fabricated of galvanized steel.
   2. Each cabinet shall house a liquid-gas separator and multiple refrigeration control valves.
   3. The unit shall house two tube-in-tube heat exchangers.

C. Refrigerant
   1. R-454B or R-32 refrigerant shall be required.

D. Refrigerant Valves:
   1. Each branch shall have multiple two-position valves to control refrigerant flow.
   2. Service shut-off valves shall be field-provided/installed for each branch to allow service to any indoor unit without field interruption to overall system operation.
   3. Linear electronic expansion valves shall be used to control the variable refrigerant flow.

E. Electrical:
   1. The unit electrical power shall be 208/230 volts, 1 phase, 60 Hertz. Provide with unit mounted disconnect switch.
   2. The unit shall be capable of satisfactory operation within voltage limits of 187-228 (208V/60Hz) or 207-253 (230/60Hz).
   3. The unit controller shall be controlled by integral microprocessors
   4. The control circuit between the indoor units and outdoor units shall be 24VDC completed using a 2-conductor, twisted pair shielded cable to provide total integration of the system.

2.08 TOUCH SCREEN CONTROLLER

A. General
   1. The Toshiba Carrier BMS-CT2560U-UL is an advanced wall-mounted central touch screen controller designed for commercial and light residential HVAC networks. It allows users to control, monitor, and schedule up to 256 indoor connected VRF (Variable Refrigerant Flow) units from a single interface.

B. Core Features
   1. Unit Capacity:
      a. Manages up to 256 indoor units across up to two independent communication channels (128 units per LINK terminal).
   2. Energy Monitoring:
      a. Offers granular tracking of system settings and performance data for energy efficiency optimization.
   3. Diagnostics:
      a. Capable of displaying real-time malfunction check codes and system status alerts.
   4. User Interface:
      a. Features an intuitive LCD touch display with multiple language options (English, French, Japanese, etc.).

C. Technical Specifications
   1. Power Supply:
      a. 208/230V AC, 1-phase, 60 Hz or 120V AC depending on the regional variant and relay configuration.
   2. Consumed Current:
      a. Approximately 1.17 A.
   3. Operating Temperature:
      a. 0° C to 40° C (32°F to 104°F) with 10% to 90% relative humidity.

4. Connectivity:
    a. Includes RS-485 port, LAN port, and dual USB ports for data management.

2.09 BACNET INTERFACE

A. Prove a BACnet interface module for the VRF system controls to talk to the building's ATC/DDC system.

B. The Toshiba Carrier BMS-IFBN1281U-UL is a specialized BACnet Application Specific Controller (B-ASC) server designed to bridge Toshiba Carrier VRF systems with a centralized Building Management System (BMS) or Building Automation System (BAS). It functions as a hardware gateway, translating proprietary HVAC communication protocols into standard BACnet IP over an Ethernet connection.

C. Core Technical Specifications
    1. System Capacity:
        a. Connects up to 128 indoor units when using a newer U-Series (TU2C-Link) communication bus, or up to 64 indoor units when backward-compatible with legacy E-Series (TCC-Link) buses.
    2. Power Supply:
        a. Operates on a standard 120V AC, 60 Hz power input, consuming a low 3W of power during standard operations.
    3. Mounting:
        a. Designed for simple installation using standard DIN rails inside an electrical switchboard, or it can be directly surface/wall mounted.
    4. Certification:
        a. Tested and recognized under BTL (BACnet Testing Laboratories) guidelines to guarantee standard interoperability with major BMS platforms.

D. Primary BMS Control and Monitoring Functions
    1. The device exposes the indoor HVAC units as data objects to your BMS, granting full visibility and operational control:
        a. Basic Commands:
            1) Global or unit-specific control over ON/OFF status, operation modes (Cool, Heat, Fan, Dry, Auto), and fan speed adjustments.
        b. Temperature Precision:
            1) Allows the BMS to command temperature setpoints in highly accurate 0.1°C or 1°F increments (within a typical 60°F to 90°F range) while reading ambient room temperatures in real time.
        c. Diagnostics:
            1) Forwards specific 2-digit error and system abnormality codes from indoor units, outdoor units, remote controllers, and branch boxes directly to the BMS interface for faster troubleshooting.

E. Configuration & Wiring Setup
    1. Networking:
        a. Employs a dedicated Ethernet (LAN) port to map the data points directly onto the building's localized automation network.
    2. Field Wiring:
        a. Control lines routed back to the outdoor header units typically require stranded, 2-conductor, non-polarity, shielded 16 AWG wire.
    3. Software Utility:
        a. Complete commissioning, configuration file deployment, and firmware upgrades are managed externally via the manufacturer's proprietary Setting File Creation Software 2 (SFC2).

2.10 REFRIGERANT PIPING

A. Piping joints and headers shall be used to ensure proper refrigerant balance and flow for optimum system capacity and performance. T-style joints shall not be acceptable as this will negatively impact proper refrigerant balance and flow for optimum system capacity and performance.

2.11 A2L REFRIGERANT LEAK DETECTION SYSTEM

A. For three-phase VRF, provide manufacturer's A2L refrigerant leak detection system.

B. Indoor unit detects refrigerant leaks.

C. 3 seconds after the leak is detected.
   1. Fan set to Hi Speed. Ceiling ducted concealed and multi-positioned air handlers models only (non-ducted units remain at current setting; this will change with future firmware update).
   2. External signal (alarm) output from connection terminal on an indoor HVAC/VRF unit is activated.
   3. The specific terminal/port located on the control board of HVAC/VRF indoor units turns OFF.

D. 7 seconds after the leak is detected.
   1. Branch Circuit controller shut-off valves begin to close (if heat recovery).
   2. 2-Pipe VRF systems - Shut-off valves begin to close (heat pump, if installed).
   3. Alarm activated at the wired wall-mounted remote controller and thermostat and centralized controller.
   4. Alarm signal activated – Branch Circuit controller (I/O terminal block) (heat recovery)
   5. Alarm signal activated - Outdoor unit (specific terminal connector on the indoor control boards of VRF systems).

E. 10 seconds after the leak is detected.
   1. Sub-branch-circuit shut-off valves begin to close.

F. All safety measures are activated within 15 seconds (when no controo network communication issues – proprietary communication protocol used to connect control, and monitor the HVAC system).

G. All other indoor units that are not affected by the refrigerant leak continue to operate as normal.

H. Note, above timing is approximate and will depend on communication traffic.

PART 3 - EXECUTION

3.01 GENERAL

3.02 REFERENCE STANDARDS

A. ISO 9001 - Quality Management Systems — Requirements; 2015.

B. ISO 14001 - Environmental Management Systems — Requirements with Guidance for Use; 2026.

C. UL 1995 - Heating and Cooling Equipment; Current Edition, Including All Revisions.

3.03 INSTALLATION

A. Install all equipment, piping, and controls in accordance with the manufacturer’s installation instructions.

B. Install refrigerant piping as per the manufacturer’s instructions and specifications.

C. Mount the outdoor condensing unit on a concrete equipment pad or equipment support rails.

D. Support the indoor unit as per the manufacturer’s instructions.

E. Mount the controller. Coordinate the exact location with the owner.

F. Install the drain line. Pitch the drain line in the direction of flow.

G. Install a new filter on the indoor unit.

H. Clean all equipment after installation.

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 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF WORK

A. Furnish and install new and/or replacement unit ventilators as shown on the drawings.

B. Include starters, disconnects, and required electrical devices, except where specified as furnished or factory-installed by the manufacturer.

C. Provide interlock wiring between electrically-operated terminal units and between terminal units and field-installed control devices.

D. Interlock wiring specified, as factory-installed, is the work of this section.

E. Provide the following electrical work as work of this section:
   1. Control wiring between field-installed controls, indicating devices, and terminal unit control panels.
   2. Control wiring specified, as work of Division 23 for HVAC controls is work of that section.

1.03 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in the manufacture of terminal units of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Units shall be tested and certified in accordance with ARI Standard 840.

C. Unit insulation and adhesive shall meet the requirements for flame spread rating of lower than 25 per ASTM E84 and smoke generation rating of lower than 50 per ASTM E84. Only closed-cell insulation shall be used. The use of fiberglass insulation is not acceptable.

D. Each coil shall be factory tested for leakage at 350 psig air pressure with the coil submerged in water.

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. Unit Ventilator Product Data Submittal
      a. Product Data: Submit manufacturer's specifications for terminal units showing dimensions, capacities, ratings, performance characteristics, gauges and finishes of materials, and installation instructions.
      b. Shop Drawings: Submit assembly-type shop drawings showing unit dimensions, construction details, and field connection details.
      c. Wiring Diagrams: Submit manufacturer's electrical requirements for power supply wiring to terminal units. Submit manufacturer's ladder-type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed.
      d. Samples: Submit 3 samples of each type of cabinet finish and color furnished.
      e. Maintenance Data: Submit maintenance instructions, including lubrication instructions, filter replacement, motor and drive replacement, and spare parts lists. Include this data, product data, and shop drawings in maintenance manuals; in accordance with requirements of Division 01.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Handle terminal units and components carefully to prevent damage, breaking, denting and scoring. Do not install damaged terminal units or components; replace with new.

B. Store terminal units and components in clean dry place. Protect from weather, dirt, fumes, water, construction debris, and physical damage.

C. Comply with Manufacturer's rigging and installation instructions for unloading terminal units, and moving them to final location.

PART 2 - PRODUCTS

2.01 UNIT VENTILATORS

A. Manufacturer: Subject to compliance with requirements. Provide unit ventilators of one of the following:
   1. Carrier (basis of design)
   2. Trane
   3. Daikin
   4. Engineer approved equivalent

B. General: Provide unit ventilators having cabinet sizes, and in locations indicated, and of capacities, style, and having accessories as scheduled. Unit ventilators shall be designed for floor (vertical) mounting. Units shall incorporate hot water or steam heat as specified. Include in basic unit cabinets, dampers, fan board assembly, motors, and coils. The unit shall be a factory-assembled bolt-together unit ventilator. Contained within the unit enclosure shall be a factory-installed motor, wiring, blowers, coil(s), bearing, and outdoor/return air dampers. Units shall be of draw-thru design. Blow-thru design is not acceptable.

C. Unit Construction:
   1. Unit frame shall be constructed of heavy gage galvanized steel components that form a rigid foundation and resist corrosion.
   2. Unit shall be 21 7/8 inches deep and include a false back to allow alignment of unit outside air passage with existing outside air louver connection.
   3. Unit composed of three main sub-assembled modules: Blower Module, Coil Module and Damper Module. Modules shall be removable without disassembling the unit.
   4. Modules shall be externally insulated using closed cell insulation.
   5. Unit back shall be insulated using closed cell insulation.
   6. Exterior access panels shall be constructed of heavy gage galvanized steel that has been cleaned and pretreated before painting to maximize corrosion resistance. Exterior service access panels shall be retained by tamper-resistant fasteners. Panels shall be electrostatically coated with polyester powder baked on textured paint.

D. Vertical Unit:
   1. Cabinet shall be provided with three 16-gauge exposed front panels, service access panels with tamper-resistant hex socket head threaded fasteners and retainer chains for safety and ease of service.
   2. Cabinet models shall have standard textured baked powder finished panels. Cabinet tops shall be charcoal bronze with a steel bar-stock discharge grille. Cabinet top shall have textured charcoal finish.
   3. External access panels shall be easily removed from outside of the unit for easy access to filters and routine maintenance. Unit top shall be easily removed for routine maintenance.
   4. Unit shall include leveling legs to compensate for floor irregularities.

E. Coils:
   1. Hot water coils shall be constructed of mechanically expanded copper tubing minimum wall .016" inside, aluminum fins, minimum thickness .025". The fin surface shall be enhanced to the maximum degree by incorporating a raised lance design. Coils shall be pressure tested at no less than 350 psig at the factory to ensure they are leak tight. Hot water coils shall be constructed of mechanically expanded copper tubing minimum wall .016", inside aluminum fins minimum thickness .045". The coil performance shall be maximized by incorporation of a waffle design of the fin surface. Coils shall be pressure tested at no less than 350 psig at the factory to ensure they are teak tight. A coil low limit shall be factory mounted on the leaving side of the heating coil. If the capillary device senses a temperature less than 38°F along any 6" the device will actuate, device shall be SPDT (single pull, double throw), auto reset.

2. Steam heating exchanger elements shall be double tube (DT) steam distributing, freeze-resistant type with the same end (or for floor units, either same end or opposite end connections), as indicated on the plans. A pressure equalizing device (vacuum breaker) shall be factory-installed to prevent the retention of condensate in the coil. The installing contractor shall connect the equalizing device to the return line beyond the trap using the tubing provided.
3. DX cooling coils are for future cooling.

F. Pipe Tunnel:
1. Units rated 750 to 1500 CFM vertical units shall have an integral pipe tunnel that can be used for piping across the unit. This tunnel shall be insulated, with closed cell insulation, from the unit and accessible from each end compartments to allow maximum flexibility of crossover piping installation.

G. Drain Pans:
1. Unit drain pan shall be double sloped welded galvanized steel to prevent standing water.
2. Drain pan will be coated to prevent external condensation during cooling.
3. Drain connections (7/8 inch OD) shall be supplied on both ends of pan for field conversion of slope and drain hand connection if required.
4. Drain pan slope shall be field convertible without removing the coil module.
5. Heating only units shall come equipped with a double sloped drain pan for future cooling needs.

H. Fan and Motor:
1. Fan and motor assembly shall be direct driven. One end of drive shaft shall be mounted in a sleeve-type or ball bearing, with other end of shaft supported by motor bearings.
2. Fan wheels shall be double-width, double-inlet with forward-curved blades, and shall operate at low speed. Fan wheels shall be mounted on a hollow one piece steel shaft.
3. Fan wheels shall be statically and dynamically balanced.
4. Fan (blower) housings shall be constructed from heavy-gauge steel and mounted to a heavy-gauge galvanized steel fan deck.
5. To prevent vibration transmission to the unit frame, motor and shaft bearing shall be resiliently mounted. The drive shaft shall be connected to motor with a flexible coupling.
6. Fan motors shall be mounted outside of the airstream on a heavy-gauge steel partition and removable without removing the blower module.
7. Units shall be supplied with permanently split capacitor (PSC) multi-tap transformer motors. All motors shall have integral high temperature reset and shall be protected with cartridge-type fuse(s).

I. Filters:
1. Unit shall be supplied with 1-inch throwaway filter. The unit shall be capable of incorporating a 2 inch filter. For even loading, filter shall be positioned to filter mixed outdoor and return air.
2. Filter track shall be field adjustable to accept 1-inch or 2-inch permanent or renewable media replacement filters.

J. Dampers:
1. Unit shall contain a single outdoor-air/return-air damper with multiple sealing points. Damper shall be constructed of extruded aluminum with external closed cell insulation. The damper assembly shall include an anti-draft plate to prohibit outdoor air from penetrating the classrooms through the damper assembly.
2. As scheduled: Unit shall contain a single (heating coil and/or cooling coil) face/bypass control damper for full modulation of heating and cooling supply air control.

K. Accessories:
1. Exterior wall louver

L. Provide finished side panels and matching filler sections by the same manufacturer, where new unit ventilators are smaller than the existing unit ventilators being replaced, or where the unit

ventilator is larger than the existing and no new cabinetry is specified. No unfinished wall surfaces shall be exposed after installation.

M. A2L Refrigerant Leak Detection System
   1. DX cooling is future.
   2. The leak detection system consists of one or more refrigerant detection sensors. When the system detects a leak, the following mitigation actions will be initiated until refrigerant has not been detected for at least 5 minutes:
      a. Energize the supply fan(s) to deliver a required minimum amount of circulation airflow.
      b. Disable compressor operation.
      c. Provide an output signal to fully open all zoning dampers, such as VAV boxes.
      d. Provide an output to energize additional mechanical ventilation (if needed).
      e. Units without airflow proving will disable electric heat sources.
   3. Building fire and smoke systems may override this function.
   4. If the refrigerant sensor has a fault, is at the end of its life, or is disconnected, the unit will initiate the mitigation actions. Mitigation actions may be verified by disconnecting the sensor.
   5. The refrigerant sensors do not need service. Use only manufacturer-approved sensors when replacement is required.
   6. Notes:
      a. Factory-installed manufacturer's controllers are programmed with leak detection sequence of operations at the factory.
      b. Field-installed unit controllers require field programming of the leak detection sequence of operations by the controls contractor. See UL 60335–2–40 for more information.

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine areas and conditions under which terminal units are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.02 INSTALLATION OF UNIT VENTILATORS

A. General: Install unit ventilators as indicated, and in accordance with manufacturer's installation instructions.

B. Locate unit ventilators as indicated, level and shim units, anchor to substrate.

C. Provide all blocking, weather striping, insulation boards, fire rated marine grade plywood, etc. To provide a level, plumb and air and weather tight seal of unit ventilators to existing exterior wall / outside air louver.

D. Adjust and level unit ventilators to within ±1/8" of adjacent cabinetry surfaces. Bring to the attention of the construction manager any conditions which prevent the ability to meet this requirement as soon as they are found.

E. Install piping as indicated.

F. Protect units with protective covers during balance of construction.

G. Coordinate all demolition or modification of existing equipment and adjacent cabinetry with the Owner prior to the start of any work.

H. In no case shall there be any exposed sharp corners or edges which can lead to cuts or abrasions by the nominal activity of the occupants.

3.03 ELECTRICAL WIRING

A. General: Install electrical devices furnished by manufacturer not specified to be factory-mounted. Furnish copy of manufacturer's wiring diagram.

B. Verify that electrical wiring installation is in accordance with manufacturer's submittal. Do not proceed with equipment start-up until wiring installation is acceptable to equipment installer.

3.04 ADJUSTMENT AND CLEANING

A. General: After construction is completed, including painting, clean unit exposed surfaces, vacuum clean terminal coils and inside of cabinets.

B. Retouch any marred or scratched surfaces of factory-finished cabinets, using finish materials furnished by manufacturer. Provide extra touch up paint to owner.

C. Install new filter units for terminals requiring the same.

D. Test, adjusting, and balancing is specified in other Division 23 sections; not work of this section.

END OF SECTION

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PART 1 - GENERAL

1.01 REFERENCE STANDARDS

A. ASTM C916 - Standard Specification for Adhesives for Duct Thermal Insulation; 2020.

B. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material); 2019.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2026a.

D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2021.

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 cabinet unit heaters.

1.04 SUBMITTALS

A. Product Data: Include specialties and accessories for each unit type and configuration.

B. Shop Drawings: Submit the following for each unit type and configuration:
   1. Plans, elevations, sections, and details.
   2. Details of anchorages and attachments to structure and to supported equipment.
   3. Power, signal, and control wiring diagrams. Differentiate between manufacturer-installed and field-installed wiring.
   4. Equipment schedules to include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories.

C. Color Charts for Initial Selection: Manufacturer's color charts showing the full range of colors available for units with factory-applied color finishes.

D. Field Test Reports: Written reports of tests specified in Part 3 of this Section.

E. Maintenance Data: For cabinet unit heaters to include in maintenance manuals specified in Division 01. Include the following:
   1. Maintenance schedules and repair parts lists for motors, coils, integral controls, and filters.

1.05 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.06 COORDINATION

A. Coordinate layout and installation of cabinet unit heaters and suspension system components with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression-system components, and partition assemblies.

1.07 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Cabinet Unit Heater Filters: Furnish one spare filter for each filter installed.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Trane (basis of design)
2. Modine
3. Daikin
4. Sterling Hydronics, Mestek
5. Vulcan, Mestek
6. Airtherm, Mestek

2.02 PERFORMANCE DATA

A. Capacity: Unit capacities rated in accordance with AHRI Standard 440-19. Safety: All standard units are UL listed in the United States and Canada. units comply with NFPA90A requirements.

2.03 CONSTRUCTION

A. All Units
   1. The unit includes a chassis, coil, fan wheel(s), fan casing(s), fan board, and motor(s). The fan board assembly is easily removable. The fan board assembly includes a quick-disconnect motor plug. The chassis construction is 18-gauge galvanized steel and continuous throughout the unit. The unit is acoustically and thermally insulated with closed-cell insulation. All panels are made rigid by channel forming.

B. Horizontal Cabinet Units
   1. All panels are 18-gauge galvanized steel, including the bottom panel. The hinged access door is flush with the front panel. Bottom panels ship with tamperproof screw fasteners and a safety chain.

C. Concealed/Recessed Units
   1. Exposed panels on recessed units are 18-gauge steel construction and ship separately from the unit. Bottom panels on horizontal recessed models ship with tamperproof screw fasteners and a safety chain. Horizontal recessed units feature a telescoping panel to allow the panel to be adjusted to line up flush with the ceiling. The telescoping panel extends 1.25-inch to 2-inch depending on the configuration of airflow.

D. Unit Finish
   1. All cabinet parts and exposed recessed panels are cleaned, bonderized, phosphatized, and painted with a baked powder finish available in six decorator colors. Standard finish meets ASTM B117 specifications (salt spray test).

E. Fans
   1. The galvanized metal fan wheels are centrifugal, forward-curved, and double-width. Fan wheels and housings are corrosion-resistant. Fan housing construction is formed from sheet metal.

F. Motors
   1. All motors are brushless DC (BLDC)/electronically commutated motors (ECM), factory-programmed and run-tested in assembled units. The motor controller is mounted in a touch-safe control box with a built-in integrated user interface and LED tachometer. If adjustments are needed, motor parameters can be adjusted through momentary contact switches accessible without factory service personnel on the motor control board.
   2. Motors will soft-ramp between speeds to lessen the acoustics due to sudden speed changes. Motors can be operated at three speeds or with a field-supplied variable speed controller. The motor will choose the highest speed if there are simultaneous/conflicting speed requests.
   3. All motors have integral thermal overload protection with a maximum ambient operating temperature of 104°F and are permanently lubricated. Motors are capable of starting at 50 percent of rated voltage and operating at 90 percent of rated voltage on all speed settings. Motors can operate up to 10 percent overvoltage.

G. Tamperproof Locks
   1. Key-operated locking access doors and/or panels will help prevent nuisance tampering with the unit and/or controls. Tamperproof locks are available on vertical cabinets, horizontal

cabinets, vertical wall-hung cabinets, vertical recessed cabinets, and vertical slope-top units.

2.04 CONTROLS

A. All controls shall be coordinated with the building's ATC/DDC system, the design drawings, and control specifications.

B. General
   1. Controls options are: fan speed control, customer-supplied terminal interface, and Tracer ZN520, UC400-B/Symbio 400-B, and Thermostat. A variety of inputs and outputs are available for the control interface and Tracer controller options. A disconnect switch (for non-electric heat units), fused transformer, contactor(s), and terminal strip are provided with the control interface and Tracer controller options.

C. Customer Supplied Terminal Interface
   1. The control interface is intended to be used with a field-supplied, low-voltage thermostat or controller. The control box contains a relay board which includes a line voltage to 24-volt transformer, quiet contactors (for electric heat units), and an optional disconnect switch. All end devices are wired to a low-voltage terminal block and are run-tested, so only a power connection and thermostat connection are needed to commission the unit. Changeover sensors and controls are provided whenever a changeover coil is selected. When N.O. valves are selected, inverting relays are provided for use with standard thermostats.

D. Fan Speed Control
   1. The fan speed control is available with or without the control interface option and is available as wall-mount or unit-mount. The speed control incorporates a 0-10 Vdc signal providing limitless control of the motor RPM between the factory set low and high speeds. The control box contains a line voltage to a 24-volt transformer, an ECM motor controller, and an optional disconnect switch.

E. Disconnect Switch
   1. A unit-mounted disconnect switch is available as a standard option on all units.

2.05 COILS

A. General
   1. All water coils are proof-tested at 300 psig (air) and leak-tested at 100 psig (air under water). The maximum main coil working pressure is 300 psig. The maximum entering water temperature is 200°F. Tubes and U-bends are 3/8-inch OD copper. Fins are aluminum and are mechanically bonded to the copper tubes. Coil stub-outs are 5/8-inch OD copper tubing.

B. Hot Water Coils
   1. Hot water coils are proof tested at 350 psig (air under water) and leak-tested at 125 psig (air under water). Additionally, a pressure decay test is conducted at 120 psig. The maximum main coil working pressure is 300 psig. The maximum entering water temperature is 200°F. Tubes and U-bends are 3/8-inch OD copper. Fins are aluminum and are mechanically bonded to the copper tubes. Coil stub outs are 5/8-inch OD copper tubing.

2.06 FILTERS

A. Filters are concealed from sight and easily removable. Filters are located behind an integral access door on horizontal-type units. Filters are either 1-inch throwaway, MERV 13.

B. Units equipped with 1-inch MERV 13 filters have a rating based on ASHRAE Standard 52.2. The average dust spot efficiency is no less than 90 percent efficiency on 1–3 micron particles and greater than 90 percent efficiency on 3–10 micron particles when tested in accordance with ASHRAE Test Standard 52.2.

2.07 OUTSIDE AIR DAMPER

A. General

1. An outside air opening with a damper is a factory-installed option. Dampers are constructed of 18-gauge steel. Fresh air is sealed off with gasket material when the damper is set in the closed position. Return and fresh air mix when the damper is open.

B. Manual Damper
1. The manual damper is field-adjustable to allow zero to 100 percent fresh air. The automatic two-position damper is accompanied by a factory-installed and wired two-position (spring-return) actuator.

C. Auto Two-Position Damper
1. The auto two-position damper is factory set at 25 percent when open. The damper can be set in the field to allow from zero to 50 percent fresh air.

D. Disconnect Switch
1. A unit–mounted disconnect switch is available as a standard option on all units (except electric heat units)

2.08 COLORS

A. Provide color chart. Colors are available in a baked powder finish. Architect or owner's representative shall select colors.

2.09 COMPONENTS

A. Quad Grille Outlet
1. Quad grilles are square multi-directional grilles that allow four different discharge directions by rotating the grilles 90°. The quad grille is constructed of a black plastic material (NORYL-SE-1731) with a 15° angle on the discharge louvers. Quad grilles are available on all cabinet-style units.

B. Bar Grille Inlet/Outlet
1. Bar grilles are formed steel grille options available on the discharge of all units and the return of vertical cabinet and vertical slope tops. The grilles have a black paint finish with 18-gauge steel construction. The louvers are formed at a 15° angle. The bar grilles are fixed in one discharge direction.

C. Recessing Flanges
1. Recessing flanges have 18-gauge steel construction and are painted the same finish as the unit. Recessing flanges provide an aesthetic architectural border or frame around vertical and horizontal cabinet units.

2.10 PIPING PACKAGES

A. Piping packages are a contractor's option. See drawing details for coil piping details showing valves.

B. All piping packages are proof-tested at 300 psig (air) and leak tested at 100 psig (air under water). The maximum working pressure of the interconnecting piping is 300 psig. For hydronic applications, the maximum working temperature is 200°F except for applications with up to 50% glycol, where the limit is 180°F.

C. Control valves are mounted in all factory piping packages. All piping packages are factory-installed and come in a variety of options:
1. Basic: Shut-off ball valve on the supply line. Control valve and shut-off ball valve on the return line.
2. Basic with manual circuit setter: Shut-off ball valve on the supply line. Control valve and manual circuit setter on the return line.
3. Deluxe with manual circuit setter: Union, strainer, P/T port, and shut-off ball valve on the supply line. Union, control valve, and manual circuit setter on the return line.
4. Deluxe with auto flow: Union, strainer, P/T port, and shut-off ball valve on the supply line. Union, control valve, auto flow valve, P/T port, and shut-off ball valve on the return line.

D. Two Position Control Valves

1. Two-position control valves are ball valves designed with zero leakage. The ball valve incorporates self-cleaning technology to provide superior clog resistance. The actuator is easily removable for service without removing the valve body. Actuators are a capacitor discharge return.

E. Modulating and Analog (2–10 Vdc) Control Valves
   1. Modulating and analog control valves are ball valve designed with zero leakage. The ball valve incorporates self-cleaning technology to provide superior clog resistance. If the actuators fail, they can be easily removed for servicing without removing the valve body.

F. End Valves
   1. Each piping package includes a ball valve on the entering water pipe and one of the following end valves on the leaving water pipe:
      a. Ball valve
      b. Manual circuit setter
      c. Auto circuit setter
   2. The end valve serves as the field connection point on all the Fan Coil piping packages.

G. Ball Valve
   1. Ball valves, also known as stop valves, allow the unit to be cut off for service purposes. The valve handle rotates 90 degrees to a fully open position with a maximum working pressure of 600 psig.

H. Manual Circuit Setter
   1. A manual circuit setter acts as both a flow setting device and a stop valve. This valve allows water flow through the unit to be set quickly and accurately. The manual circuit setter includes ¼-inch Schrader ports in the valve body. These ports are used to measure the pressure drop across the valve. This pressure drop can be compared to factory-supplied curves that relate the pressure drop to a specific flow rate. This valve also has a memory stop that helps find the correct setting quickly.

I. Automatic Flow Control (Auto Flow Valve)
   1. Automatic Flow Control is located on the return line. This device is a non-adjustable in-line flow control valve that maintains the GPM for the unit with a cartridge sized to a specific flow rate.

J. Strainer
   1. The strainer is provided with a plug to access the basket. The strainer contains a 20-mesh screen with a working pressure of 300 psig and a maximum water temperature of 210 degrees.

K. P/T Port
   1. P/T Port has the ability to measure the temperature or pressure of the line.

L. Bypass Balance Valve
   1. The balance valve incorporates both a gland screw and a stem for manual flow adjustment. The working pressure of this valve is 400 psig.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas to receive cabinet unit heaters for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine roughing-in for piping and electrical connections to verify actual locations before cabinet unit heater installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Furnish and install cabinet unit heaters as per manufacturer's recommendations and installation instructions.

B. Install cabinet unit heaters level and plumb.

C. Install cabinet unit heaters to comply with NFPA 90A.

D. Suspend cabinet unit heaters from the structure with rubber-in-shear vibration isolators (rubber hangers) or as recmmended by the manufacturer.

E. Install wall-mounting thermostats and switch controls in electrical outlet boxes at heights to match lighting controls.

3.03 CONNECTIONS

A. Piping installation requirements are specified in other mechanical Sections. Drawings indicate the general arrangement of piping, fittings, and specialties.

B. Unless otherwise indicated, install a shutoff valve and union or flange at each connection.

C. Install piping adjacent to the machine to allow service and maintenance.

D. Ground equipment.

E. Tighten electrical connectors and terminals according to the manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.04 FIELD QUALITY CONTROL

A. Testing: Perform the following field quality-control testing and report results in writing:
   1. After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
   2. Test and adjust controls and safeties.

B. Repair or replace malfunctioning units. Retest as specified above after repairs or replacements are made.

3.05 CLEANING

A. After installing units, inspect the unit cabinet for damage to the finish. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match the original finish.

B. After installing units, clean cabinet unit heaters internally according to the manufacturer's written instructions.

C. Install new filters in each cabinet unit heater within two weeks after Substantial Completion.

3.06 DEMONSTRATION

A. Engage a factory-authorized service representative to train the Owner's maintenance personnel to adjust, operate, and maintain cabinet unit heaters.
   1. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment.
   2. Review data in maintenance manuals. Refer to Division 01 for Closeout Procedures and Division 01 for Operation and Maintenance Data.
   3. Schedule training with Owner, through Architect, with at least seven days' advance notice.

END OF SECTION

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. 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 spaces.

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. Distribution panelboards.

B. Retrofit panelboards.

1.02 REFERENCES

A. ANSI/NFPA 70 - National Electric Code.

B. NECA Standard of Installation.

C. NEMA AB1 - Molded Case Circuit Breakers.

D. NEMA PB1 - Panelboards.

E. NEMA PB1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.

F. NEMA ICS2 - Industrial Control Devices, Controllers and Assemblies.

G. NEMA KS1 - Enclosed Switches.

1.03 SUBMITTALS

A. Submit product data under provisions of Section 013300.

B. Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, and circuit breaker arrangement and sizes.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. New Panelboards
   1. Panelboards shall be manufactured by Siemens.
   2. Approved equal.

B. Retrofit Panelboards
   1. Retrofit Panelboards shall be manufactured by Eaton.
   2. Approved equal.

2.02 PANELBOARD REQUIREMENTS

A. Provide panelboards of circuit breaker, dead-front safety type, UL labeled, and meeting all applicable requirements of the National Electrical Manufacturers Association.

B. Provide panelboards with lugs (both main lugs and branch circuit lugs) suitable and UL approved for both aluminum and copper conductors.

C. Provide electrically isolated neutral bars.

D. Provide separate ground bars complete with lugs or connectors on bar.

E. Provide key operated door and door lock. Door shall prevent access to operate circuit breakers.

F. Provide panelboards with sequence phased bus bars or distributed phase bussing for voltage and phase as indicated on drawings.

G. Refer to drawings for numbers of branch circuits, their ratings, number of poles, arrangements, etc.

H. Provide typed circuit directory cards.

I. Provide front filler plates for unused breaker knockouts.

J. Refer to drawings for Ratings and Features.

K. All bus bars, including ground bars shall be tin-plated copper.

L. All circuit breakers shall be bolt-on type.

2.03 RETROFIT PANELBOARD REQUIREMENTS

A. The panelboard shall be specifically designed for retrofit applications in existing panelboard boxes. The manufacturer shall supply in advance to the consultant complete application instructions and information on the panelboards.

B. Trims for retrofit panelboards shall be designed specifically for retrofit applications. Trim mounting shall not be dependant nor attached to the existing enclosure. The trim and door shall attach directly to the panelboard deadfront assembly so that no external trim-fastening hardware shall be required. Trims shall have concealed hardware. Trims for branch circuit panelboards shall be supplied with a hinged door over all circuit breaker handles. Doors in panelboard trims shall not uncover any live parts. Doors shall have a semi flush cylinder lock and catch assembly. Doors over 48 inches in height shall have auxiliary fasteners. The trim and door shall be flush with adjacent walls.

C. The minimum short-circuit rating for branch circuit panel boards shall be as specified as indicated on the drawings. Panelboards shall be fully rated. Panelboards shall be Cutler-Hammer (Eaton) type Pow-R-Line 1R or approved equal.

D. Bolt-on type, heavy-duty, quick-make, quick-break, single- and multi-pole circuit breakers of the types specified herein, shall be provided for each circuit with toggle handles that indicate when unit has tripped.

E. Circuit breakers shall be thermal-magnetic type with common type handle for all multiple pole circuit breakers. Circuit breakers shall be minimum 100-ampere frame and through 100-ampere trip sizes shall take up the same pole spacing. Circuit breakers shall be UL listed as type SWD for lighting circuits and HACR for all HVAC circuits. Circuit breaker handle locks shall be provided for all circuits that supply exit signs, emergency lights, energy management, and control system (EMCS) panels and fire alarm panels.

F. Circuit breakers shall have a minimum interrupting rating of 10,000 amperes symmetrical at 240 volts, unless otherwise noted on the drawings.

G. Existing enclosures shall be identified for retrofit suitability in advance. The structural integrity of all existing enclosures shall be verified. Any enclosure that is damaged shall be replaced with a new enclosure and panelboard under Section 262400 of this specification. The contractor shall provide exact dimensions of the existing enclosure to the manufacturer.

H. Prior to ordering panel boards the contractor shall conduct a full evaluation of the existing panelboards. The contractor shall provide the engineer, in Microsoft Excel spreadsheet format, the following information:
   1. Existing main conduit feed location (top or bottom)
   2. Existing panelboard ampere rating and MCB or MLO
   3. Existing main feeder wire sizes and quantities
   4. Existing main ground wire size and quantities
   5. Any visible NEC violations
   6. Back-box dimensions
   7. Circuit breaker ampere rating and quantities

I. Provide panelboards of circuit breaker, dead-front safety type, UL labeled, and meeting all applicable requirements of the National Electrical Manufacturers Association.

J. Provide panelboards with lugs (both main lugs and branch circuit lugs) suitable and UL approved for both aluminum and copper conductors.

K. Provide electrically isolated neutral bars.

L. Provide separate ground bars complete with lugs or connectors on bar.

M. Provide key operated door lock.

N. Provide panelboards with sequence phased bus bars or distributed phase bussing for voltage and phase as indicated on drawings.

O. Refer to drawings for numbers of branch circuits, their ratings, number of poles, arrangements, etc.

P. Provide typed circuit directory cards.

Q. Provide front filler plates for unused breaker knockouts.

R. Refer to drawings for Ratings and Features.

S. All bus bars, including ground bars shall be tin-plated copper.

T. All circuit breakers shall be bolt-on type.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Ground separate ground bars to panel boxes and to the main service entrance ground bus with a code-sized grounding conductor installed in the same conduit as the phase and neutral conductors under provisions of Section 260526.

B. Install all circuits using a common neutral bus bay in accordance with the National Electric Code. Balance all circuits to achieve not greater than 7% unbalanced neutral current in panel feeders.

C. Provide six circuit breaker handle lock-on devices for each lighting and miscellaneous power panelboard for installation by the contractor on circuits as directed by the Engineer to prevent unauthorized personnel from turning off circuits to controls, unit heaters, auto-dial alarm system, etc. Provide spare lock-on devices over to the Engineer.

D. Install panelboards in accordance with NEMA PB 1.1.

E. Install panelboards plumb.

F. Height: 6 feet (2 m) to top of panel board.

G. Provide typed circuit directory for each branch circuit panelboard. Handwritten circuit directory cards will not be accepted. Revise directory to reflect circuiting changes required to balance phase loads.

H. Provide a typed circuit directory in accordance with NEC sections 110.22 and 408.4. Circuits shall be labeled with detailed information describing the switches function and equipment location.

I. For all existing circuits terminated to a new panelboard, contractor shall trace out and update the circuit directory in accordance with NEC sections 110.22 and 408.4. Include all costs for this work in base bid.

J. Revise directory to reflect circuiting changes required to balance phase loads.

K. Provide engraved plastic nameplates under the provisions of Section 260553.

L. Panelboards shall be factory installed in the motor control center by the manufacturer of Motor Control Center where indicated on drawings.

3.02 FIELD QUALITY CONTROL

A. Maintain proper phasing for multi-wire branch circuits.

B. Visual and Mechanical Inspection: Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections for circuit breakers, fusible switches, and fuses.

END OF SECTION

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PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Switches, receptacles, thermostats, device plates and other wiring devices as indicated on Drawings.

1.02 RELATED SECTIONS

A. Section 260533 - Raceways and Boxes for Electrical Systems.

1.03 REFERENCES

A. ANSI/NFPA 70 - National Electric Code.

B. NEMA WD1 - General Purpose Wiring Devices.

1.04 SUBMITTALS

A. Submit product data under provisions of Section 013300.

B. Provide manufacturer's catalog information showing dimensions, colors and configuration.

1.05 REGULATORY REQUIREMENTS

A. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

PART 2 - PRODUCTS

2.01 SWITCHES

A. Manufacturers: HUBBELL, BRYANT, GENERAL ELECTRIC.

B. Single pole, 20 amp, 120/277 VAC, NEMA WD-1, heavy duty, UL20.

C. Device Plate: Stainless steel.

2.02 RECEPTACLES

A. Manufacturers: HUBBELL, BRYANT, GENERAL ELECTRIC.

B. 20 amp, 125 VAC, NEMA WD-1, heavy duty.

C. 20 amp, 125 VAC, NEMA WD-1, heavy duty, ground fault circuit interrupter.

D. Duplex type.

E. Device Plate: Stainless steel.

F. Tamper-Resistant Receptacles: All receptacles in areas specified below shall be listed tamper-resistant receptacles:

1. Preschools and elementary education facilities.
2. Preschools and elementary education facilities
3. All areas required by NFPA 70 NEC

2.03 MANUAL MOTOR RATED THERMAL SWITCH

A. Acceptable Manufacturers: SQUARE D, Class 2510, Type KG1A, Type KG2C (3-pole, 600V) or approved equal.

B. Contractor shall coordinate voltage, phase and current rating with equipment.

2.04 TELEPHONE/DATA OUTLETS

A. Provide combination telephone/data jacks compatible with RJ-45 and RJ-11 cable connections.

B. Provide “Decora” type with matching vinyl cover plate.

C. Colors shall be selected by the Owner.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Mounting:

1. Mount all switches 46-inches above finished floor to center line of switch unless noted otherwise.
2. Mount all receptacles 18-inches above finished floor to center line of receptacle unless noted otherwise.
3. Install switches with OFF position down.

B. Polarity: Properly wire all receptacles so that the hot wire, the neutral wire and the ground wire connect to the proper terminal on all receptacles.

C. Grounding: Install all devices in boxes specified under Section 260533 and install a No. 12 green ground wire from device grounding terminal to the outlet box in accordance with the National Electric Code.

D. Install device plates on switch, receptacle and blank outlets in full contact with wall surface.

3.02 FIELD QUALITY CONTROL

A. Inspect each wiring device for defects.

B. Operate each wall switch with circuit energized and verify proper operation.

C. Verify that each receptacle device is energized.

D. Test each receptacle device for proper polarity.

E. Test each GFCI receptacle device for proper operation.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Disconnect switches.

B. Fuses.

C. Enclosed Circuit Breakers.

1.02 REFERENCES

A. NEMA KS-1 - Enclosed Switches.

B. ANSI/UL 198C - High Intensity Capacity Fuses, Current Limiting Types.

C. ANSI/UL 198E - Class R Fuses.

D. FS W-S 865 - Switch, Box (Enclosed), Surface Mounted.

E. NEMA AB1 - Molded Case Circuit Breakers.

1.03 SUBMITTALS

A. Submit product data under provisions of Section 013300.

B. Include outlet drawings with dimensions and equipment ratings for voltage, capacity, horsepower and short circuit current ratings.

1.04 RELATED SECTION

A. Section 260553 - Identification for Electrical Systems.

1.05 COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

2.01 DISCONNECT SWITCHES

A. Disconnect switches shall be GENERAL ELECTRIC, heavy-duty Type TH or approved equal.

B. 75ºC conductor ratings.

C. Ratings: 600VAC

D. Quick-break, quick-make, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position.

E. Suitable for use as service entrance equipment.

F. UL listed for Class R 200,000 RMS amps, symmetrical IC.

G. Class R fusing kit.

H. Enclosures: Refer to drawings.

2.02 FUSES

A. Fuses shall be Littlefuse KLNR Class RK1 or approved equal.

B. Fuses shall be rated for 600 volts AC.

C. Interrupting Rating: 200,000 RMS amps.

2.03 MOLDED CASE CIRCUIT BREAKERS

A. Install molded case circuit breakers for Main Circuit Breaker, Generator Circuit Breaker and Panel Circuit Breakers.

B. Molded Case Circuit Breaker:
   1. Manufacturer: SIEMENS, or approved equal.

a. 125 Amp, 3 Pole Type ED6.
b. 250 Amp, 3 Pole Type HFD6.
c. 400Amp, 3 Pole Type HJD6.
d. 600Amp, 3 Pole Type HLD6.
e. 800Amp, 3 Pole Type HMD6.

2. AIC Rating: 65,000 amperes.
3. Thermal magnetic with interchangeable trip

C. Enclosure
1. Manufacturer: SIEMENS or approved equal.
2. Rating: NEMA 1 (for interior use) or NEMA 4X Stainless Steel (for exterior use).
3. External Throw.
4. Suitable for Service Entrance Equipment (where applicable).

2.04 EXTRA MATERIALS

A. Provide one complete set based on number of poles of spare fuses for each fused disconnect switch. Provide to Owner with Closeout Submittals - See Section 017800

PART 3 - EXECUTION

3.01 INSTALLATION REQUIREMENTS

A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

B. Temporary Lifting Provisions: Removed temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

C. Provide switches/enclosed circuit breakers at locations as indicated on drawings.

D. Refer to disconnect switch schedule on drawings for ampacity ratings, fuse sizes, number of poles and enclosure ratings.

E. Install fuses in fusible devices.

F. Install engraved nameplates on each switch and enclosed circuit breaker identifying the following:
1. Switch designated.
2. Load served.
3. Power origination.
4. Fuse size as indicated on drawings.

3.02 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit breaker trip ranges.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Magnetic motor starters.

1.02 REFERENCES

A. NFPA 70 - National Electrical Code.

B. NECA "Standard of Installation," published by National Electrical Contractors Association.

C. NEMA ICS 2 - Industrial Control Devices, Controllers and Assemblies.

D. NEMA ICS 6 - Enclosures for Industrial Controls and Systems.

E. NEMA KS 1 - Enclosed Switches.

1.03 SUBMITTALS

A. Refer to drawing for starter sizes on schedules.

B. Product Data: Provide catalog sheets showing voltage, controller size, ratings and size of switching and overcurrent protective devices, short circuit ratings, dimensions, and enclosure details.

C. Test Reports: Indicate field test and inspection procedures and test results.

1.04 QUALITY ASSURANCE

A. Perform Work in accordance with NECA Standard of Installation.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with NEMA ICS 2.3.

1.06 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 indicated.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. SIEMENS, Class 17

B. Substitutions: Under provisions of Section 012500

2.02 AUTOMATIC CONTROLLERS

A. Combination Magnetic Motor Controllers: NEMA ICS 2, AC general-purpose Class A magnetic controller for induction motors rated in horsepower.

B. Motor starters shall be NEMA rated.

C. Coil operating voltage: Coordinate voltage required with equipment to be installed and associated contactor(s).

D. Auxiliary contacts: NEMA N/O and N/C contacts rated up to 10 Amp. SIEMENS Model No. 49AAFO and 49AAFC.

E. Overload Relay: NEMA ICS; melting alloy overload.

F. Enclosure: As shown in contract drawings.

G. Circuit Breaker Disconnect Switch with external lockable handle.

2.03 PRODUCT OPTIONS AND FEATURES

A. Auxiliary Contacts: NEMA ICS 2, 1 each normally open/closed contacts.

B. Motor running and overload indication lights. Pilot lights shall be heavy duty 30.5 mm oiltight press-to-test by SIEMENS or equal.

C. Selector Switches: Hand-off-automatic selector switch shall be heavy duty 30.5 mm oiltight by SIEMENS or equal.

D. Manual reset push button for overload.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install enclosed controllers size as indicated, on starter schedule, in accordance with manufacturer's instructions.

B. Install enclosed controllers plumb in locations indicated on drawings. Provide supports in accordance with Section 260526.

C. Select and install overload heater elements in motor controllers to match installed motor characteristics.

D. Provide engraved plastic nameplates for each starter.

E. Provide neatly typed label inside each motor controller door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor and voltage/phase rating.

END OF SECTION 262914