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PROJECT MANUAL

VOLUME 2: DIVISIONS 02 – 14

Binghamton City School District 2024 Capital Project

- Theodore Roosevelt Elementary School

03-02-00-01-0-010-014



CSArch Project # 215-2402

The design of this project conforms to applicable provisions of the New York State Uniform Fire Prevention and Building Code the New York State Energy Conservation Construction Code and the Manual of Planning Standards of the New York State Education Department

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END OF SECTION

SECTION 022460 -NEW MATERIALS TESTING

PART I GENERAL

1.1 DESCRIPTION

- A. This Section requires all Contractors, Subcontractors, Vendors and Suppliers to submit, upon request, any New Material or Product introduced, as part of this 2021 Capital Project.
- B. Provide all labor, materials, and equipment requested by the Environmental Remediation Consultant.

1.2 WORK INCLUDED ELSEWHERE

- A. Architect's Project Manual Division 00 —Procurement and Contracting Requirements
- B. Architect's Project Manual Division 01 — GeneralRequirements
- C. Architect's Contract Drawings

1.3 SUMMARY

- A. The Work defined in this Section shall be performed inclusive of Contractual Agreement for construction by all Contractors, Subcontractors, Vendors and Suppliers. Contractors, Subcontractors, Vendors and Suppliers shall coordinate with Owner's independent professional Environmental Consultant to assemble and present materials for sampling and testing.
- B. For purposes of this Project Manual Section, the term "Contractor", shall include all Prime Contractors, all Subcontractors, all Vendors and allSuppliers.
- C. Contractors shall notify Consultant of all scheduled new products and materials that will be installed in the renovations of Buildings which are part of this 2021 Capital Projects.
- D. sampling and testing may include individual products, materials, assemblies or partial components used in the Project, and sampling/testing required shall be at the sole discretion of the Owner, Architect or Environmental Consultant.
- E. The Owner, Architect or Environmental Consultant expressly reserves the right to

sample and test and reject any suspect contaminants determined to be a concern for the Owner, unless or otherwise determined not able to be substituted at a reasonable cost, and the future cost implications are not adverse to the Owner.

- F. Labor and materials required of the Contractor to conduct these services shall be included in the Contractor's Bid Price. The Owner shall be responsible for costs of services for sampling/testing by Owner's Environmental Consultant.

1.4 SUBMITTALS

- A. Contractor shall make available material samples for collection by the Owner's Environmental Consultant, a minimum of three (3) samples of each suspect product or material, or as otherwise requested by Environmental Consultant, for testing. Sizes and amounts of samples to be tested shall be determined by Environmental Consultant, dependent upon required regulatory requirements.
- B. Samples will be collected for:
 - 1. Asbestos-Containing Materials (ACM's);
 - 2. Lead-Based Paints and Soils (LBP's);
 - 3. Lead-in-Drinking Water (LDW);
 - 3. Polychlorinated Biphenyl's (PCB's).
- C. The Environmental Consultant will submit Reports for all materials sampled and tested for ACM, LBP, LDW and PCB content. Reports shall be submitted to Owner, Architect and Environmental Consultant immediately identifying specific product or material tested with any detectable limit of concern or elevated amount analytes requested.
- D. Contaminants detected, in any amount, shall require Environmental Consultant to recommend, based upon consultation with the Owner, Architect and Contractor, if the product or material should be rejected and substituted or deleted from the Project construction. Unless decision is made to substitute or reject by Owner or Architect, the product or material shall be implemented into the construction, as specified.
- E. Contractor may include in its Bid Price costs associated with labor and material to comply with this New Material Hazardous Testing requirements.

PART 2 — PRODUCTS AND MATERIALS

2.1 GENERAL

- A. Environmental Consultant shall provide appropriate sampling media/containers to Contractors, if/as required or requested.
- B. Contractors shall not use any container, packaging or other method of supplying samples to Environmental Consultant, other than used and/or recommended by product or material manufacturer or by Environmental Consultant.

PART 3 - EXECUTION

3.1 SUSPECT ASBESTOS, LEAD AND PCB PRODUCTS AND MATERIALS

- A. In order to assist the Contractor selected for this Project, the following is a list of those materials requested to be tested prior to use in construction, and the analyte to be tested. Final determination will be made at the discretion of the Owner, Architect and Environmental Consultant.
- B. This list provided shall only be used as a resource for determining representative products and materials that may be scheduled for sampling/testing.

LISTING OF SUSPECT NEW PRODUCT & MATERIALS FOR TESTING

ASBESTOS (Min. Quantity: 01 Sq. In.)

▪ Paint chips (TEM)	▪ Floor Tile
▪ Caulk	▪ Cove Base
▪ Soil	▪ Floor Leveler Compound
▪ Fireproofing	▪ Ceiling Tile
▪ Acoustical Plasters	▪ Vermiculite Insulation & Soils (no less than 10 oz.)
▪ Scratch and/or Finish Plasters	▪ Chalkboards
▪ Skim Coats of Joint Compound	▪ Electrical Wire Insulation
▪ Equipment Insulation	▪ Fire Curtains
▪ Insulation Board	▪ Fire Blankets
▪ Vapor Barriers	▪ Fire Doors
▪ Coatings	▪ Brakes and Clutches
▪ Dust and Debris	▪ Mastics, Adhesives and Glues

ASBESTOS (cont.)

- Gaskets, Seals, Sealants
- Laboratory Tables & Hoods
- Felts
- Cementitious Board
- Flashing
- Shingles
- Galbestos
- Vibration Isolators
- Plasterboard
- Non-Metallic or Non-wood Roof Decking
- Spackling/Joint Compound
- Textured Paint
- Grout
- Glazing Compound
- Terrazzo
- Caulks
- Boiler, Breeching, Boiler rope, Duct or Tape insulation, Cement or Mortar used for boilers and Refractory Brick
- Piping and Fitting Insulations Non-fibrous glass, including coverings over fibrous glass insulation
- Gaskets, Seals, Sealants (including for condensate control)
- Pipe Penetration Packing or Other Firestopping Materials

LEAD (Min. Quantity: 1 Sq. In. Solid or 1 oz. Liquid)

- Paint Chips
- Windows
- Window Sills
- Window Frames
- Doors
- Door Frames
- Cove Base
- Wood Support Beams
- Metal Pipes
- Metal Steps
- Solder
- Anything Painted/Varnished/Stained
- Cable Sheathing
- Sheet Metal
- Plumbing Fixtures
- Soil
- Mini-blinds
- Batteries
- Ceramics/China/Pottery
- Radiators
- Hoses
- Playgrounds
- Metal Roof Flashing

PCB (Min. Quantity: 05 Sq. In. Solid or 1
oz. Liquid)

- Caulk
- Soil
- Plastics
- Paints
- Asphalt
- Gasket Sealers
- Lubricants
- Gas Pipelines
- Flame Retardants
- Oils
- Ballasts
- Sealants
- Coatings
- Friction Fluids
- Polymers
- Adhesives
- Mastics

3.2 SUBMISSIONS

- A. Contractors shall implement the following Submission Procedure and Process as follows, unless directed otherwise by Owner or Architect:
 - 1. Reference the Contractor's "Submittal Schedule" for suspect products and materials;
 - 2. Environmental Consultant shall review "Submittal Schedule", in conjunction with the Contractors, suspect products and materials requiring testing;
 - 3. Contractor shall submit Product Data Sheets/Information and Hazard Communication Standard Safety and Data Sheets (SDS's) when submitting the min. three (3) samples of each suspect product or material to Environmental Consultant;
 - 4. Environmental Consultant will assist Contractor with aspects related to this Section, including the collection of new construction materials.
- B. The Environmental Consultant shall retain the services of Independent Testing Laboratory which specializes in environmental analyses. The Laboratory shall be required to conduct testing in accordance with policies, protocols and methodologies of New York State Education Department (NYSED), New York State Department of Health's (NYSDOH) Environmental Laboratory Accreditation Program (ELAP), of National Institute of Occupational Safety and Health (NIOSH), of United States Department of Commerce National Institute of Standards and Technology's (NIST's) National Voluntary Laboratory Accreditation Program (NVLAP), of Environmental Protection Agency (EPA), and of Asbestos Hazard Emergency Response Act (AHERA). Additionally, the Testing Laboratory shall be required to conduct in-house Quality Control analysis program in compliance with applicable regulations.
- C. Sampling & Testing for Asbestos-Containing Materials (ACM's) shall be performed on all suspect materials scheduled for the construction as part of the renovations or addition. The Environmental Consultant may choose to randomly sample stored or installed products and materials at any time.
- D. Sampling/testing for Polychlorinated Biphenyl's (PCB's) content shall be performed on suspect materials scheduled for construction as part of the renovations. The Environmental Consultant may choose to randomly sample stored or installed products and materials at anytime.
- E. Sampling & Testing for Lead Based Paint (LBP) shall be performed on suspect materials scheduled for construction as part of the renovations. The Environmental Consultant may choose to randomly sample stored or installed products and materials at anytime.

- F. Sampling & Testing for Lead-in-Drinking Water (LDW) shall be performed on new suspect materials including, but not limited to, drinking devices, piping systems, plumbing fixtures, solder and flux scheduled for the renovation and addition construction. New NYS LDW regulations, effective 2016, require sampling/testing of new drinking water sources and of existing sources which have new or renovated plumbing fixtures or appurtenances.
- G. Coordinate delivery or installations of new construction materials and assemblies with Environmental Consultant, Contractor and Architect, as applicable.
- H. Asbestos and PCB's: Materials or products with any amount of Asbestos or PCB shall not be installed whether or not regulations state otherwise, unless the Owner determines otherwise, based upon recommendation of the Environmental Consultant. It is the intent of this testing to have "zero tolerance" for any amount of Asbestos, Lead, PCB or LDW contaminants or the lowest detectable limit, whichever is applicable and reasonable.
- I. Lead-Based Paint: Based upon past experience, the Owner and Environmental Consultant are aware that a number of suspect materials and products for lead content, in particular metals, will have some presence of lead. The Environmental Consultant shall developed parameters for acceptable amounts of lead content, based upon use, location and other assessment factors. Environmental Consultant will make recommendations to the Owner based upon these parameters.
- J. Lead-in-Drinking Water: Recent NYS regulations in 2016 established methodologies, thresholds and detection limits for LDW. These parameters shall be basis of determinations whether levels are acceptable or if water source must be shut-down until remedy is in-place, i.e. retesting, fixture or mechanical piping replacements, etc.

Environmental Consultant will make recommendations to the Owner based upon these parameters.
- K. Owner or Environmental Consultant have the sole authority to waive any stipulation or condition of this Section.

3.3 TEST REPORTS:

- A. Reports shall be prepared and submitted to the Owner and Architect and include the following:
 - 1. Product or material tested, manufacturing and product data/information;
 - 2. Small-scale drawings with locations of sampling and test result, if/as applicable;
 - 3. Safety Data Sheets (SDS's), if/as requested or available from manufacturer via the Contractor.

4. Accreditations, Certifications and Licenses of professional Environmental Consultant(s) and of applicable independent testing laboratories.

3.4 PROTOCOL OF ASBESTOS TESTING:

- A. Friable material samples shall be analyzed by Polarized Light Microscopy (PLM), EPA/600/R-93/116/NYS-DOH 198.1 (Regular) method and Polarized Light Microscopy. Non-friable organically bound (NOB) materials shall be analyzed by Transmission Electron Microscopy (TEM), NYSDOH ELAP 198.4 method in accordance with applicable regulations of NYSDOH Environmental Laboratory Accreditation Program [ELAP] and National Voluntary Laboratory Accreditation Program [NVLAP].
- B. Non-organically bound (NOB) materials determined to contain less than 1% asbestos via TEM method, must also be analyzed by via PLM (198.6) to verify the absence of large amphibole fibers which may not have been successfully transferred to the EM Grid, Per NYSDOH. NOB materials with other inorganic substances determined to be <1% will not be analyzed by PLM (198.6)
- C. The Testing Firm shall be licensed by NYSDOL and EPA.
- D. Sampling personnel shall be NYSDOL Certified Building Inspectors.

34 PROTOCOL OF PCB TESTING:

- A. Samples shall be prepared and analyzed by EPA SW 8082.

35 PROTOCOL OF LDW TESTING:

- A. Drinking Water for lead content shall be analyzed by EPA 200.9 Method.
- B. Drinking Water sampling & testing will be performed in accordance with policies and procedures delineated in "The Reduction of Lead in Drinking Water, effective January 4, 2014" which revises and updates the "Safe Water Drinking Act (SWDA), Section 1417, effective 1986.
- C. Testing Firm shall be certified under Section 402 of Toxic Substances Control Act (TSCA), 15 U.S.C. 2682.

36 PROTOCOL OF LBP TESTING:

- A. Bulk materials for lead content shall be analyzed EPA SW 8082 Method.
- B. Testing Firm shall be licensed by EPA.

- C. Testing Firm shall be certified under Section 402 of Toxic Substances Control Act (TSCA), 15 U.S.C. 2682.

3.7 FINAL DEPOSITION

- A. When a conflict or overlap of the above references exists, the most stringent provision shall apply, and the Architect and Owner shall have full force and application over interpretative matters.

END SECTION

215-2402

SECTION 02 33 13 - UNDERGROUND UTILITY LOCATOR SERVICE

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes:

1. Requirements and standards for underground utility location services to be completed prior to commencement of construction.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.3 REFERENCES

- A. American Society of Civil Engineers, CI / ASCE 38 - 02, "Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data."
- B. American Public Works Association, Uniform Color Code."

1.4 DEFINITIONS

A. Utility Quality Levels:

1. Level A: Precise horizontal and vertical location of utilities obtained by the actual exposure (or verification of previously exposed and surveyed utilities) and subsequent measurement of subsurface utilities, usually at a specific point. Minimally intrusive excavation equipment is typically used to minimize the potential for utility damage. A precise horizontal and vertical location, as well as other utility attributes, is shown on plan documents. Accuracy is typically set to 15-mm vertical and to applicable horizontal survey and mapping accuracy as defined or expected by the project owner.
2. Level B: Information obtained through the application of appropriate surface geophysical methods to determine the existence and approximate horizontal position of subsurface utilities. Quality level B data should be reproducible by surface geophysics at any point of their depiction. This information is surveyed to applicable tolerances defined by the project and reduced onto plan documents.

1.5 DESCRIPTION

A. Retain an independent utility locator service company with a minimum of five (5) years' experience to field locate, mark, and stakeout existing underground utilities and service connections.

1. Level B locator service shall be performed in all project areas where excavations, regrading of the ground surface, and penetrations of the ground surface are to be performed.

- a. Contractor shall include a minimum of 16 hours of Level A locator service to locate underground utilities as identified on the contract drawings or as identified during the Level B investigation that require more specific location, invert elevation, size, etc. Level A investigation shall only be performed at locations where shown or as directed.
 - b. In heavy metal areas, such as near perimeter fences, ground penetrating radar shall be used to determine the location of underground utilities. The use of equipment that induce a tracing signal along the utility path (such as a Metrotech unit) can cause false readings, shall not be used within five feet of fences.
2. The Level A investigation shall be performed as follows:
 - a. Hand excavation may be performed for depths of three feet or less.
 - b. Vacuum excavation shall be performed at depths greater than three feet.
 - c. All excavation test pits shall be backfilled by close of business that day.
3. Support and protect all utilities and service connections to remain in place.
4. The locator service shall field locate and mark underground utilities and service connections prior to excavation.
5. The contractor shall be responsible for coordinating the extent of the areas of subsurface investigation required to locate all underground utilities and service connections in the areas of excavation.
6. All costs associated with the repair of underground utilities and service connections hit/damaged during the investigative work shall be the responsibility of the contractor.
7. Utility location services shall be in accordance with the provisions of CIASCE 38-02, "Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data."

1.6 SUBMITTALS

- A. Submit detailed experience and qualifications description of underground utility locator service. Experience and qualifications package should include a description of the types of utility locator equipment and experience that can be provided.
- B. Investigative Report:
 1. Submit detailed written report and scaled drawings of the subsurface investigation, documenting all underground utilities and service connections located and identified.
 - a. All documentation shall be referenced to existing data (horizontal and vertical) previously established.
 - b. Provide three (3) paper copies and one (1) electronic copy of detailed written report and drawings.

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- c. Submit Investigative Report at least two weeks prior to advancing construction within the scheduled areas of excavation within the project site.

1.7 COORDINATION AND SCHEDULE

- A. Coordinate the Work to determine the extent of the areas of subsurface investigation required to locate all underground utilities and service connections in the areas of excavation.
- B. Coordinate the Work with the Owner's Representative to minimize utility disruptions and facility operations. Provide a schedule for the Work required to the Owner's Representative for approval. Upon approval of the schedule, notify the Owner's Representative a minimum of three (3) working days prior to performing the Work.
- C. Within the areas of excavation, all underground utilities and service connections shall be field located, and their locations marked at least two (2) weeks prior to the performance of the required excavation work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 WORK AREAS AND PERFORMANCE

- A. If any underground utilities and service connections are hit or damaged during the work, immediately inform the Owner and Engineer for directions on how to proceed.
- B. The utility locator service investigative work, field location and marking of underground utilities and service connections and submission of the investigative report must be completed before any excavation work can begin.
- C. Provide subsurface investigation information, detailed written report and drawings of the subsurface investigation, documenting all underground utilities and service connections located and identified, prior to the performance of the required excavation work.
- D. If during the Level B investigations, unknown underground utilities are discovered, the Engineer shall be notified as soon as possible or before the close of that business day.
- E. Field Marking of underground utilities shall follow the American Public Works Association (APWA) uniform color code:
 - 1. White: Proposed Excavation.
 - 2. Pink: Temporary Survey Markings.
 - 3. Red: Electric power lines, cables, conduit, and lighting cables.
 - 4. Yellow: Gas, oil, steam, petroleum, and gaseous material.
 - 5. Orange: Communications, alarm, signal lines, cables, or conduit.
 - 6. Blue: Potable water.
 - 7. Purple: Reclaimed water, irrigation, and slurry lines.
 - 8. Green: Sewer and drain lines.
- F. The Owner or Engineer may limit or restrict scheduling of the utility locator service based upon project progress.

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END OF SECTION 02 33 13

SECTION 024100 - DEMOLITION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Selective demolition of built site elements.
- B. Selective demolition of building elements for alteration purposes.
- C. Salvaged Building Components.

1.2 DEFINITIONS

- A. Demolition: Dismantle, raze, destroy or wreck any building or structure or any part thereof.
- B. Remove: Detach or dismantle items from existing construction and dispose of them off site, unless items are indicated to be salvaged or reinstalled.
- C. Remove and Salvage: Detach or dismantle items from existing construction in a manner to prevent damage. Clean, package, label and store in ready-for-reuse condition.
- D. Remove and Reinstall: Detach or dismantle items from existing construction in a manner to prevent damage. Clean and prepare for reuse and reinstall where indicated.
- E. Existing to Remain: Designation for existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

1.3 REFERENCE STANDARDS

- A. 29 CFR 1926 - Safety and Health Regulations for Construction; Current Edition.
- B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2022, with Errata (2021).

1.4 SUBMITTALS

- A. Demolition Plan: Submit demolition plan as required by OSHA and local AHJs.
 - 1. Demolition plan to include an engineering survey, prepared by a licensed professional engineer in the State of New York, of the building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during building demolition operations.

2. Indicate extent of demolition, removal sequencing, bracing and shoring, and location and construction of barricades and fences.
 3. Summary of safety procedures.
 4. Demolition firm qualifications.
- B. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

PART 2 PRODUCTS NONE.

PART 3 EXECUTION

3.1 DEMOLITION

- A. Remove portions of existing buildings as indicated.
- B. Remove site components as indicated.
- C. Remove other items indicated, for salvage and relocation.

3.2 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
 1. Obtain required permits.
 2. Comply with applicable requirements of NFPA 241.
 3. Use of explosives is not permitted.
 4. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
 5. Provide, erect, and maintain temporary barriers and security devices.
 6. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
 7. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
 8. Do not close or obstruct roadways or sidewalks without permits from authority having jurisdiction.
 9. Conduct operations to minimize obstruction of public and private entrances and exits. Do not obstruct required exits at any time. Protect persons using entrances and exits from removal operations.
 10. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon, or limit access to their property.

- B. Do not begin removal until built elements to be salvaged or relocated have been removed.
- C. Protect existing structures and other elements to remain in place and not removed.
 - 1. Provide bracing and shoring.
 - 2. Prevent movement or settlement of adjacent structures.
 - 3. Stop work immediately if adjacent structures appear to be in danger.
- D. Minimize production of dust due to demolition operations. Do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.
- E. Hazardous Materials:
 - 1. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCBs, and mercury.
 - 2. Hazardous Materials: Comply with 29 CFR 1926 and state and local regulations.
- F. Perform demolition in a manner that maximizes salvage and recycling of materials.
 - 1. Dismantle existing construction and separate materials.
 - 2. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

3.3 EXISTING UTILITIES

- A. Coordinate work with utility companies. Notify utilities before starting work, comply with their requirements, and obtain required permits.
- B. Protect existing utilities to remain from damage.
- C. Do not disrupt public utilities without permit from authority having jurisdiction.
- D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.
- E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.
- F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.
- G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.
- H. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone. Identify and mark, in same manner as other utilities to remain, utilities to be reconnected.

3.4 SELECTIVE DEMOLITION FOR ALTERATIONS

- A. Existing construction and utilities indicated on drawings are based on casual field observation and existing record documents only.
 - 1. Verify construction and utility arrangements are as indicated.
 - 2. Report discrepancies to Architect before disturbing existing installation.
 - 3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.
- B. Separate areas in which demolition is being conducted from areas that remain occupied.
 - 1. Provide, erect, and maintain temporary dustproof partitions of construction indicated on drawings in locations indicated on drawings.
- C. Maintain weatherproof exterior building enclosure, except for interruptions required for replacement or modifications; prevent water and humidity damage.
- D. Remove existing work as indicated and required to accomplish new work.
 - 1. Remove items indicated on drawings.
- E. Services including, but not limited to, HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications: Remove existing systems and equipment as indicated.
 - 1. Maintain existing active systems to remain in operation, and maintain access to equipment and operational components.
 - 2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
 - 3. Verify that abandoned services serve only abandoned facilities before removal.
 - 4. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings. Remove back to source of supply where possible, otherwise cap stub and tag with identification.
- F. Protect existing work to remain.
 - 1. Prevent movement of structure. Provide shoring and bracing as required.
 - 2. Perform cutting to accomplish removal work neatly and as specified for cutting new work.
 - 3. Repair adjacent construction and finishes damaged during removal work.
 - 4. Patch to match new work.

3.5 DEBRIS AND WASTE REMOVAL

- A. Remove debris, junk, and trash from site.
- B. Leave site in clean condition, ready for subsequent work.
- C. Clean up spillage and wind-blown debris from public and private lands.

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END OF SECTION 024100

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SECTION 028200 – ASBESTOS ABATEMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section describes procedures for abatement of asbestos-containing materials (ACM) from the areas of scheduled work.
 - 1. ACM and assumed ACM that are located within the areas of scheduled work will require abatement prior to, or in coordination with, the scheduled demolition and renovation activities. Reference the Contract Drawings for additional details pertaining to abatement of identified or assumed ACM.
 - 2. Verify the locations and quantities of materials to be removed as the basis for the bid. Contract Drawings depict the areas in which the work will be conducted, and show the general location of identified or assumed ACM, as determined from the hazardous materials assessment performed for the site.
 - 3. Suspect ACM that have not been tested must be assumed to contain asbestos, unless proved otherwise through sampling and analysis.
- B. The Contractor is responsible for all work related to the abatement of identified ACM, including, but not limited to, the following:
 - 1. Submission and approval of required notification prior to commencement of work.
 - 2. Coordination with the Owner or Owner's designated representative for removal of movable furnishings and equipment, including miscellaneous small items such as tools, stored materials, files, and records, prior to asbestos abatement work commencing.
 - 3. Protection of Work to Remain: Preserve and protect building materials and finishes, electrical equipment, and heating and ventilation equipment present within each work area that is not removed or abated. Perform work without damage to or contamination of adjacent areas. The Contractor and Owner shall agree in writing on the condition of the building and fixtures and background level, prior to commencement of the work.
 - 4. Removal of all ACM within the areas of work, as designated on the Contract Drawings.
 - 5. Inspection of areas of work to ensure that all ACM has been removed in accordance with the Contract Documents.
 - 6. Furnish all labor, materials, services, insurance, and equipment necessary to complete the abatement work in accordance with applicable regulations and codes.
 - 7. Obtain approval for a waste disposal site and transportation of waste to waste disposal facility. Waste disposal facility must have a valid NYSDEC or Regulatory Waste Authority permit. Waste transporter shall have a valid NYSDEC, Division of Solid & Hazardous Materials, Part 364 Waste Transporter Permit.
 - 8. Post all applicable regulations at the project site.
 - 9. Maintain the required log of all persons entering work area.
 - 10. Provide Owner with close-out report and record drawings containing all information pertaining to the removal and disposal of ACM (quantity and location).
 - 11. Provide Owner with record drawing of asbestos removal including location, quantity and type of asbestos removed.

- C. Perform all work in such a manner as to minimize the risk of exposure to personnel, to prevent exposure to occupants, and to minimize the risk of release of asbestos or asbestos-containing debris to the environment.
- D. Take notice, and make employees aware, of occupational safety hazards associated with the abatement work and other work being performed on-site.
- E. Perform all work in strict accordance with the Contract Documents and all governing codes, rules, and regulations. Where conflicts occur between the Contract Documents and applicable codes, rules, and regulations, the more stringent procedure(s) shall apply. Interpretation of regulations or differences in interpretation of applicable regulations between any parties associated with the project shall be settled in a manner consistent with the administrative and contractual procedures specified in other applicable sections of the Contract Documents. If a resolution cannot be readily obtained, the applicable regulatory authority will be contacted for interpretation. The interpretation of the regulatory authority will be final.

1.2 REGULATIONS AND CODES

- A. Comply with the codes and standards listed below, except where more stringent requirements are shown and/or specified. Specific regulations, standards, and guidance documents are listed for informational purposes due to relevance to the work described herein. Specific regulations, standards, and guidance documents that are not listed may also be applicable to the work.

1. Federal Regulations:

- a. American National Standard Institute (ANSI)
 - 1) ANSI Z88.2-80, Practices for Respiratory Protection
 - 2) ANSI Z9.2-79, Fundamentals Governing the Design and Operation of Local Exhaust Systems
- b. Code of Federal Regulations (CFR)
 - 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" (OSHA)
 - 7) 29 CFR 1926.500, "Guardrails, Handrails and Covers" (OSHA)
 - 8) 40 CFR 61, Subpart A, "General Provisions" (EPA)
 - 9) 40 CFR 61, Subpart M, "National Emission Standard for Asbestos" (USEPA)
 - 10) 49 CFR 171-172, "Transportation Standards" (USDOT)
 - 11) 40 CFR 763, Subpart E, "Asbestos-Containing Materials in Schools" (USEPA)
- c. Occupational Safety and Health Administration (OSHA)
- d. United States Department of Transportation (USDOT)
- e. United States Environmental Protection Agency (USEPA)
 - 1) USEPA 560/585-024, Guidance for Controlling Asbestos-Containing Materials in Buildings (Purple Book)
 - 2) USEPA 530-SW-85-007, Asbestos Waste Management Guidance

2. New York State:

- a. Compilation of the Rules and Regulations of the State of New York (NYCRR)
 - 1) 6 NYCRR, Parts 360 and 364, "Disposal and Transportation" (NYSDEC)

- 2) 10 NYCRR, Part 73, "Asbestos Safety Program Requirements" (NYSDOH)
- 3) 12 NYCRR, Part 56, "Asbestos", Industrial Code Rule 56 (NYSDOL)
- 4) Guidance Document (AGD-v2.0) on 12 NYCRR, Part 56
- 5) Fire Code of New York, 2020 including Technical Bulletins issued by the New York State Department of State
- 6) Existing Building Code of New York State 2020, Including Technical Bulletins issued by New York State Department of State
- 7) New York State Department of Environmental Conservation (NYSDEC)
- 8) New York State Department of Health (NYSDOH)
- 9) New York State Department of Labor (NYSDOL)
- 10) New York State Department of State (NYSDOS)
- 11) New York State Department of Transportation (NYSDOT)

1.3 ENVIRONMENTAL CONSULTANT

- A. An Environmental Consultant will be retained by the Owner under separate contract, to represent the Owner in matters pertaining to the work performed in accordance with these specifications and requirements.
- B. The Environmental Consultant is authorized by the Owner to provide monitoring during removal work, to interpret procedures and to enforce provisions of the contract documents and NYS Code Rule 56 pertaining to the removal of ACM.
- C. If, in the opinion of the Environmental Consultant, there is a substantial non-conformance with the contract documents and NYS Code Rule 56 and/or a situation presenting a health hazard to workers or to the Owner's employees, the Environmental Consultant will be authorized to stop work.
- D. The Environmental Consultant's role in health and safety matters does not alleviate the Contractor's obligation to comply with all applicable health and safety regulations promulgated by the local state or federal government.
- E. The Environmental Consultant will provide Air Monitoring, Project Monitoring, and work area clearance pursuant to requirements of 12 NYCRR Part 56 and 40 CFR 763, Subpart E.
 1. Should any visual clearance or clearance air sample(s) fail to meet clearance criteria, the Contractor will be directed to re-clean the work area and new clearance air samples will be collected. The Contractor will be responsible for any and all costs incurred due to clearance sample failures.

1.4 SUBMITTALS

- A. Submit in accordance with applicable provisions of the Contract Documents.
- B. Pre-Work Submittals: Submit a minimum of 10 days prior to the anticipated commencement of the asbestos abatement work and expedite any resubmissions.
 1. Work Plan: Provide a Work Plan that describes the abatement methods to be used, schedule of removal, the type of decontamination units, worker protection plan, and Safety Data Sheets (SDS) for any chemicals or products to be used to facilitate the work. The Work Plan shall also show the limits of the work area(s), locations of decontamination units, entrance and exit to the work area(s), and exhaust locations.
 2. Submit satisfactory proof to Asbestos Designer of Record and Environmental Consultant that all required permits, licenses and certifications have been obtained,

notifications have been issued, and arrangements made for transport and disposal of ACM, including:

- a. Copy of project notifications for the asbestos abatement work, as applicable and required by federal and state regulatory agencies, together with proof of transmittal (i.e., certified mail return receipt).
 - b. Copy of building occupant notification, as applicable and as required by regulatory agencies.
 - c. Copy of each Contractor's asbestos handler's license and copy of each employee's asbestos handler's certificate. In addition to the asbestos handler's licenses, the Contractor shall submit each employee's "OSHA 10" card. Should Handlers' or Supervisor's documentation expire during the duration of the project, the Contractor shall submit replacement documents.
 - d. Copy of waste hauler's NYSDEC permit and one copy of NYSDEC Certificate of Approval for the ACM waste disposal site.
 - e. Submit documentation indicating that all employees have had instruction on the hazards of asbestos exposure, on use of fitting of respirators, on protective dress, on use of showers, on entry and exit from work areas, and on all aspects of work procedures and protective measures.
 - f. Submit documentation certifying that all workers employed in asbestos related aspects of the job have had medical examinations as prescribed by the OSHA regulations and have been found fit to perform work while wearing a respirator. This certification is to be signed by a physician indicating that he has reviewed the relevant medical records and that they support the certification. Medical records are not to be submitted and will not be accepted.
 - g. Submit manufacturer's certification that vacuums, ventilation equipment and other equipment required to contain airborne fibers, conform to ANSI Z9.2.
 - h. Establish a manifest system that accounts for all asbestos waste. The manifest system shall be described in writing and will be subject to the approval of the Environmental Consultant. Copies of the written description and any receipts generated during the handling and disposal process shall be provided to the Owner. The Contractor must be able to demonstrate custody over all asbestos waste from the time it is removed from the work area until it is deposited at the landfill.
- C. Project Close-out Submittals: Within 30 days of project completion, and prior to final payment, submit a closeout package to include:
1. Copy of final project notifications.
 2. Copy of Contractor asbestos license and certifications for employees involved in the project.
 3. Copy of Haulers Permit.
 4. Copy of daily work area entry logs.
 5. Copy of laboratory reports for personal air monitoring.
 6. Copy of asbestos disposal manifests completed by all parties, for each phase of work as applicable.
 7. Copy of record drawing indicating locations type, and quantities of ACM removed.
 8. As-built plans showing locations of ACM removals and locations of inaccessible ACM that remain in-place.

PART 2 - PRODUCTS

2.1 PROJECT LOG BOOK

- A. Provide a permanently bound project log book. The log book shall contain, on the title page, the project name; name, address, and telephone number of Owner; name, address, and telephone number of Consultant; name, address, and telephone number of the Contractor; and emergency numbers, including, but not limited to, local Fire/Rescue Department .
- B. Record all entries into the log with non-washable, permanent ink. Under no circumstances shall pencil entries be permitted.
- C. Ensure that all persons entering and exiting the work area sign the log and include name, employer, NYSDOL certification number, and time of entrance and exiting.
- D. Ensure that the Project Supervisor documents all work performed daily and notes all visual assessments required by 12 NYCRR Part 56 (e.g., testing and inspection of barriers and enclosure by smoke testing, negative air systems, and manometer readings).

2.2 PERSONAL PROTECTIVE EQUIPMENT

- A. Comply with applicable OSHA regulations and procedures for selection and use of personal protective equipment (PPE).
- B. The minimum PPE is Level D Modified (hard hat, safety glasses, and steel-toed boots), at all times at the project site both inside and outside the work areas. Additional PPE is required to reduce exposure to asbestos, including the following:
 - 1. Respiratory Protection
 - a. Select respirators from those approved by the NIOSH, Department of Health and Human Services.
 - b. Ensure that respirators and filters are selected, used, maintained, and stored pursuant to an established respiratory protection program, pursuant to 29 CFR 1910.134.
 - c. Provide for surveillance of working conditions to ensure the selected respirator provides adequate protection, as defined in 29 CFR 1926.1101.
 - 2. Disposable Protective Clothing
 - a. Provide disposable protective whole body clothing, head coverings, plastic or rubber gloves, and foot coverings to personnel utilized during the project. Cloth gloves may be worn inside the plastic or rubber gloves for comfort, but shall not be used alone. Secure sleeves at the wrists, and foot coverings at the ankles, by the use of tape, or provide disposable coverings with elastic wrists or tops.
- C. Provide workers and authorized visitors with suitable protective clothing, headgear, eye protection, and footwear whenever they enter the work area.

2.3 SIGNS AND LABELS

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

- B. Provide danger signs in vertical format conforming to 29 CFR 1926.1101, minimum size of 20 inches by 14 inches, and displaying the following legend:

DANGER
ASBESTOS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
AUTHORIZED PERSONNEL ONLY
WEAR RESPIRATORY PROTECTION AND PROTECTIVE CLOTHING IN THIS AREA

- C. Provide 3-inch wide red barrier tape printed with black letters, "DANGER ASBESTOS REMOVAL". Locate barrier tape across all corridors, entrances, and across routes to each asbestos work area. Install tape 3 to 4 feet above finish floor.
- D. Provide asbestos danger labels affixed to all asbestos materials, scrap, waste, debris, and other products contaminated with asbestos. Labels shall state the following.

DANGER
CONTAINS ASBESTOS FIBERS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
DO NOT BREATHE DUST
AVOID CREATING DUST

- E. Provide the following asbestos label, of sufficient size to be clearly legible, for display on waste containers (bags or drums) that will be used to transport asbestos contaminated material in accordance with 49 CFR Parts 171 and 172. Labels shall state the following.

RQ HAZARDOUS SUBSTANCE
SOLID, NOS
FORM E, NA 9188
ASBESTOS

- F. Generator identification information shall be affixed to each waste container, indicating the following and printed in indelible ink.

Generator Name: Binghamton City School District
Building Name: Theodore Roosevelt Elementary School
Facility Address: 9 Odgen Street, Binghamton, New York
Date: MM/DD/YYYY

2.4 POLYETHYLENE SHEETING

- A. Unless otherwise indicated, utilize polyethylene sheeting that is at least 6 mil fire retardant sheeting.
- B. Utilize at least 6 mil opaque fire retardant plastic sheeting for decontamination enclosure systems.

2.5 HEPA VACUUM EQUIPMENT

- A. Conduct all vacuuming using 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.

2.6 DISPOSAL BAGS, DRUMS, AND CONTAINERS

- A. Provide 6 mil polyethylene disposal bags printed with asbestos caution labels, and imprinted with USDOT required markings.
- B. Provide 30- or 55-gallon capacity fiber or metal drums capable of being sealed air- and water-tight if asbestos waste has the potential to damage or puncture disposal bags. Affix asbestos caution labels on lids and at one-third points around drum circumference to assure ready identification.
- C. Label containers and bags with the name of the waste generator and the location at which the waste was generated, in accordance with 40 CFR 61 – NESHAPS.
- D. Label containers and bags with the date moved from the waste decontamination enclosure to the waste transport container, in accordance with 12 NYCRR 56, Subpart 8.9(C)(3).
- E. Do not use labeled ACM waste containers or bags for non-ACM waste or trash. Any material placed in labeled containers or bags, whether turned inside out or not, will need to be handled and disposed of as ACM waste.

2.7 SURFACTANT (AMENDED WATER)

- A. Wet all ACM prior to removal with surfactant mix, and apply in accordance with manufacturer's printed instructions.

2.8 POWER TOOLS

- A. Ensure that any power tools used to drill, cut into, or otherwise disturb asbestos material is manufacturer equipped with HEPA filtered local exhaust ventilation.

2.9 WATER AND ELECTRICAL

- A. Coordinate water and electrical service with the Owner prior to initiation of abatement activities. Verify suitability and location of all connections.

2.10 OTHER PRODUCTS OR MATERIALS

- A. Ensure that other products or materials required for use during abatement activities are in compliance with local, state, and federal codes and regulations, if applicable. Furnish and utilize industry standard equipment and materials. Do not furnish equipment or materials that have been modified or altered in such a manner to violate local, state, and/or federal codes and regulations, or presents unnecessary health and safety risks.

PART 3 - EXECUTION

3.1 NOTICES

- A. Provide notification of intent to commence asbestos abatement activities as indicated below.
 - 1. At least 10 working days prior to beginning abatement activities, send written notification to:

United States Environmental Protection Agency
National Emissions Standards for Hazardous Air Pollutants Coordinator
26 Federal Plaza
New York, New York 10007
 - 2. At least 10 calendar days prior to beginning abatement activities, send written notification to:

New York State Department of Labor
Division of Safety and Health, Asbestos Control Program
State Office Campus
Building 12 – Room 454
Albany, New York 12240
- B. Send notifications to regulatory agencies via mail or package delivery service that will provide proof of delivery and receipt.
- C. Post and/or provide Building Occupant Notification at least 10 calendar days prior to beginning abatement activities, as required by 12 NYCRR Part 56. The posting must include the following information.
 - 1. The locations of the abatement project.
 - 2. The amounts and types of ACM being abated.
 - 3. The commencement and completion dates of the project.
 - 4. The name, address, and asbestos license number of the Asbestos Abatement Contractor.
 - 5. The name, address, and license number of the Asbestos Abatement Project Monitor.
 - 6. The name, address, and NYSDOH ELAP number of the laboratory providing analytical services.

3.2 PERSONAL PROTECTIVE EQUIPMENT

- A. Refer to Article 2.2 for applicable PPE requirements.
- B. Ensure that respirators are worn until outside the decontamination room.
- C. Ensure that disposable protective clothing is donned upon entering the decontamination room and before entering the work area, and street clothes are placed in a storable locker or bin. Ensure that workers exiting the work area immediately remove protective clothing and place the waste into sealable containers.

3.3 PERSONAL AIR MONITORING

- A. Conduct requisite personal air monitoring pursuant to the requirements of 29 CFR 1926.1101, at a minimum. Verify compliance with applicable personal exposure and excursion limits.

3.4 PROJECT SUPERVISOR

- A. Designate a full-time Project Supervisor, who meets the following qualifications.
 - 1. The Project Supervisor must hold a current New York State certification as an Asbestos Contractor Supervisor.
 - 2. The Project Supervisor must meet the requirements of a "Competent Person", as defined by OSHA 1926.1101, and have a minimum of 2 years experience as a Supervisor.
 - 3. The Project Supervisor must be able to speak, read, and write English fluently, as well as communicate in the primary language of the Workers.
- B. Ensure the Project Supervisor is on-site at all times during abatement work, until the Project is complete. Work will be stopped if the Project Supervisor is not present on-site. The Project Supervisor is responsible for the performance of the work and will be required to represent the Contractor in all respects at the Project site. The Supervisor will be the primary point of contact for the Asbestos Abatement Project Monitor. The Project Supervisor cannot be removed from the Project without the written consent of the Owner. The Project Supervisor will be removed from the Project, if so requested, by the Owner.
- C. Ensure the Project Supervisor maintains the Project Log Book in accordance with 12 NYCRR 56, Subpart 7.3, and as described in Article 2.1.

3.5 MEDICAL REQUIREMENTS

- A. Comply with medical examination and recordkeeping requirements, and maintain a medical surveillance program, pursuant to requirements of 29 CFR 1910.1001 and 29 CFR 1926.1101.

3.6 TRAINING

- A. As required by applicable regulations, prior to assignment to asbestos work, instruct each employee with regard to the hazards of asbestos, safety and health precautions, and the use and requirements of protective clothing and equipment.
- B. Maintain an established respirator program, as required by ANSI Z88.2, 29 CFR 1910.134, and 29 CFR 1926.1101. Comply with requirements for respirator training and fit testing.
- C. Ensure that all Workers and Supervisors have successfully completed training and received appropriate certifications, in accordance with NYSDOL and NYSDOH requirements.

3.7 PERSONAL AIR MONITORING

- A. Personal air monitoring required by the OSHA is the responsibility of the Contractor, not the Owner or Owner's representative.

3.8 ON-SITE DOCUMENTATION

- A. Maintain the following submittals, documentation, and postings on-site during abatement activities, at a location approved by the Asbestos Abatement Project Monitor.
 - 1. Valid Contractor license issued by the NYSDOL.
 - 2. Worker certification, training, and medical surveillance records
 - a. Current New York State Asbestos Handler certification cards for each person employed in the removal, handling, or disturbance of asbestos.
 - b. Evidence that Workers have received proper training required by the regulations and the medical examinations required by OSHA 29 CFR 1926.1101.
 - c. Documentation that Workers have been fit tested specifically for respirators used on the project.
 - d. Workers Acknowledgment Statements signed by each employee stating that the employee has received training in the proper handling of ACM; understands the health implications and risks involved; and understands the use and limitations of the respiratory equipment to be used.
 - 3. Daily OSHA personal air monitoring results
 - 4. NYSDOH ELAP certification for the laboratory that will be analyzing the OSHA personal air samples
 - 5. NYSDEC Waste Transporter Permit
 - 6. Contract Documents (Project Manual and Contract Drawings)
 - 7. Notifications and variances (site-specific) – ensure the most up-to-date notifications and variances are on-site
 - 8. Applicable regulations
 - 9. Safety Data Sheets (SDS) of supplies/chemicals used on the project
 - 10. Approved Abatement Work Plan
 - 11. List of emergency telephone numbers
 - 12. Waste disposal log
 - 13. Project log book

3.9 TEMPORARY UTILITIES

- A. Shut down and lock out all electrical power to the asbestos abatement work area.
- B. Provide temporary 120-240 volt, single phase, three-wire, 100 amp electric service with ground fault circuit interrupters (GFCI) for all electric requirements within the asbestos abatement work area.
 - 1. Where available, obtain a power supply from the 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 Asbestos Abatement Project Monitor, for air sampling equipment.
 - 4. Supply all power to the work area from outside the area through GFCI at the source.
- C. Provide temporary lighting with "weatherproof" fixtures for the work area, including decontamination chambers.
 - 1. Maintain the work area in an illuminated condition at all times during work.
 - 2. Provide lighting, as required by the Asbestos Abatement Project Monitor, for performance of required visual assessments.

- D. All temporary devices and wiring used in the work area must be capable of withstanding decontamination procedures, including HEPA vacuuming and wet wiping.
- E. Utilize domestic water services, if available, from the Owner's existing system. Provide hot water heaters with sufficient capacity to meet project demands.

3.10 DECONTAMINATION ENCLOSURES AND WORK AREA PREPARATION

- A. The work area must be vacated by building occupants prior to decontamination enclosure construction and work area preparation.
- B. All demolition necessary to access ACM for removal must be conducted within negative pressure enclosures by licensed asbestos handlers. Demolition debris must be disposed of as asbestos waste.
- C. Provide a personal decontamination enclosure contiguous to each work area. The following conditions apply for the construction of a personal decontamination enclosure.
 - 1. Utilize a decontamination enclosure that is attached to the work area and fully framed and sheathed to prevent unauthorized entry.
 - 2. For large asbestos projects, provide access to the work area from the clean room through an airlock to the shower, followed by an airlock to the equipment room to the work area. For small asbestos projects, provide access to the work area from the clean room, to the shower, and through the equipment room to the work area. Each airlock must be a minimum of 3 feet from door to door.
 - 3. Cover the decontamination enclosure ceiling and walls with one layer of polyethylene sheeting. Utilize two layers of reinforced polyethylene sheeting to cover the floor.
 - 4. Establish a triple layer of polyethylene sheeting at the decontamination chamber doorways, weighted to ensure a tight seal of the enclosure. Prior to establishing doorway seals, move all required tools, scaffolding, and equipment into the work area.
 - 5. Provide a lockable door for the entrance to the clean room. The clean room must be sized to accommodate all full-shift Workers and the Asbestos Project Monitor. The minimum dimensions of the clean room must be 32 square feet for every 6 full-shift Workers, and 6 feet in height. Provide suitable lockers for storage of Workers' street clothes. Provide for storage of respirators, along with replacement filters and disposable towels.
 - 6. Provide a temporary shower, with individual hot and cold water supplies and faucets. Provide a sufficient supply of soap and shampoo. There must be at least 1 shower for every 6 full-shift abatement Workers. Construct the shower room in such a way so that travel through the shower chamber will be through the shower. The shower must not be able to be bypassed.
 - 7. Drain, collect, and filter shower water 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. Discharge the filtered wastewater in accordance with applicable codes, and dispose of the contaminated filters as asbestos waste.
 - 8. The equipment room is to be used for the storage of tools and equipment. Place a walk-off pan filled with water in the work area outside the equipment room for workers to clean foot coverings when leaving the work area. Place a labeled 6 mil plastic ACM waste bag, for collection of contaminated clothing, in this room.
 - 9. At a minimum, clean and disinfect the personal decontamination enclosure at the end of each work shift and as otherwise directed by the Asbestos Project Monitor.

- D. Provide a waste decontamination enclosure contiguous to each work area. The following conditions apply for the construction of a waste decontamination enclosure.
1. The decontamination enclosure must be attached to the work area and not located within it. The decontamination enclosure must be fully framed and sheathed to prevent unauthorized entry.
 2. Construct the waste decontamination enclosure system to include a washroom/cleanup room to the work area and an airlock doorway to the holding area. The airlock must be a minimum of 3 feet from door to door. Provide a lockable door for the entrance to the holding area.
 3. Cover the decontamination enclosure ceiling and walls with one layer of polyethylene sheeting. Utilize two layers of reinforced polyethylene sheeting to cover the floor.
 4. Establish a triple layer of polyethylene sheeting at the decontamination chamber doorways, weighted to ensure a tight seal of the enclosure. Prior to establishing doorway seals, move all required tools, scaffolding, and equipment into the work area.
 5. Where there is only one egress from the work area, the holding area of the waste decontamination enclosure system may branch off from the personal decontamination enclosure equipment room, which may then serve as the waste wash room.
- E. The following conditions apply to work area preparation procedures.
1. Post asbestos danger signs at all approaches to the asbestos abatement work area. Post all emergency exit signs only on the work area side at the containment, and post with asbestos caution signs on the non-work area side. Provide all non-work area stairs and corridors accessible to the asbestos abatement work area with warning tapes at the base of stairs and beginning of corridors. Utilize warning tape in addition to caution signs.
 2. Shut down and lock out the building heating, ventilation, and air conditioning (HVAC) and electrical systems. Provide temporary electric power and lighting, as specified in Article 3.8.
 3. Pre-clean all surfaces and objects within the work area, using HEPA vacuuming and/or wet wiping methods. Dry sweeping and any other methods that raise dust are prohibited. ACM must not be disturbed during pre-cleaning.
 4. For movable objects within the work area, clean via HEPA vacuum and/or wet wipe and remove from the work area.
 5. For all non-movable equipment in the work area, completely cover with 2 layers of polyethylene sheeting, that is secured in place with duct tape and/or spray adhesive.
 6. Provide enclosure of the asbestos abatement work area necessary to isolate it from unsealed areas of the building, in accordance with the approved Asbestos Abatement Work Plan, and as specified herein.
 7. 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 polyethylene sheeting to form a critical barrier.
 8. Provide temporary framing and sheathing at openings larger than 32 square feet that form the limits of the asbestos abatement 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 2 layers of polyethylene sheeting to form an isolation barrier.
 9. Secure sheeting with spray adhesive and then sealed with duct tape. Ensure all joints in polyethylene sheeting overlap a minimum of 12 inches.
 10. Frame out emergency exits. Provide double-layered 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.

11. 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 removal from the work area and before the start of asbestos removal operations.

3.11 WORK AREA ENTRY AND EXIT PROCEDURES

- A. Access to and from the asbestos abatement work area is permitted only through the personal decontamination enclosure, unless otherwise stipulated in 12 NYCRR and/or a site-specific or applicable variance.
- B. Workers must sign the entry/exit log upon every entry and exit.
- C. The following procedures must be followed when entering the work area.
 1. Before entering the work area, Workers must proceed to the clean room, remove all street clothes, and don protective clothing, equipment, and respirators.
 2. Workers must proceed from the clean room, through the shower room and the equipment room, and into the work area.
- D. The following procedures must be followed when exiting the work area.
- E. Before leaving the work area, remove gross asbestos contamination by brushing, wet cleaning, and/or HEPA vacuuming.
 1. In the equipment room, Workers are to remove disposable clothing, but not respirators, and place clothing in plastic disposal bags for disposal as contaminated debris prior to entering the shower room.
 2. Workers are to shower thoroughly while wearing respirators, and then wash respirator with soap and water prior to removal.
- F. Upon exiting the shower, Workers are to don new disposable clothing if the work shift is to continue or street clothes to exit the area. Under no circumstances shall Workers enter public, non-work areas in disposable protective clothing.

3.12 NEGATIVE AIR PRESSURE FILTRATION SYSTEM

- A. Provide a portable asbestos filtration system that develops a minimum pressure differential of negative 0.02 inches 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. Such filtration systems must be operated 24 hours per day during the entire Project, until the final cleanup is completed and satisfactory results of the final air samples are received from the laboratory.
- C. Ensure the system includes a series of pre-filters and filters to provide HEPA filtration of particles down to 0.3 microns at 100% efficiency and below 0.3 microns at 99.97% 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.

- D. A minimum of one additional filtration unit of at least the same capacity as the primary unit(s) must be installed and fully functional to be used during primary unit(s) filter changing and in case of primary failure. Install at least one back-up unit for every five primary units.
- E. Upon electric power failure or shut-down of any filtration unit, all abatement activities must stop immediately and only resume after power is restored and all filtration units are fully operating. For shut-downs longer than one hour, all openings into the work area, including the decontamination enclosures, must be sealed.
- F. Provide a manometer with a chart recorder to measure and record negative pressure differential across the work area barriers without interruption 24 hours per day for all OSHA Class I friable asbestos projects.

3.13 REMOVAL OF ASBESTOS-CONTAINING MATERIALS

- A. Remove ACM in accordance with the Contract Documents and the approved Asbestos Abatement Work Plan.
- B. Should the area beyond the work area become contaminated with ACM or elevated fiber levels, immediately stop work and institute emergency procedures. Contaminated non-work areas must be isolated and subsequently decontaminated in accordance with procedures established for asbestos removal. All costs incurred from decontaminating such non-work areas and the contents thereof will be borne solely by the Contractor, at no additional cost to the Owner.
- C. Perform all asbestos removal work using wet removal procedures. Mix and apply surfactant in accordance with manufacturer's written instructions. Dry removal procedures are not permitted.
- D. Sufficiently wet asbestos materials with a low pressure, airless fine spray of amended water to ensure full penetration prior to ACM removal. Re-wet materials that do not display evidence of saturation.
- E. Employ a sufficient number of Workers to continuously apply amended water while ACM is being removed. Contain excess water within the work area at all times, and continuously containerize through the use of a HEPA equipped wet/dry vacuum or other adequate methods.
- F. Perform cutting, drilling, abrading, or any penetration or disturbance of ACM 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 must be provided with HEPA equipped filtered local exhaust ventilation.
- G. Place all removed material 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 work area surfaces free of accumulation of asbestos debris.
- H. Power or pressure washers are not permitted for asbestos removal or clean-up procedures.
- I. Encapsulate all open ends of pipe and duct insulation not scheduled for removal, using lag cloth.

- J. All construction and demolition debris determined by the Asbestos Abatement Project Monitor to be contaminated with asbestos must be handled and disposed of as asbestos waste.
- K. The use of metal shovels, metal dust pans, etc. are not permitted inside the work area.

3.14 EQUIPMENT AND WASTE CONTAINER DECONTAMINATION AND REMOVAL PROCEDURES

- A. Clean external surfaces of contaminated containers and equipment 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 personnel are not to enter the airlock.
- B. Remove the containers and equipment from the airlock by personnel stationed in the wash room during waste removal operations. Clean the external surfaces of containers and equipment a second time by wet cleaning.
- C. The cleaned containers of asbestos material and equipment are to be dried of any excessive pooled or beaded liquid, placed in uncontaminated plastic bags or sheeting, dependent upon the physical characteristics of the item, and sealed airtight.
- D. Transfer the clean re-containerized items into the airlock that leads to the holding area. Workers in the wash room are not to enter this airlock or the work area until waste removal is finished for that period.
- E. Transfer containers and equipment from the airlock and into the holding area by personnel dressed in clean personal protective equipment, and who have entered from uncontaminated areas.
- F. Place the cleaned containers of asbestos material and equipment in water tight carts with doors or tops that are to be closed and secured. Maintain these carts in the holding area pending removal. Ensure the carts are wet cleaned and/or HEPA vacuumed at least once each day.
- G. Secure the exit from the decontamination enclosure system to prevent unauthorized entry.
- H. Where the waste removal enclosure is part of the personal decontamination enclosure, ensure waste removal does not occur during shift changes or when otherwise occupied. Implement precautions to prevent short circuiting and cycling of air outward through the shower and clean room.

3.15 WORK AREA DECONTAMINATION

- A. Following completion of gross abatement and after all accumulations of asbestos waste materials have been containerized, perform decontamination procedures, as specified in 12 NYCRR 56, Subpart 9.1, unless modified by a site-specific or applicable variance.
- B. Secure the exit from the decontamination enclosure system to prevent unauthorized entry.
- C. Where the waste removal enclosure is part of the personnel decontamination enclosure, ensure waste removal does not occur during shift changes or when otherwise occupied. Implement precautions to prevent short circuiting and cycling of air outward through the shower and clean room.
- D. After isolation and critical barriers are removed, the Asbestos Abatement Project Monitor

will inspect the work area for cleanliness. If necessary, perform additional cleaning, as directed by the Asbestos Abatement Project Monitor.

- E. As a result of any unsatisfactory visual assessment by the Asbestos Abatement Project Monitor, or should final clearance air sampling results indicate high fiber levels, the affected areas will be required to be cleaned or re-cleaned at no additional expense to the Owner.

3.16 TENT ENCLOSURES (IF APPLICABLE)

- A. Tent enclosures may only be used in areas specifically permitted by 12 NYCRR Part 56 or a project site-specific variance issued by the NYSDOL.
- B. Restrict access to the immediate area where tent removal procedures are taking place using barrier tape and/or construction barriers, and post caution signs.
- C. Remote personal and waste decontamination enclosure systems are not to be constructed or utilized. The personal and waste decontamination enclosure systems must be connected to the work area.
- D. Pre-clean the work area. For all objects and equipment that will remain in the restricted area during abatement, seal with 2 layers polyethylene sheeting and tape.
- E. For the tent, utilize a single-use barrier constructed with a rigid frame and at least 2 layers of polyethylene sheeting, unless 1 layer of polyethylene sheeting is otherwise permitted by 12 NYCRR 56 and/or a site-specific variance. Ensure all seams are sealed airtight using duct tape and/or spray adhesive.
- F. During removals, utilize negative pressure filtration units to maintain negative air pressure inside the tent.
- G. Perform ACM removal following procedures described in Article 3.13.
- H. Place waste material in properly labeled 6 mil plastic bags or other appropriate containers. Ensure the outside of the bags or containers are wet wiped and/or HEPA vacuumed before being passed into the waste decontamination enclosure system for double-bagging. Utilize watertight carts for transportation of waste bags and containers outside the work area.
- I. Subsequent to completion of gross abatement and after all accumulations of asbestos waste materials have been containerized, implement the following decontamination procedures.
 - 1. All bagged asbestos waste and unnecessary equipment must be decontaminated and removed from the work area.
 - 2. All surfaces in the work area must be wet cleaned. A wet-purpose shop vacuum may be used to pick up excess liquid, and must be decontaminated prior to removal from the work area.
 - 3. The Asbestos Abatement Project Monitor will conduct a visual assessment of the work area for cleanliness and completion of abatement.
 - 4. Apply a thin coat of encapsulant to all surfaces in the work area that were not the subject of removal. In no event is encapsulant be applied to any surface that was the subject of removal prior to obtaining satisfactory air monitoring results.
 - 5. After the encapsulant has dried, aggressive final clearance air sampling will be conducted by the Asbestos Abatement Project Monitor.
 - 6. Upon receipt of satisfactory final clearance air sampling results, collapse the tent into

itself, place in suitable disposal bags, and transport to the waste decontamination enclosure. Remove isolation and critical barriers.

3.17 GLOVEBAG REMOVAL (IF APPLICABLE)

- A. In addition to conformance with applicable regulations and variances, glovebag removals are only permitted to be conducted within tent enclosures complying with these specifications. Conduct removal and disposal in conformance with all regulatory conditions.
- B. Restrict access to the immediate area where tent/glovebag removal procedures are taking place using barrier tape and/or construction barriers, and post caution signs.
- C. Pre-clean the work area. Seal all objects and equipment that will remain in the restricted area during abatement, utilizing 2 layers of polyethylene sheeting and tape.
- D. Utilize commercially available glovebags of at least 6 mil thickness. Use shall be in accordance with the manufacturer's instructions and the following minimum requirements.
 - 1. Cut the sides of the glovebag to fit the size of pipe being removed. Insert tools into the attached tool pocket.
 - 2. Place the glovebag around the pipe, and fold and seal the open edges with staples and duct tape. Ensure the glovebag is also sealed at the pipe to form a tight seal.
 - 3. Install openings in the glovebag for the wetting tube and HEPA vacuum hose. Seal the opening to form a tight seal.
 - 4. Conduct smoke testing for all glovebags, with verification by the Asbestos Abatement Project Monitor before removal operations commence. Glovebags that do not pass the smoke test will be required to be resealed and retested.
 - 5. Commence removal after first wetting the materials to be removed. Ensure ACM is continuously wetted. After removal of the ACM, scrub or brush the piping so that no visible ACM remains. Encapsulate any open ends of pipe insulation to remain.
 - 6. After the piping is cleaned, wash down the inside of the glovebag and remove the wetting tube. Collapse the glovebag using the HEPA vacuum. With the ACM at the bottom of the bag, twist and seal with the tape.
 - 7. Place a disposal bag around the glovebag, and detach from the pipe. Seal the disposal bag and transport to the decontamination enclosure.

3.18 RESTORATION OF FACILITIES

- A. Remove temporary utilities upon completion of abatement activities and notification of compliance with clearance criteria. Disconnect all temporary power, remove power lockouts, and restore power. Remove all temporary plumbing. Restore area designated for these facilities to its original condition or better.

3.19 DISPOSAL OF ASBESTOS WASTE

- A. Store, transport, and dispose of all asbestos waste in accordance with the following regulations, at a minimum.
 - 1. 6 NYCRR Parts 360 and 364
 - 2. 40 CFR 61 – NESHAPS
 - 3. USEPA Asbestos Waste Management Guidance EPA/530-SW85
 - 4. 12 NYCRR 56, Section 10

- B. The following conditions apply for transportation of waste and the selected disposal site.
1. Hauler and disposal site are subject to pre-approval by the Owner or Owner's designated representative.
 2. Provide 24-hour notification prior to removing any waste from the site. Remove waste from the site only during normal working hours, unless otherwise specified. No waste is to be taken from the site, unless the Asbestos Abatement Contractor and Asbestos Abatement Project Monitor authorizes the release of the waste, as described herein.
 3. Coordinate with the Hauler to provide the estimated date and time of arrival at the disposal site.
 4. Upon arrival at the project site, the hauler must possess and present to the Asbestos Abatement Project Monitor a valid NYSDEC Part 364 Asbestos Hauler's Permit.
 5. Coordinate with the Hauler to inspect material in the transport container prior to the Hauler taking possession and signing the asbestos waste manifests.
 6. Unless specifically approved by the Owner or Owner's designated representative, do 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, as identified on the notifications, with no unauthorized stops.
- C. The following conditions apply to waste storage containers:
1. Ensure that all waste containers are fully enclosed and lockable (i.e., enclosed dumpster, trailer, etc.). No open containers will be permitted on-site (i.e., open dumpster with canvas cover, etc.), unless specifically permitted by an applicable or site-specific variance.
 2. Verify that the truck tags (license plates) match that listed on the 6 NYCRR Part 364 permit.
 3. Plasticize and seal the container with a minimum of 2 layers of polyethylene sheeting on the sides and floor. Once on site, keep the waste container locked at all times, except during load out. Do not use the waste container for storage of equipment or supplies.
 4. While on-site, label the container with USEPA danger signage in accordance with Paragraph 2.3(D).
 5. Stencil the NYSDEC Asbestos Hauler's Permit number on both sides and the back of the container.
 6. Do not permit the container to be loaded unless it is properly plasticized, has the appropriate danger signage affixed, and has the permit number appropriately stenciled on the container.
- D. The following conditions apply to the Owner's and Hauler's asbestos waste manifests:
1. Utilize an asbestos waste manifest in conjunction with the asbestos hauler's manifest.
 2. Verify the manifests have the appropriate signatures prior to any waste being removed from the site.
 3. Retain copies of the completed hauler's manifest.
 4. Coordinate with the disposal facility to ensure return of the original hauler's manifest after waste is disposed of.
 5. Forward copies of hauler's manifest to the Abatement Project Monitor within 14 calendar days of the waste container being removed from the site.
 6. Utilize waste disposal logs. Maintain this log on-site at all times. Submit originals of all waste disposal manifests, seals, and disposal logs to the Owner with the final close-out documentation.

END OF SECTION 028200

SECTION 028300 – LEAD HAZARD CONTROL ACTIVITIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section describes requirements for work activities affecting building materials in proposed renovation areas that are impacted with lead-based paint (LBP) or lead-containing materials (LCM).
1. LBP is defined as paint or other surface coating that has a lead content greater than 5,000 parts per million (or 0.5 percent by weight or 1 milligram per square centimeter). LCM is herein defined as paint or other surface coating that contains a detectable concentration of lead, and can include LBP and non-LBP. For purposes of this project, defined LBP or LCM may include ceramic tiles, and/or porcelain surfaces in addition to "paint" coatings.
 2. The project includes demolition and renovation of building materials that are impacted with LBP and/or LCM. Based on site usages, certain areas of the facility would be considered a "child-occupied facility" per United States Environmental Protection Agency (EPA) requirements for LBP abatement. Affected areas of the facility with LBP do not include rooms that would be frequented by children. OSHA 1926.62 requirements would apply to the non-child-occupied areas of the facility, and all areas of work must be cleaned of lead-containing paint debris and dust.
 3. The Contractor will be responsible to furnish all labor, materials, facilities, equipment, installation services, employee training, notifications, permits, licenses, certifications, and agreements necessary to perform the specified work. Perform work in accordance with the Contract Documents, the latest regulations from the Occupational Safety and Health Administration (OSHA), the U.S. Environmental Protection Agency (EPA), the State of New York, and all other applicable federal, state and local agencies. Whenever the requirements of the above references conflict or overlap, the most stringent provision shall apply.
 4. Work that will impact LBP or LCM must be identified and coordinated relative to the full scope of work for the project.
 5. Verify the quantities of materials to be removed and extent of LBP or LCM to be mitigated/remediated, relative to the requirements described herein and the full scope of work for the project, as the basis for the bid. Drawings depict the areas in which the work will be conducted. Selected surfaces have been tested and determined to be LBP or LCM, and are identified in the hazardous materials survey report for the project. Painted surfaces, ceramic tiles, and/or porcelain materials not previously tested shall be assumed to be LBP.
 6. At a minimum, workers shall have Lead Awareness training prior to commencement of the work, and be trained in accordance with OSHA Regulations 29 CFR 1926.62 and 1919.120. Additional training and certification shall be provided for LBP abatement work, as required.
 7. Painted surfaces that have not been tested must be assumed to contain lead, unless proven otherwise through sampling and analysis or testing with a x-ray fluorescence (XRF) analyzer.
- B. Coordinate with the Owner or the Owner's designated representative for the removal of movable furnishings and equipment, including miscellaneous small items such as tools, stored materials, files, and records, prior to commencing work in each established work area.

- C. Perform all work in such a manner as to minimize the risk of exposure to personnel, to prevent exposure to occupants, and to minimize the risk of release of lead or lead-containing debris to the environment. Heating these materials may produce fumes that are highly toxic to Workers and harmful to the environment. Removal of these materials from the structure may produce dust and chips that must be collected and contained for subsequent management and disposal.
- D. Perform all work in strict accordance with the Contract Documents and all governing codes, rules, and regulations. The information contained herein will be considered part of the Contract Documents. Where conflicts occur between the Contract Documents and applicable codes, rules, and regulations, the more stringent procedure(s) will apply.
- E. Take notice, and make employees aware, of occupational safety hazards associated with the LBP or LCM work and other work being performed on-site. Comply with any site-specific policies or safety training that may be required by the Owner.
- F. Protection of Work to Remain: Preserve and protect building materials and finishes, electrical equipment, heating and ventilation equipment, and other components and items present within each work area that is not removed or remediated. Perform work without damage to or contamination of adjacent areas. Where such areas are contaminated, specified procedures for containment must be followed, and contamination must be cleaned up. Where adjacent areas are damaged, restoration must be to original condition.
- G. Title to Materials: Waste with lead-containing materials resulting from the work, except as otherwise indicated, will remain the property of the Owner. Disposal and maintaining records of disposal will be the responsibility of the Contractor.

1.2 REGULATIONS AND CODES

- A. Comply with the codes and standards listed below, except where more stringent requirements are shown and/or specified. Specific regulations, standards, and guidance documents are listed for informational purposes due to relevance to the work described herein. Specific regulations, standards, and guidance documents that are not listed may also be applicable to the work.
 - 1. Federal:
 - a. American National Standard Institute (ANSI)
 - 1) ANSI Z88.2-80, Practices for Respiratory Protection
 - b. Code of Federal Regulations (CFR)
 - 1) 29 CFR 1910.1200, "Hazard Communication"
 - 2) 29 CFR 1910.134, "Respiratory Protection"
 - 3) 29 CFR 1926, "Construction Industry"
 - 4) 29 CFR 1926.62, "Lead Exposure in Construction"
 - 5) 40 CFR 260, "Hazardous Waste Management System: General"
 - 6) 40 CFR 261, "Identification and Listing of Hazardous Waste"
 - 7) 40 CFR 262, "Standards Applicable to Generators of Hazardous Waste"
 - 8) 40 CFR 263, "Standards Applicable to Transporters of Hazardous Waste"
 - 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) 49 CFR 171-172, "Transportation Standards"
 - c. Occupational Safety and Health Administration (OSHA)
 - d. United States Department of Transportation (USDOT)
 - e. United States Environmental Protection Agency (USEPA)

- 1) Toxic Substance Control Act (TSCA)
 - 2) Renovation, Repair, and Painting (RRP) Rule
 - f. United States Department of Housing and Urban Development (HUD)
 - 1) "Guidelines for the Evaluation and Control of Lead Based Paint Hazards"
2. New York State:
 - a. Compilation of the Rules and Regulations of the State of New York (NYCRR)
 - 1) 6 NYCRR, Part 360, "Solid Waste Management Facilities"
 - 2) 6 NYCRR, Part 364, "Waste Transporter Permits"
 - 3) 6 NYCRR, Part 370, "Hazardous Waste Management System – General"
 - 4) 6 NYCRR, Part 371, "Identification and Listing of Hazardous Wastes"
 - 5) 6 NYCRR, Part 372, "Hazardous Waste Manifest System and Related Standards for Generators, Transporters, and Facilities"
 - 6) 6 NYCRR, Part 373, "Hazardous Waste Management Facilities"
 - b. New York State Department of Environmental Conservation (NYSDEC)
 - c. New York State Department of Health (NYSDOH)
 - d. New York State Department of Transportation (NYSDOT)

1.3 ENVIRONMENTAL CONSULTANT

- A. An Environmental Consultant will be retained by the Owner under separate contract, to represent the Owner in matters pertaining to lead abatement work performed in accordance with these specifications and requirements.
- B. The Environmental Consultant is authorized by the Owner to provide monitoring during work activities with LBP, to interpret procedures and to enforce provisions of the contract documents and USEPA regulations pertaining to the abatement of LBP.
- C. If, in the opinion of the Environmental Consultant, there is a substantial non-conformance with the contract documents and/or a situation presenting a health hazard to workers or to the Owner's employees, the Environmental Consultant will be authorized to stop work.
- D. The Environmental Consultant's role in health and safety matters does not alleviate the Contractor's obligation to comply with all applicable health and safety regulations promulgated by the local, state, or federal government.
- E. Where applicable, the Environmental Consultant will provide work area clearance pursuant to requirements of 40 CFR 745.227(e)(8).
 1. Should any visual clearance or clearance wipe sample(s) fail to meet clearance criteria, the Contractor will be directed to re-clean the work area and new clearance wipe samples will be collected. The Contractor will be responsible for any and all costs incurred due to clearance sample failures.

1.4 SUBMITTALS

- A. Submit in accordance with applicable provisions of the Contract Documents.
- B. Pre-Work Submittals: Submit a minimum of 10 days prior to the anticipated commencement of work activities affecting LBP and/or LCM and expedite any resubmissions.
 1. Provide a Work Plan that describes work procedures, cleaning procedures, and procedures for collection and disposal of waste materials to be implemented when

- working with materials impacted by LBP or LCM. Provide applicable Workers' training and refresher training certifications and copies of fit test and medical clearance records.
2. Provide an Occupant Protection Plan that describes the work practices and precautionary measures that will be utilized at the facility to protect building occupants from lead exposure during LBP abatement activities. The Occupant Protection Plan can be included as part of the Work Plan submittal described in Subparagraph 1.4(B)(1).
 3. Disposal site/landfill permit
 4. Safety Data Sheets (SDS) for proposed detergents or cleaning products, chemical strippers, and/or other products proposed for use during work with LBP or LCM.
- C. Close-out Submittals: Within 30 days of project completion, and prior to final payment, submit a closeout package to include:
1. Copy of laboratory analysis report for waste characterization sampling and analysis, as described in Article 3.9.
 2. Submit originals of all waste disposal manifests, as applicable, and waste disposal receipts within 30 days of transport
 3. Certification of Lead Hazard Control Work: The Contractor's Supervisor shall certify in writing that all lead hazard control work and waste disposal has been completed in accordance with this specification and all applicable federal and state regulations.

PART 2 – PRODUCTS

2.1 PERSONAL PROTECTIVE EQUIPMENT

- A. The minimum personal protective equipment (PPE) is Level D Modified (hard hat, safety glasses, and steel-toed boots), at all times at the project site both inside and outside the work areas. Select and use additional requisite PPE, including respiratory protection and disposable protective clothing, pursuant to project conditions and requirements and OSHA regulations and procedures.
- B. For use of respiratory protection, ensure that respirators and filters are selected, used, maintained, and stored pursuant to an established respiratory protection program that is compliant with OSHA 29 CFR 1910.134 requirements. Provide for surveillance of working conditions to ensure the selected respirator provides adequate protection, as defined in OSHA 29 CFR 1926.1101.
- C. Provide workers and authorized visitors with suitable PPE whenever they enter the work area.

2.2 SIGNS AND LABELS

- A. Provide warning signs and barrier tapes at all approaches to each work area where LBP or LCM will be disturbed. Locate signs at such distance that personnel may read the sign and take the necessary protective steps required before entering the area.
- B. Provide danger signs in vertical format conforming to 29 CFR 1926.62, minimum size of 20 inches by 14 inches, and displaying the following legend:

DANGER
LEAD WORK AREA
MAY DAMAGE FERTILITY OR THE UNBORN CHILD
CAUSES DAMAGE TO THE CENTRAL NERVOUS SYSTEM
DO NOT EAT, DRINK, OR SMOKE IN THIS AREA

- C. Provide labels for waste containers in accordance with applicable USEPA, USDOT, and NYSDOT regulations.

2.3 POLYETHYLENE SHEETING

- A. Unless otherwise indicated, use polyethylene sheeting that is at least 6 mil fire retardant sheeting.

2.4 HEPA VACUUM EQUIPMENT

- A. Conduct all vacuuming of surfaces within work area using HEPA filter equipped industrial vacuums conforming to ANSI Z9.2.
- B. For removal activities that may generate dust, provide tools and specialized equipment with integral vacuum hoods connected to a HEPA vacuum with flexible hose.

2.5 CLEANING OR PAINT REMOVAL PRODUCTS

- A. Provide products that are considered suitable for the types of surfaces being cleaned or treated. Do not utilize products that could produce noxious fumes, contain methylene chloride, or may result in staining, discoloration, or other damage to the substrate materials.

2.6 DISPOSAL BAGS, DRUMS, AND CONTAINERS

- A. Provide disposal drums and/or containers, and appropriate labels that comply with applicable USEPA, USDOT, and NYSDOT regulations.

2.7 WATER AND ELECTRICAL

- A. Coordinate water and electrical service with the Owner prior to initiation of work. Verify suitability and location of all connections.

2.8 OTHER PRODUCTS AND MATERIALS

- A. For other products or materials that are required for use during work activities, ensure compliance with local, state, and federal codes and regulations, if applicable. Furnish and utilize industry standard equipment and materials. Do not furnish equipment or materials that have been altered in such a manner that violates local, state, and/or federal codes and regulations, or presents unnecessary health and safety risks.

PART 3 – EXECUTION

3.1 NOTIFICATION

- A. Notify the Owner or Owner's designated representative a minimum of 5 business days prior

to initiating work that will affect LBP or LCM.

- B. For any work that is considered to be LBP abatement requiring USEPA notification, ensure that such notification is provided a minimum of 5 business days prior to initiating work.

3.2 EMPLOYEE PROTECTION

- A. Comply with all applicable OSHA requirements. Refer to Article 2.1 for details pertaining to PPE.

3.3 PERSONAL AIR MONITORING

- A. Personal air monitoring required by the OSHA is the responsibility of the Contractor, not the Owner or Owner's representative.

3.4 PROJECT SUPERVISOR

- A. Designate a full-time Project Supervisor, with the following minimum qualifications.
 - 1. The Project Supervisor must have a minimum of 3 years experience with lead safe work practices and performing work per requirements of the OSHA 29 CFR 1926.62 standard.
 - 2. The Project Supervisor must be able to read and write English fluently, and be able to communicate in the primary language of the workers.
- B. Ensure the Project Supervisor is on-site at all times during work activities that affect LBP or LCM and is responsible for the performance of the work. The designated Project Supervisor will be the primary point of contact relative to the work activities associated with LBP or LCM.

3.5 WORK AFFECTING LBP OR LCM

- A. Remove, contain, collect, and dispose of LBP or LCM that are disturbed during the project, in addition to dust and debris that are generated during the work activities affecting the LBP or LCM. Perform work using lead safe work practices and in compliance with applicable federal, state, and local regulations.
- B. Disturbance methods must be performed in a manner that will control lead hazards and limit worker exposure to lead hazards. Ensure that provisions are implemented to minimize the generation of dust during the demolition and removal operations. Wherever possible, remove existing building components without cutting, heating, abrading, or otherwise significantly disturbing the LBP or LCM.
- C. Prohibited Methods: The following methods must not be used for work affecting surfaces with LBP or LCM.
 - 1. Open flame burning or torching.
 - 2. Machine sanding or grinding without a HEPA local exhaust control.
 - 3. Abrasive blasting or sandblasting without HEPA local exhaust control.
 - 4. Heat guns operating above 1,100 degrees Fahrenheit or charring the paint.
 - 5. Dry sanding or dry scraping, except dry scraping in conjunction with heat guns or within 1 foot of electrical outlets.
 - 6. Paint stripping in a poorly ventilated space using a volatile stripper that is a hazardous substance per 16 CFR 1500.3, and/or a hazardous chemical per 29 CFR 1910.1200 or 29 CFR 1926.59, as applicable to the work.

- D. Utilize work area containment, signage and barriers, lead safe removal and cleaning methods, change areas, showers/wash facilities, employee monitoring, recordkeeping, and other applicable work practices, as necessary to complete the work in compliance with OSHA 29 CFR 1926.62.
- E. Isolate heating, ventilation, and air conditioning (HVAC) equipment within and adjacent to work areas where LBP or LCM will be disturbed. If possible, shut down and lock out the building HVAC systems servicing the work area. For contained work areas, seal off all openings, including, but not limited to, windows, diffusers, grills, electrical outlets and boxes, doors, and any other penetrations of the work area enclosure, using 2 layers of at least 6 mil fire retardant polyethylene sheeting.
- F. Ensure that waste with lead is properly handled during each project phase, and packaged and maintained in appropriate containers. Implement provisions to prevent lead contamination of the surrounding environment. Provide for sampling and analysis and disposal of waste with lead, as described in Article 3.9.

3.6 WORK AREA CLEANING

- A. The following conditions apply to cleaning activities for interior work areas.
 - 1. Clean all surfaces within the established work area using HEPA vacuuming and wet washing/wiping methods.
 - 2. At a minimum, perform an initial clean with HEPA vacuum, followed by wet washing/wiping, followed by a final pass with HEPA vacuum.
 - 3. Commence each cleaning phase at the ceiling level and finish at the floor level.
 - 4. For work areas with multiple rooms or distinct functional spaces, sequence cleaning from areas that are generally considered to be in the cleanest condition to dirtier conditions and avoid passing through rooms or spaces already cleaned.
 - 5. Perform wet washing/wiping using a detergent or cleaning agent that is suitable for cleaning of dust from surfaces. Submit information for proposed detergents or cleaning products pursuant to requirements of Paragraph 1.4(B). Select detergents or cleaning agents in consideration of the types of surfaces to be cleaned, such that the surface finishes will not be damaged. Mix and use cleaning agents pursuant to the manufacturer's instructions.
 - 6. Collect all residual waste material by HEPA vacuum. Sweeping of materials is prohibited. Cleaning with compressed air and/or other methods that could unnecessarily spread and disperse dust to other areas are also not permitted.
 - 7. Perform clean-up operations as the work progresses and on a daily basis at a minimum. Waste debris must be properly containerized at all times.

3.7 WORK AREA CLEARANCE

- A. Minimum work area clearance requirements include a visual inspection by the Project Supervisor to verify that no visible accumulations of debris or dust remain. At the option of the Owner, an Environmental Consultant may be retained to perform an additional visual inspection and/or provide for wipe sampling and analysis.
- B. If applicable, clearance wipe samples will be collected from representative locations of floor surfaces and submitted to a NYSDOH ELAP certified laboratory for analysis of total lead. Clearance wipe samples will be considered satisfactory provided analytical results are at or below the EPA clearance standard for floors.
- C. It will be the responsibility of the Contractor to re-clean work areas, in the event that visual

clearance or wipe sample clearance criteria are not satisfied.

3.8 RESTORATION OF FACILITIES

- A. Remove any installed temporary utilities upon completion of abatement activities and notification of compliance with clearance criteria. Disconnect all temporary power, remove power lockouts, and restore power if applicable. Remove all temporary plumbing.

3.9 DISPOSAL OF WASTE WITH LEAD

- A. Prior to disposal of waste with lead, provide for the collection and laboratory analysis of a waste characterization sample(s). Provide for laboratory analysis for toxicity in accordance with USEPA methods (i.e., Toxicity Characteristic Leaching Procedure (TCLP) lead). Laboratory analysis must be performed by a NYSDOH Environmental Laboratory Approval Program (ELAP) certified laboratory.
 - 1. Waste materials with a TCLP lead concentration equal to or greater than the TCLP limit for lead of 5 parts per million must be classified as hazardous waste. Package, transport, and dispose of hazardous waste in accordance with all requirements of the agencies listed in Article 1.2. Ensure that the time periods for on-site storage of hazardous wastes do not exceed maximum timeframes permitted by federal, state, and local regulations.
 - 2. Waste materials with a TCLP lead concentration less than the TCLP limit for lead of 5 parts per million can be processed and disposed of as non-hazardous waste, provided there are no other characteristics that would render the waste as hazardous. Package, transport, and dispose of non-hazardous waste in accordance with all requirements of the agencies listed in Article 1.2.
- B. Provide waste disposal documentation as specified in Article 1.4.

END OF SECTION 028300

SECTION 028400- PCB-CONTAINING MATERIAL ABATEMENT

PART 1 GENERAL

1.1 SUMMARY

- A. This Section describes the methods and procedures for abatement of materials, which are impacted with polychlorinated biphenyls (PCB), from the areas of scheduled work.
 - 1. All identified regulated PCB-containing materials must be removed completely. Reference the Contract Drawings for additional details pertaining to abatement of identified regulated PCB-containing caulk determined to contain greater than or equal to 50 parts per million (ppm) PCB.
 - 2. Verify the locations and quantities of materials to be removed as the basis for the bid. Contract Drawings depict the areas in which the work will be conducted, and show the general location of identified PCB-containing materials, as determined from the limited hazardous materials assessment performed for the site.
- B. The Contractor is responsible for all work related to the abatement of identified PCB-containing materials, including, but not limited to, the following:
 - 1. Coordination with the Owner or Owner's designated representative for removal of movable furnishings and equipment, including miscellaneous small items such as tools, stored materials, files, and records, prior to asbestos abatement work commencing.
 - 2. Protection of Work to Remain: Preserve and protect building materials and finishes, electrical equipment, and heating and ventilation equipment present within each work area that is not removed or abated. Perform work without damage to or contamination of adjacent areas. The Contractor and Owner shall agree in writing on the condition of the building and fixtures and background level, prior to commencement of the work.
 - 3. Removal of all regulated PCB-containing caulk within the areas of work, as designated on the Contract Drawings. Other materials with PCB at less than 50 ppm shall also be coordinated for removal, as necessary to complete scheduled work.
 - 4. Inspection of areas of work to ensure that all regulated PCB-containing caulk has been removed in accordance with the Contract Documents.
 - 5. Furnish all labor, materials, services, insurance, and equipment necessary to complete the abatement work in accordance with applicable regulations and codes.
 - 6. Provide Workers certified with the Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response (HAZWOPER) 40-hour training to perform remediation activities. As required by applicable regulations, prior to assignment to PCB work, instruct each employee with regard to the hazards of PCB, safety and health precautions, and the use and requirements of protective clothing and equipment.
 - 7. Provide a Project Health and Safety Officer having a minimum of 8 hours of supervisor training in hazardous waste site operations, in accordance with the

requirements of 29 CFR 1910. The Project Health and Safety Officer must be on-site at all times during abatement work.

8. Unless the quantity of generated hazardous waste at the facility (including waste generated during the PCB caulk abatement work and other hazardous waste not incidental to the PCB caulk abatement work) would render the facility as a Very Small Quantity Generator, verify a current EPA identification number is assigned to the facility prior to initiating the PCB abatement work.
 9. Obtain approval for a waste disposal site and transportation of waste to disposal facility. Waste disposal facility must have a valid NYSDEC or Regulatory Waste Authority permit. Waste transporter shall have a valid NYSDEC, Division of Solid & Hazardous Materials, Part 364 Waste Transporter Permit. For the PCB-containing hazardous waste, waste manifests must be used and include all applicable information for the generator, transporter, and disposal facility.
 10. Provide Owner with close-out report and record drawings containing all information pertaining to the removal and disposal of PCB-containing materials (quantity and location).
- C. Perform all work in such a manner as to minimize the risk of exposure to personnel, to prevent exposure to occupants, and to minimize the risk of release of PCB or PCB-containing debris to the environment. Heating these materials may produce fumes that are highly toxic to Workers and harmful to the environment. Removal of these materials from the structures may produce dust and debris that must be collected and contained for subsequent management and disposal.
- D. Take notice, and make employees aware, of occupational safety hazards associated with the abatement work and other work being performed on-site.
- E. Perform all work in strict accordance with the Contract Documents and all governing codes, rules, and regulations. Where conflicts occur between the Contract Documents and applicable codes, rules, and regulations, the more stringent procedure(s) shall apply. Interpretation of regulations or differences in interpretation of applicable regulations between any parties associated with the project shall be settled in a manner consistent with the administrative and contractual procedures specified in other applicable sections of the Contract Documents. If a resolution cannot be readily obtained, the applicable regulatory authority will be contacted for interpretation. The interpretation of the regulatory authority will be final.
- 1.2 REGULATIONS AND CODES
- A. Comply with the codes and standards listed below, except where more stringent requirements are shown and/or specified. Specific regulations, standards, and guidance documents are listed for informational purposes due to relevance to the work described herein. Specific regulations, standards, and guidance documents that are not listed may also be applicable to the work.
1. Federal Regulations:
 - a. American National Standard Institute (ANSI)
 - 1) ANSI Z88.2-80, Practices for Respiratory Protection
 - b. Code of Federal Regulations (CFR)
 - 1) 29 CFR 1910.1200, "Hazard Communication"

- 2) 29 CFR 1910.134, "Respiratory Protection"
- 3) 29 CFR 1910.145, "Specification for Accident Prevention Signs and Tags"
- 4) 29 CFR 1926, "Construction Industry"
- 5) 40 CFR 260, "Hazardous Waste Management System: General"
- 6) 40 CFR 261, "Identification and Listing of Hazardous Waste"
- 7) 40 CFR 262, "Standards Applicable to Generators of Hazardous Waste"
- 8) 40 CFR 263, "Standards Applicable to Transporters of Hazardous Waste"
- 9) 40 CFR 264, "Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities"
- 10) 40 CFR 265, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities"
- 11) 40 CFR 268, "Land Disposal Restrictions"
- 12) 40 CFR Part 761, "Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions"
- 13) 49 CFR 171-172, "Transportation Standards"
- c. Occupational Safety and Health Administration (OSHA)
- d. United States Department of Transportation (USDOT)
- e. United States Environmental Protection Agency (USEPA)
2. New York State:
 - a. Compilation of the Rules and Regulations of the State of New York (NYCRR)
 - b. 6 NYCRR, Parts 360 and 364, "Disposal and Transportation"
 - c. 6 NYCRR Parts 370-374, Hazardous Waste Regulations
 - d. Fire Code of New York, 2020 including Technical Bulletins issued by the New York State Department of State
 - e. Existing Building Code of New York State 2020, Including Technical Bulletins issued by New York State Department of State
 - f. New York State Department of Environmental Conservation (NYSDEC)
 - g. New York State Department of Health (NYSDOH)
 - h. New York State Department of State (NYSDOS)
 - i. New York State Department of Transportation (NYSDOT)

1.3 ENVIRONMENTAL CONSULTANT

- A. An Environmental Consultant will be retained by the Owner under separate contract, to represent the Owner in matters pertaining to the work performed in accordance with these specifications and requirements.
- B. The Environmental Consultant is authorized by the Owner to provide monitoring during removal work, to interpret procedures and to enforce provisions of the contract documents pertaining to the abatement of PCB-containing materials.
- C. If, in the opinion of the Environmental Consultant, there is a substantial non-conformance with the contract documents and/or a situation presenting a health hazard to workers or to the Owner's employees, the Environmental Consultant will be authorized to stop work.
- D. The Environmental Consultant's role in health and safety matters does not alleviate the Contractor's obligation to comply with all applicable health and safety regulations promulgated by the local state or federal government.
- E. The Environmental Consultant will provide visual work area clearance to verify caulk materials have been removed complete.
 1. Should any visual clearance fail to meet clearance criteria, the Contractor will be

directed to re-clean the work area. The Contractor will be responsible for any and all costs incurred due to unsatisfactory work area clearances.

1.4 SUBMITTALS

- A. Submit in accordance with applicable provisions of the Contract Documents.
- B. Pre-Work Submittals: Submit a minimum of 10 days prior to the anticipated commencement of the asbestos abatement work and expedite any resubmissions.
 - 1. Work Plan: Provide a detailed Work Plan that includes, at a minimum, containment procedures, work procedures, cleaning procedures, type of equipment, crew size, applicable permits, and copies of Workers' 40-hour OSHA training and 8-hour refresher training certifications. The Work Plan must be reviewed and approved by the Owner or Owner's designated representative prior to commencing the work.
 - 2. PCB Disposal Plan: Provide a Disposal Plan that describes the Contractor's plan for transportation and disposal of PCB-containing wastes generated during the project. The Disposal Plan shall include, at a minimum, waste packaging procedures, waste labeling and placarding procedures, waste manifesting procedures, the name and address for the proposed treatment or disposal facility, 24-hour contact number proposed treatment or disposal facility, the name and address for the proposed waste transporters, waste transport permits, and EPA identification numbers (generator, transporter, and disposal facility), as applicable for the quantity of hazardous waste to be generated. The route(s) by which the waste will be transported to the designated disposal facility, and states or territories through which the waste will pass, shall also be identified. The Disposal Plan must be reviewed and approved by the Owner or Owner's designated representative prior to commencing the work.
 - 3. Safety Data Sheets (SDS) for all chemicals and materials to be used during the project.
- C. Project Close-out Submittals: Within 21 days following removal of the waste from the site, and prior to final payment, submit a closeout package to include:
 - 1. Waste disposal manifests signed by the disposal facility, seals, and disposal logs (originals to the Owner).
 - 2. Tipping receipts provided by the disposal facility.
 - 3. Copy of daily progress logs.

PART 2 – PRODUCTS

2.1 PROJECT LOG BOOK

- A. Provide a permanently bound project log book. The log book shall contain, on the title page, the project name; name, address, and telephone number of Owner; name, address, and telephone number of Consultant; name, address, and telephone number of the Contractor; and emergency numbers, including, but not limited to, local Fire/Rescue Department.

- B. Record all entries into the log with non-washable, permanent ink. Under no circumstances shall pencil entries be permitted.
- C. Ensure that all persons entering and exiting the work area sign the log and include name, employer, NYSDOL certification number, and time of entrance and exiting.
- D. Ensure that the Project Supervisor documents all work performed daily and all materials removed from the site.

2.2 PERSONAL PROTECTIVE EQUIPMENT

- A. Comply with applicable OSHA regulations and procedures for selection and use of personal protective equipment (PPE).
- B. The minimum PPE is Level D Modified (hard hat, safety glasses, and steel-toed boots), at all times at the project site both inside and outside the work areas. Additional PPE that may be necessary to reduce exposure to PCB include, but may not be limited to, the following.
 - 1. Respiratory Protection
 - a. Select respirators from those approved by the NIOSH, Department of Health and Human Services.
 - b. Ensure that respirators and filters are selected, used, maintained, and stored pursuant to an established respiratory protection program, pursuant to 29 CFR 1910.134.
 - c. Provide for surveillance of working conditions to ensure the selected respirator provides adequate protection, as defined in 29 CFR 1926.1101.
 - 2. Disposable Protective Clothing
 - a. Provide disposable protective whole body clothing, head coverings, plastic or rubber gloves, and foot coverings to personnel utilized during the project. Cloth gloves may be worn inside the plastic or rubber gloves for comfort, but shall not be used alone. Secure sleeves at the wrists, and foot coverings at the ankles, by the use of tape, or provide disposable coverings with elastic wrists or tops.
- C. Provide workers and authorized visitors with suitable protective clothing, headgear, eye protection, and footwear whenever they enter the work area.

2.3 SIGNS AND LABELS

- A. Provide warning signs and barrier tapes at all approaches to the work area. Locate signs at such distance that personnel may read the sign and take the necessary protective steps required before entering the area.
- B. Provide appropriate hazardous waste labels affixed to all waste containers that will be used to transport PCB contaminated material in accordance with USDOT 49 CFR Parts 171 and 172.
- C. Provide the appropriate "Large PCB Marking" or "Small PCB Marking" (ML or MS, respectively, per 40 CFR 761), of sufficient size to be clearly legible, for display on waste containers (bags, boxes, rollofs, or drums), which will be used to contain or transport PCB-contaminated material, in accordance with 40 CFR 761. In addition, U.S. Department of Transportation (DOT) 49 CFR Parts 171 and 172 requires the name and

UN number of the material to be on the bags or drums, and, if shipped in bulk (rolloffs, Gaylord boxes, etc.), the bulk container must also be labeled: Polychlorinated Biphenyl, Solid Mixture UN 3432. Provide appropriate alternate labeling if transporting and disposing of a mixed waste (e.g., asbestos, lead also present).

- D. Waste generated during the abatement of material containing greater than 50 parts per million PCB is designated as a hazardous waste in New York State, and as such, the following identification information shall be affixed to each waste container.

HAZARDOUS WASTE--Federal Law Prohibits Improper Disposal. If found, contact the nearest police or public safety authority, or the U.S. Environmental Protection Agency.

Generator Name and Address: _____

Generator EPA Identification Number: _____

Manifest Tracking Number: _____

2.4 POLYETHYLENE SHEETING

- A. Unless otherwise indicated, utilize polyethylene sheeting that is at least 6 mil fire retardant sheeting.
- B. Utilize at least 6 mil opaque fire retardant plastic sheeting for decontamination enclosure systems.

2.5 HEPA VACUUM EQUIPMENT

- A. Conduct all vacuuming using 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.

2.6 DISPOSAL CONTAINERS

- A. Provide packaging in accordance with 49 CFR 173 Packaging Group 9, such as 30- or 55-gallon capacity fiber, plastic, or metal drums, Gaylord Boxes, or other Intermediate Bulk Containers (IBCs), or non-siftable bulk containers, capable of being sealed air and water tight if PCB waste has the potential to damage or puncture disposal bags. Affix PCB caution labels on lids of drums, and opposite sides of drums or bulk containers, as well as the ends of bulk containers.
- B. Label containers as described in Paragraphs 2.3(C) and (D).
- C. Labeled PCB waste containers must not be used for non-PCB waste or trash. Any material placed in labeled containers must be handled and disposed of as PCB (hazardous) waste.

2.7 WATER AND ELECTRICAL

- A. Coordinate water and electrical service with the Owner prior to initiation of abatement activities. Verify suitability and location of all connections.

2.8 OTHER PRODUCTS OR MATERIALS

- A. Ensure that other products or materials required for use during abatement activities are in compliance with local, state, and federal codes and regulations, if applicable. Furnish and utilize industry standard equipment and materials. Do not furnish equipment or materials that have been modified or altered in such a manner to violate local, state, and/or federal codes and regulations, or presents unnecessary health and safety risks.

PART 3 – EXECUTION

3.1 PERSONAL PROTECTIVE EQUIPMENT

- A. Refer to Article 2.2 for applicable PPE requirements.
- B. Ensure that respirators are worn until outside the decontamination room.
- C. Ensure that disposable protective clothing is donned upon entering the decontamination room and before entering the work area, and street clothes are placed in a storable locker or bin. Ensure that workers exiting the work area immediately remove protective clothing and place the waste into sealable containers.

3.2 PERSONAL AIR MONITORING

- A. Provide personal air monitoring, as applicable to OSHA requirements.
- B. Personal air monitoring that may be required is the responsibility of the Contractor, not the Owner or Owner's representative.

3.3 PROJECT SUPERVISOR

- A. Designate a full-time Project Supervisor, who meets the following qualifications.
- B. The Project Supervisor must hold a current OSHA 40-hour HAZWOPER certification. If the Project Supervisor is also the Project Health and Safety Officer, training shall also include a minimum of 8 hours of supervisor training in hazardous waste site operations, in accordance with the requirements of 29 CFR 1910.
- C. The Project Supervisor must be able to speak, read, and write English fluently, as well as communicate in the primary language of the Workers.
- D. Ensure the Project Supervisor is on-site at all times during abatement work, until the Project is complete. Work will be stopped if the Project Supervisor is not present on-site. The Project Supervisor is responsible for the performance of the work and will be required to represent the Contractor in all respects at the Project site. The Supervisor will be the primary point of contact for the PCB Abatement Project Monitor. The Project Supervisor cannot be removed from the Project without the written consent of the Owner. The Project Supervisor will be removed from the Project, if so requested, by the Owner.
- E. Ensure the Project Supervisor maintains the Project Log Book, as described in Article 2.1.

3.4 ON-SITE DOCUMENTATION

- A. Maintain the following submittals, documentation, and postings on-site during abatement activities.
 - 1. NYSDEC Waste Transporter Permit
 - 2. Project documents (specifications and drawings)
 - 3. Applicable regulations
 - 4. Safety Data Sheets (SDS) of supplies/chemicals used on the project
 - 5. Approved Abatement Work Plan
 - 6. List of emergency telephone numbers
 - 7. Waste disposal log
 - 8. Project log book

3.5 DECONTAMINATION AREA AND WORK AREA PREPARATION

- A. Prepare and provide a decontamination area for the PCB abatement work. An existing room or area adjacent to the work area can be used for decontamination of equipment and personnel. Ensure the decontamination area complies with the following conditions, at a minimum.
 - 1. Cover the decontamination area ceiling and walls with 2 layers of polyethylene sheeting. Cover the floor with 2 layers of reinforced polyethylene sheeting.
 - 2. Ensure the decontamination area is large enough to hold the appropriate waste containers, and also allow Workers to apply and remove PPE. Utilize sealable waste containers in this area for contaminated PPE.
 - 3. Provide shower equipment or a wash station for Workers.
 - 4. Provide lockers or storage bins for Workers to store street clothes when donning appropriate PPE.
 - 5. Provide a lockable door for the decontamination unit.
 - 6. Clean all equipment and surfaces of waste containers prior to removal from the decontamination area.
 - 7. Ensure all personnel enter and exit the work area through the decontamination area.
- B. Prepare PCB abatement work areas, as necessary to contain the work activities and all debris that will be generated.
 - 1. The following minimum conditions apply to interior work area preparation procedures.
 - a. Post warning signs at all approaches to the PCB abatement work area. Provide warning tapes around the work area.
 - b. Isolate HVAC equipment in the area, including installing polyethylene sheeting over air returns and exhausts. If possible, shut down and lock out the building heating, ventilation, and air conditioning (HVAC) systems servicing the work

- area.
 - c. Pre-clean all surfaces and objects within the work area using HEPA vacuuming.
 - d. For movable objects within the work area, clean via HEPA vacuum and/or wet wipe and remove from the work area.
 - e. For non-movable equipment in the work area, completely cover with 2 layers of polyethylene sheeting, that is secured in place with duct tape and/or spray adhesive.
 - f. 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 polyethylene sheeting to form a critical barrier.
 - g. Secure sheeting with spray adhesive and then seal with duct tape. Ensure all joints in polyethylene sheeting overlap a minimum of 12 inches.
 - h. Cover the floor surface with a minimum of 2 layers of polyethylene sheeting. Ensure the work area extends a minimum of 5 feet outward from the surface being remediated.
2. The following minimum conditions shall apply to exterior work area preparation procedures.
- a. For all ground surfaces exterior to the work area, install a layer of polyethylene sheeting, attached to the building face and laid down on the surface below the exterior abatement work area, at least 10 feet wide or to the furthest point of gravity fall for dislodged debris by methods used, whichever is further. For work at the second story and above, extend polyethylene sheeting as necessary. For work above third story, by sidewalk, street, or property boundary, cover scaffolding sides in polyethylene sheeting.
 - b. Ensure all operable windows within the work area and 25 feet from all sides of the work area are closed and secured.
 - c. In the work area, isolate all HVAC equipment intakes by temporarily shutting down units during removals and installing plastic sheeting over the opening.

3.6 PCB ABATEMENT

- A. The following general procedures apply to removal of PCB-containing caulk.
- 1. Utilize a decontamination enclosure that is attached to the work area and fully framed and sheathed to prevent unauthorized entry.
 - 2. Install requisite containment barriers.
 - 3. Perform removal of the caulk utilizing hand removal methods, tools, and techniques. Select and implement removal procedures that are directed at removing the material in larger intact sections to the extent possible (as opposed to smaller cuts and increased material disturbances), minimizing dust generation, and containing any generated debris. Mechanical scouring, milling, or intensive dust-generating demolition-type methods are not to be utilized for removal of the caulk.
 - 4. For remaining surfaces from which PCB-containing caulk materials are removed, utilize physical means such that no visible residue remains. At a minimum, ensure these areas are manually scraped free of visible debris and residue and a HEPA vacuum is utilized prior to visual clearance and final clean.

5. The PCB Abatement Project Monitor will perform visual clearance of the work areas prior to break-down. Perform additional removals and cleaning, if necessary, as directed by the PCB Abatement Project Monitor.
6. Subsequent to passing visual inspection for residual caulk by the PCB Abatement Project Monitor, perform a final clean and decontamination for the work area.
7. Perform a final clean using a HEPA vacuum followed by wet wiping/mopping, and a repeated HEPA vacuuming. All surfaces in and around the work area must be free of dust.
8. Decontaminate all tools and equipment used during the work.
9. The waste disposal receptacle(s) must be situated adjacent to each work area, at the time of removal. Transportation of remediation waste across the property, outside of containment, will not be allowed.
10. Waste receptacles must adhere to the regulatory requirements referenced in Article 1.2, and be suitable to the type of waste (i.e., hazardous, non-hazardous) being removed. Waste containers must be appropriately labeled (reference Articles 2.3 and 2.6) and any temporary storage must be in compliance with 6 NYCRR Part 372 and 373 and 40 CFR Part 262.
11. All disposable waste material, including PPE, must be appropriately containerized and disposed of in accordance with the regulatory requirements referenced in Article 1.2.

3.7 RESTORATION OF FACILITIES

- A. Remove temporary utilities upon completion of abatement activities and notification of compliance with clearance criteria. Disconnect all temporary power, remove power lockouts, and restore power. Remove all temporary plumbing. Restore area designated for these facilities to its original condition or better.

3.8 DISPOSAL OF PCB-CONTAINING MATERIALS AND RELATED DEBRIS

- A. Package, transport, and dispose of PCB debris classified as hazardous waste in accordance with all requirements of the agencies listed in Article 1.03. Prepare hazardous waste manifests, and include the appropriate signatures of authorized representatives of the Owner (as the generator) and the hauler prior to removal from the site. The hazardous waste manifest will require signature by the disposal facility operator upon arrival, and the original manifest must be returned to the Owner (as the generator) within 45 days, pursuant to 6 NYCRR Part 372.
- B. Package, transport, and dispose of PCB debris classified as non-hazardous waste in accordance with all requirements of the agencies listed in Article 1.2.

END OF SECTION 028400

SECTION 031000 - CONCRETE FORMING AND ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Formwork for cast-in-place concrete, with shoring, bracing and anchorage.
- B. Openings for other work.
- C. Form accessories.
- D. Form stripping.

1.2 RELATED REQUIREMENTS

- A. Section 032000 - Concrete Reinforcing.
- B. Section 033000 - Cast-in-Place Concrete.
- C. Section 042000 - Unit Masonry: Reinforcement for masonry.
- D. Section 051200 - Structural Steel Framing: Placement of embedded steel anchors and plates in cast-in-place concrete.
- E. Section 053100 - Steel Decking: Placement of steel anchors in composite decking.

1.3 REFERENCE STANDARDS

- A. ACI CODE-318 - Building Code Requirements for Structural Concrete and Commentary; 2019 (Reapproved 2022).
- B. ACI PRC-347 - Guide to Formwork for Concrete; 2014 (Reapproved 2021).
- C. ACI SPEC-117 - Specification for Tolerances for Concrete Construction and Materials; 2010 (Reapproved 2015).
- D. ACI SPEC-301 - Specifications for Concrete Construction; 2020.
- E. ASME A17.1 - Safety Code for Elevators and Escalators Includes Requirements for Elevators, Escalators, Dumbwaiters, Moving Walks, Material Lifts, and Dumbwaiters with Automatic Transfer Devices; 2022.

1.4 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on void form materials and installation requirements.
- C. Shop Drawings: Indicate pertinent dimensions, materials, bracing, and arrangement of joints and ties.

1.5 QUALITY ASSURANCE

- A. Perform work of this section in accordance with relevant portions of ACI 347R, ACI 301, and ACI 318.

PART 2 PRODUCTS

2.1 FORMWORK - GENERAL

- A. Provide concrete forms, accessories, shoring, and bracing as required to accomplish cast-in-place concrete work.
- B. Design and construct concrete that complies with design with respect to shape, lines, and dimensions.
- C. Chamfer outside corners of beams, joists, columns, and walls.
- D. Comply with applicable state and local codes with respect to design, fabrication, erection, and removal of formwork.
- E. Comply with relevant portions of ACI CODE-318, ACI PRC-347, and ACI SPEC-301.
- F. Use the following form types:
 - 1. Foundation Walls: Site fabricated plywood.
 - 2. Foundation Walls Exposed To View: Site fabricated rough sawn lumber.

2.2 WOOD FORM MATERIALS

- A. All other concrete:

1. Plywood: Douglas Fir species; solid one side grade; sound undamaged sheets with clean, true edges.
 2. Provide forms to suit final installed concrete finish.
- B. Form Support Lumber: SPF, SYP or Hem Fir species; No. 2 grade; with grade stamp clearly visible.

2.3 FORMWORK ACCESSORIES

- A. Form Ties: Removable type, galvanized metal, fixed length, cone type, 3/4" break-back dimension, free of defects that could leave holes larger than 1 inch in concrete surface.
- B. Form Release Agent: Capable of releasing forms from hardened concrete without staining or discoloring concrete or forming bugholes and other surface defects, compatible with concrete and form materials, and not requiring removal for satisfactory bonding of coatings to be applied.
- C. Dovetail Anchor Slot: Galvanized steel, at least 22 gauge, 0.0299 inch thick, foam filled, release tape sealed slots, anchors for securing to concrete formwork.
- D. Embedded Anchor Shapes, Plates, Angles and Bars: As specified in Section 051200.
- E. Waterstops: Bentonite and butyl rubber.
1. Configuration: As indicated on drawings.
 2. Size: As indicated on drawings.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.2 EARTH FORMS

- A. Earth forms are permitted for footing excavations only.

- B. Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.

3.3 ERECTION - FORMWORK

- A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI SPEC-301.
- B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.
- C. Obtain approval before framing openings in structural members that are not indicated on drawings.
- D. Coordinate this section with other sections of work that require attachment of components to formwork.
- E. If formwork is placed after reinforcement, resulting in insufficient concrete cover over reinforcement, request instructions from Architect before proceeding.

3.4 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.5 INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Provide formed openings where required for items to be embedded in passing through concrete work.
- B. Locate and set in place items that will be cast directly into concrete.
- C. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other work.

- D. Position recessed anchor slots for brick veneer masonry anchors to spacing and intervals specified in Section 042613.
- E. Install accessories in accordance with manufacturer's instructions, so they are straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- F. Install waterstops in accordance with manufacturer's instructions, so they are continuous without displacing reinforcement.
- G. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
- H. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.6 FORM CLEANING

- A. Clean forms as erection proceeds, to remove foreign matter within forms.
- B. Clean formed cavities of debris prior to placing concrete.
 - 1. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.7 FORMWORK TOLERANCES

- A. Construct formwork to maintain tolerances required by ACI SPEC-117, unless otherwise indicated.
- B. Construct and align formwork for elevator hoistway in accordance with ASME A17.1.

3.8 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 014000 - Quality Requirements.

- B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and to verify that supports, fastenings, wedges, ties, and items are secure.

3.9 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Store removed forms to prevent damage to form materials or to fresh concrete. Discard damaged forms.

END OF SECTION 031000

SECTION 032000 - CONCRETE REINFORCING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Reinforcing steel for cast-in-place concrete.
- B. Supports and accessories for steel reinforcement.

1.2 RELATED REQUIREMENTS

- A. Section 031000 - Concrete Forming and Accessories.
- B. Section 033000 - Cast-in-Place Concrete.
- C. Section 042000 - Unit Masonry: Reinforcement for masonry.

1.3 REFERENCE STANDARDS

- A. ACI MNL-66 - ACI Detailing Manual; 2020.
- B. ACI SPEC-301 - Specifications for Concrete Construction; 2020.
- C. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2020.
- D. ASTM A706/A706M - Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement; 2016.
- E. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2022.
- F. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021.
- G. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel; 2018.
- H. CRSI (DA4) - Manual of Standard Practice; 2018, with Errata (2019).
- I. CRSI (P1) - Placing Reinforcing Bars, 10th Edition; 2019.

1.4 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Comply with requirements of ACI MNL-66 Include bar schedules, shapes of bent bars, spacing of bars, and location of splices.
- C. Manufacturer's Certificate: Certify that reinforcing steel and accessories supplied for this project meet or exceed specified requirements.
- D. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.
- E. Reports: Submit certified copies of mill test report of reinforcement materials analysis.

1.5 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI SPEC-301.
 - 1. Maintain one copy of each document on project site.
- B. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.4/D1.4M and no more than 12 months before start of scheduled welding work.

PART 2 PRODUCTS

2.1 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi), deformed steel bars.
 - 1. Plain billet-steel bars.
 - 2. Unfinished.
- B. Weldable Reinforcing Steel: ASTM A706/A706M, deformed low-alloy steel bars.
 - 1. Unfinished.
- C. Steel Welded Wire Reinforcement (WWR): Galvanized, deformed type; ASTM A1064/A1064M.

1. Form: Flat Sheets.

D. Reinforcement Accessories:

1. Tie Wire: Annealed, minimum 16 gauge, 0.0508 inch.
2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
3. Provide stainless steel components for placement within 1-1/2 inches of weathering surfaces.

2.2 FABRICATION

- A. Fabricate concrete reinforcing in accordance with CRSI (DA4) - Manual of Standard Practice.
- B. Welding of reinforcement is permitted only as indicated on the contract drawings. Perform welding in accordance with AWS D1.4/D1.4M.
- C. Locate reinforcing splices not indicated on drawings at point of minimum stress.
 1. Review locations of splices with Structural Engineer.

PART 3 EXECUTION

3.1 PLACEMENT

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position.
- B. Do not displace or damage vapor barrier.
- C. Accommodate placement of formed openings.
- D. Maintain concrete cover around reinforcing as indicated on the contract drawings.
- E. Bond and ground all reinforcement to requirements of Section 260526.

3.2 FIELD QUALITY CONTROL

- A. An independent testing agency, as specified in Section 01 45 33 - Code-Required Special Inspections, will inspect installed reinforcement for compliance with contract documents before concrete placement.

END OF SECTION 032000

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Concrete for composite floor construction.
- B. Floors and slabs on grade.
- C. Concrete foundation walls and Piers.
- D. Joint devices associated with concrete work.
- E. Miscellaneous concrete elements, including equipment pads, equipment pits, light pole bases, flagpole bases, thrust blocks, and manholes.
- F. Concrete curing.

1.2 RELATED REQUIREMENTS

- A. Section 031000 - Concrete Forming and Accessories: Forms and accessories for formwork.
- B. Section 032000 - Concrete Reinforcing.
- C. Section 079200 - Joint Sealants: Products and installation for sealants and joint fillers for saw cut joints and isolation joints in slabs.
- D. Section 079513 - Expansion Joint Cover Assemblies.

1.3 REFERENCE STANDARDS

- A. ACI 211.2 - Standard Practice for Selecting Proportions for Structural Lightweight Concrete; 1998 (Reapproved 2004).
- B. ACI CODE-318 - Building Code Requirements for Structural Concrete and Commentary; 2019 (Reapproved 2022).
- C. ACI PRC-211.1 - Selecting Proportions for Normal-Density and High Density-Concrete - Guide; 2022.

- D. ACI PRC-302.1 - Guide to Concrete Floor and Slab Construction; 2015.
- E. ACI PRC-304 - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000 (Reapproved 2009).
- F. ACI PRC-306 - Guide to Cold Weather Concreting; 2016.
- G. ACI PRC-308 - Guide to External Curing of Concrete; 2016.
- H. ACI SPEC-301 - Specifications for Concrete Construction; 2020.
- I. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2023.
- J. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2023.
- K. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2023.
- L. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50 mm] Cube Specimens); 2021.
- M. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2020.
- N. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.
- O. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete; 2020.
- P. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2023.
- Q. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a (Reapproved 2016).
- R. ASTM C330/C330M - Standard Specification for Lightweight Aggregates for Structural Concrete; 2023.
- S. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2019, with Editorial Revision (2022).

- T. ASTM C618 - Standard Specification for Coal Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2023, with Editorial Revision.
- U. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete; 2020a.
- V. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2020.
- W. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete; 2018.
- X. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Asphalt Types); 2023.
- Y. ASTM E1155 - Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers; 2020.
- Z. ASTM E1155M - Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers (Metric); 2014.
- AA. ASTM E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2018a.
- BB. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2017 (Reapproved 2023).

1.4 PREINSTALLATION MEETING

- A. Preinstallation Conference: Conduct conference at Project Site.
- B. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - 1. Contractor's superintendent.
 - 2. Independent testing agency responsible for concrete design mixtures.

3. Ready-mix concrete manufacturer.
4. Concrete Subcontractor.
5. Retain first subparagraph below if special concrete finishes are included in Project.
6. Special concrete finish Subcontractor.
7. Structural Engineer

1.5 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
 1. For curing compounds, provide data on method of removal in the event of incompatibility with floor covering adhesives.
- C. Mix Design: Submit proposed concrete mix design.
 1. Indicate proposed mix design complies with requirements of ACI SPEC-301, Section 4 - Concrete Mixtures.
 2. Indicated amounts of mixing water to be withheld for later addition at Project Site.
- D. Material Test Reports: For the following, from a qualified testing agency:
 1. Aggregates: Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.
- E. Test Reports: Submit report for each test or series of tests specified.
- F. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
 1. Location of construction joints is subject to approval of the Structural Engineer.
- G. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

- H. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.
- I. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Perform work of this section in accordance with ACI SPEC-301 and ACI CODE-318.
- D. Follow recommendations of ACI 207.1R when placing Mass Concrete.
- E. Follow recommendations of ACI PRC-305 when concreting during hot weather.
- F. Follow recommendations of ACI PRC-306 when concreting during cold weather.
- G. For slabs required to include moisture vapor reducing admixture (MVRA), do not proceed with placement unless manufacturer's representative is present for every day of placement.

1.7 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Slabs with Porosity Inhibiting Admixture (PIA) or Moisture Vapor Reducing Admixture (MVRA): Provide warranty to cover cost of flooring failures due to moisture migration from slabs for life of the concrete.

1. Include cost of repair or removal of failed flooring, placement of topical moisture remediation system, and replacement of flooring with comparable flooring system.
2. Provide warranty by admixture manufacturer matching terms of flooring adhesive or primer manufacturer's material defect warranty.

1.8 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Concrete Subcontractor.
 - e. Special Inspection and Testing Agency
 - f. Special concrete finish Subcontractor.
 - g. Structural Engineer
2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semirigid joint fillers, forms and form removal limitations, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, methods for achieving specified floor and slab flatness and levelness concrete repair procedures, and concrete protection.

1.9 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 - 1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301 (ACI 301M).
 - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and as follows:
 - 1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 PRODUCTS

2.1 FORMWORK

- A. Comply with requirements of Section 031000.

2.2 REINFORCEMENT MATERIALS

- A. Comply with requirements of Section 032000.

2.3 CONCRETE MATERIALS

- A. Cement: ASTM C150/C150M, Type I - Normal Portland type.

1. Acquire cement for entire project from same source.
- B. Fine and Coarse Normal-Weight Aggregates: ASTM C33/C33M.
 1. Acquire aggregates for entire project from same source.
 2. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
 3. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Lightweight Aggregate: ASTM C330/C330M.
- D. Fly Ash: ASTM C618, Class F.
- E. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.

2.4 ADMIXTURES

- A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.
- B. Air Entrainment Admixture: ASTM C260/C260M.
- C. High Range Water Reducing and Retarding Admixture: ASTM C494/C494M Type G.
- D. High Range Water Reducing Admixture: ASTM C494/C494M Type F.
- E. Water Reducing and Accelerating Admixture: ASTM C494/C494M Type E.
- F. Water Reducing and Retarding Admixture: ASTM C494/C494M Type D.
- G. Accelerating Admixture: ASTM C494/C494M Type C.
- H. Retarding Admixture: ASTM C494/C494M Type B.
- I. Water Reducing Admixture: ASTM C494/C494M Type A.

2.5 ACCESSORY MATERIALS

- A. Underslab Vapor Retarder: Multi-layer, fabric-, cord-, grid-, or aluminum-reinforced polyethylene or equivalent, complying with ASTM E1745 Class A; stated by

manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs. The use of single ply polyethylene is prohibited.

1. Sheet Material: ASTM E1745, Class A; stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs. Single-ply polyethylene is prohibited.
 2. Installation: Comply with ASTM E1643.
 - a. Single layer, 15 mil minimum.
 3. Accessory Products: Vapor retarder manufacturer's recommended tape, adhesive, mastic, prefabricated boots, etc., for sealing seams and penetrations.
 4. Products:
 - a. Stego Industries, LLC: www.stegoindustries.com/#sle.
 - b. W. R. Meadows, Inc; PERMINATOR Class A - 15 mils (0.38 mm): www.wrmeadows.com/#sle.
- B. Non-Shrink Cementitious Grout: Premixed compound consisting of nonmetallic aggregate, cement, water reducing and plasticizing agents.
1. Grout: Comply with ASTM C1107/C1107M.
 2. Minimum Compressive Strength at 28 Days, ASTM C109/C109M: 7,000 pounds per square inch.
 3. Products containing aluminum powder are not permitted.
 4. Flowable Products:
 - a. Five Star Products, Inc; Five Star Fluid Grout 100: www.fivestarproducts.com/#sle.
 - b. W. R. Meadows, Inc; CG-86: www.wrmeadows.com/#sle.
 - c. Substitutions: See Section 016000 - Product Requirements.

2.6 BONDING AND JOINTING PRODUCTS

A. Epoxy Bonding System:

1. Complying with ASTM C881/C881M and of Type required for specific application.

B. Waterstops: Self-expanding rubber strip or butyl strip; swells to 1000 percent of original size in clean water. Size 3/4 by 1 inch, minimum.

C. Slab Isolation Joint Filler: 1/2-inch thick, height equal to slab thickness, with removable top section forming 1/2-inch deep sealant pocket after removal.

1. Material: ASTM D1751, cellulose fiber.

D. Slab Construction Joint Devices: Combination keyed joint form and screed, galvanized steel, with rectangular or round knockout holes for conduit or rebar to pass through joint form at 6 inches on center; ribbed steel stakes for setting.

2.7 CURING MATERIALS

A. Evaporation Reducer: Liquid thin-film-forming compound that reduces rapid moisture loss caused by high temperature, low humidity, and high winds; intended for application immediately after concrete placement.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Sheet: ASTM C171.

1. Polyethylene film, white opaque, minimum nominal thickness of 4 mil, 0.004 inch.
2. White-burlap-polyethylene sheet, weighing not less than 3.8 ounces per square yard.

D. Water: Potable, not detrimental to concrete.

2.8 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI PRC-211.1 recommendations.

- B. Proportioning Structural Lightweight Concrete: Comply with ACI 211.2 recommendations.
- C. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI SPEC-301.
 - 1. For trial mixtures method, employ independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.
- D. Admixtures: Add acceptable admixtures as recommended in ACI PRC-211.1 and at rates recommended or required by manufacturer.
- E. Normal Weight Concrete:
 - 1. Exterior Slab-on-Grade, Foundations Walls, and Piers:
 - a. Minimum Compressive Strength: 4500 psi at 28 days.
 - b. Maximum W/C Ratio: 0.45.
 - c. Total Air Content: 6 percent, plus or minus 1.5 percent. Do not allow air content of trowel-finished floors to exceed 3 percent.
 - d. Slump Limit: 4 inches, 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
 - 2. Interior Slab-on-Grade and Footings:
 - a. Minimum Compressive Strength: 4000 psi at 28 days.
 - b. Maximum W/C Ratio: 0.50.
 - c. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
 - d. Slump Limit: 4 inches, 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
 - 3. Fly Ash Content: Maximum 25 percent of cementitious materials by weight.

4. Maximum Aggregate Size: 3/4 inch.

F. Structural Lightweight Concrete:

1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 4,000 pounds per square inch.
2. Maximum Water-Cement Ratio: 0.50.
3. Total Air Content: 5 percent, determined in accordance with ASTM C173/C173M.
4. Maximum Slump: 3 inches.
5. Maximum Aggregate Size: 5/8 inch.
6. Maximum dry unit weight: 115 pound per cubic foot.
7. Maximum wet unit weight: 125 pounds per cubic foot.

2.9 MIXING

- A. Transit Mixers: Comply with ASTM C94/C94M.
- B. Adding Water: If concrete arrives on-site with slump less than suitable for placement, do not add water that exceeds the maximum water-cement ratio or exceeds the maximum permissible slump.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.2 PREPARATION

- A. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning and applying bonding agent in according to bonding agent manufacturer's instructions.
 1. Use epoxy bonding system for bonding to damp surfaces, for structural load-bearing applications, and where curing under humid conditions is required.

- B. Where new concrete with integral waterproofing is to be bonded to previously placed concrete, prepare surfaces to be treated in accordance with waterproofing manufacturer's instructions. Saturate cold joint surface with clean water, and remove excess water before application of coat of waterproofing admixture slurry. Apply slurry coat uniformly with semi-stiff bristle brush at rate recommended by waterproofing manufacturer.
- C. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.
- D. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade. Comply with ASTM E1643. Lap joints minimum 6 inches. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions. Repair damaged vapor retarder before covering.
 - 1. Vapor Retarder Over Granular Fill: Install compactible granular fill before placing vapor retarder as indicated on drawings. Do not use sand.

3.3 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

- A. Comply with requirements of ACI SPEC-301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.
- B. Install welded wire reinforcement in maximum possible lengths, and offset end laps in both directions. Splice laps with tie wire.
- C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

3.4 PLACING CONCRETE

- A. Place concrete in accordance with ACI PRC-304.
- B. Place concrete for floor slabs in accordance with ACI PRC-302.1.
- C. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

- D. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.
- E. Place concrete continuously without construction (cold) joints wherever possible; where construction joints are necessary, before next placement prepare joint surface by removing laitance and exposing the sand and sound surface mortar, by sandblasting or high-pressure water jetting.
- F. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.5 SLAB JOINTING

- A. Locate joints as indicated on drawings.
- B. Anchor joint fillers and devices to prevent movement during concrete placement.
- C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.
 - 1. Install wherever necessary to separate slab from other building members, including columns, walls, equipment foundations, footings, stairs, manholes, sumps, and drains.
- D. Saw Cut Contraction/Control Joints: Saw cut joints before concrete begins to cool, within 4 to 12 hours after placing; use 3/16 inch thick blade and cut at least 1 inch deep but not less than one quarter (1/4) the depth of the slab.
- E. Construction Joints: Where not otherwise indicated, use metal combination screed and key form, with removable top section for joint sealant.

3.6 FLOOR FLATNESS AND LEVELNESS TOLERANCES

- A. An independent testing agency, as specified in Section 014000, will inspect finished slabs for compliance with specified tolerances.
- B. Minimum F(F) Floor Flatness and F(L) Floor Levelness Values:
 - 1. Exposed to View and Foot Traffic: F(F) of 20; F(L) of 15, on-grade only.

2. Under Thick-Bed Tile: F(F) of 20; F(L) of 15, on-grade only.
 3. Under Carpeting: F(F) of 25; F(L) of 20, on-grade only.
 4. Under Thin Resilient Flooring and Thinset Tile: F(F) of 35; F(L) of 25, on-grade only.
- C. Measure F(F) Floor Flatness and F(L) Floor Levelness in accordance with ASTM E1155 (ASTM E1155M), within 48 hours after slab installation; report both composite overall values and local values for each measured section.
- D. Correct the slab surface if composite overall value is less than specified and if local value is less than two-thirds of specified value or less than F(F) 13/F(L) 10.
- E. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.7 CONCRETE FINISHING

- A. Repair surface defects, including tie holes, immediately after removing formwork.
- B. Unexposed Form Finish: Comply with requirements listed in ACI 301 and 117.
- C. Exposed Form Finish: Comply with requirements listed in ACI 301 and 117.
1. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, not more than 24 hours after form removal.
- D. Concrete Slabs: Finish to requirements of ACI PRC-302.1 and as follows:
1. Surfaces to Receive Thick Floor Coverings: "Wood float" as described in {\rs\#1}; thick floor coverings include quarry tile and ceramic tile with full bed setting system.
 2. Surfaces to Receive Thin Floor Coverings: "Steel trowel" as described in {\rs\#1}; thin floor coverings include carpeting, resilient flooring, seamless flooring, thin set quarry tile, and thin set ceramic tile.

3. Other Surfaces to Be Left Exposed: Trowel as described in ACI PRC-302.1, minimizing burnish marks and other appearance defects.
- E. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains as indicated on drawings.

3.8 CURING AND PROTECTION

- A. Comply with requirements of ACI PRC-308. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
 1. Normal concrete: Not less than seven days.
 2. High early strength concrete: Not less than four days.
- C. Formed Surfaces: Cure by moist curing with forms in place for full curing period.
- D. Surfaces Not in Contact with Forms:
 1. Slabs and Floors To Receive Adhesive-Applied Flooring: Curing compounds and other surface coatings are usually considered unacceptable by flooring and adhesive manufacturers. If such materials must be used, either obtain the approval of the flooring and adhesive manufacturers prior to use or remove the surface coating after curing to flooring manufacturer's satisfaction.
 2. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
 - a. Saturated Burlap: Saturate burlap-polyethylene and place burlap-side down over floor slab areas, lapping ends and sides; maintain in place.
 3. Final Curing: Begin after initial curing but before surface is dry.
 - a. Moisture-Retaining Sheet: Lap strips not less than 3 inches and seal with waterproof tape or adhesive; secure at edges.

3.9 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 014000 - Quality Requirements.
- B. Provide free access to concrete operations at project site and cooperate with appointed firm.
- C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.
- D. Tests of concrete and concrete materials may be performed at any time to ensure compliance with specified requirements.
- E. Compressive Strength Tests: ASTM C39/C39M, for each test, mold and cure Five concrete test cylinders. Obtain test samples for every 100 cubic yards or less of each class of concrete placed per day.
- F. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
- G. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

3.10 DEFECTIVE CONCRETE

- A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.
- B. Defective Concrete: Concrete not complying with required lines, details, dimensions, tolerances or specified requirements.
- C. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.
- D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.

3.11 PROTECTION

- A. Do not permit traffic over unprotected concrete floor surface until fully cured.

END OF SECTION 033000

SECTION 033543 - POLISHED CONCRETE

PART 1 GENERAL

1.1 Section Includes

- A. Polished concrete system.
- B. Surface treatments for concrete floors and slabs.
- C. Densifiers and hardeners.
- D. Coatings.

1.2 Reference Standards

- A. ANSI/NFSI B101.1 - Test Method for Measuring the Wet SCOF of Hard-Surface Walkways; 2022.
- B. ANSI/NFSI B101.3 - Test Method for Measuring the Wet DCOF of Hard Surface Walkways; 2020.
- C. ASTM C1353/C1353M - Standard Test Method for Abrasion Resistance of Dimension Stone Subjected to Foot Traffic Using a Rotary Platform Abraser; 2020, with Editorial Revision.
- D. ASTM D1308 - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Coating Systems; 2020.
- E. ASTM D4541 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers; 2022.
- F. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2024a.
- G. ASTM G154 - Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials; 2023.

1.3 Administrative Requirements

- A. Coordinate work of this section with concrete floor placement and concrete floor curing.
- B. Preinstallation Meeting: Conduct a preinstallation meeting 10 days prior to start of work of this section.
 - 1. Items for Review:

- a. Physical requirements of completed concrete slab and slab finish.
 - b. Protection of surfaces not scheduled for finish application.
 - c. Surface preparation.
 - d. Application procedure and quality control.
 - e. Cleaning and protection of finish.
 - f. Coordination with other work.
2. Require attendance of parties directly affecting work of this section, including:
 - a. Finish installer.
 - b. Contractor's representative.
 - c. Architect.
 - d. Owner's representative.

1.4 Submittals

- A. Product Data: Manufacturer's published data and installation instructions for concrete polishing system and finishing products, including manufacturer's installation instructions, information on compatibility of different products, and limitations.
- B. Product Data: Submit certification that products comply with regulations controlling use of volatile organic compounds.
- C. Installer's qualification statement.
- D. Executed warranty.

1.5 Quality Assurance

- A. Comply with national, state, and local VOC regulations.
- B. Installer Qualifications:
 1. Company specializing in installing products specified in this section, having completed minimum of five projects of similar size and complexity.
 2. Company is listed applicator of concrete finishes, having completed manufacturer's training program.

1.6 Delivery, Storage, and Handling

- A. Deliver materials in manufacturer's sealed packaging, including application instructions.
- B. Store materials per manufacturer's product data sheets:
 1. Store containers upright in cool, dry, well-ventilated place, out of the sun, at temperature between 40 degrees F and 100 degrees F.
 2. Store away from other chemicals and potential sources of contamination.
 3. Keep containers tightly closed when not in use.

1.7 Field Conditions

A. Ambient Conditions:

1. Apply treatments and coatings when surface and air temperature is between 40 degrees F and 95 degrees F.
2. Apply treatments and coatings when surface and air temperature is expected to remain above 40 degrees F for a minimum of eight hours after application.
3. Maintain ambient temperature of 50 degrees F minimum.
4. Apply treatments and coatings during calm wind conditions; provide adequate ventilation of enclosed or confined area.
5. Apply treatments and coatings minimum 24 hours after rain exposure; suspend application when rain is anticipated within 8 hours of application.
6. Do not apply to frozen substrate.

PART 2 PRODUCTS

2.1 Polished Concrete System

A. Polished Concrete System: Materials, equipment, and procedures designed and furnished by a single manufacturer to produce dense polished concrete of the specified sheen.

1. Manufacturer: PROSOCO, Inc; Consolideck Polished Concrete System: www.prosoco.com/consolideck/#sle.

2.2 Densifiers and Hardeners

A. Liquid Densifier and Hardener: Penetrating chemical compound, reacts with concrete, filling pores, hardening, and dustproofing.

1. Composition: Lithium silicate.
2. VOC Content: 50 g/L or less.
3. Abrasion Resistance: Greater than 50 percent improvement compared to untreated sample in accordance with ASTM C1353/C1353M.
4. Treated Material Slip Resistance: High traction range when tested according to ANSI/NFSI B101.1 and ANSI/NFSI B101.3.
5. Adhesion: Greater than 10 percent increase in pull-off strength compared to untreated sample when tested according to ASTM D4541.
6. Water Vapor Transmission: Zero perms compared to untreated sample when tested according to ASTM E96/E96M Method B.
7. UV Stability: No degradation or yellowing when tested in accordance with ASTM G154.
8. Product: PROSOCO, Inc; Consolideck LS: www.prosoco.com/consolideck/#sle.

2.3 Coatings

- A. Coatings, General:
 - 1. Treated Material Slip Resistance: High traction range when tested according to ANSI/NFSI B101.1 and ANSI/NFSI B101.3.
 - 2. Stain Resistance: No adverse effect when tested according to ASTM D1308.
 - 3. UV Stability: No degradation or yellowing when tested according to ASTM G154.
- B. Clear Coating:
 - 1. Medium Gloss: Film forming protective treatment.
 - a. Product: PROSOCO, Inc; Consolideck PolishGuard:
www.prosoco.com/consolideck/#sle.
- C. Penetrating Sealer:
 - 1. Low Gloss: Solvent-based penetrating clear protective treatment.
 - a. VOC Content: 100 g/L or less.
 - b. Product: PROSOCO, Inc; Consolideck Concrete Protector SB:
www.prosoco.com/consolideck/#sle.

PART 3 EXECUTION

3.1 Installers

- A. Execute using manufacturer-approved installer.

3.2 Examination

- A. Verify that floor surfaces are clean and free of previous coatings, sealers, curing compounds, water repellents, laitance, efflorescence, fats, oils, grease, wax, soluble salts, residues from cleaning agents, and other impediments to adhesion.
- B. Verify that flaws in concrete have been patched and joints filled with methods and materials suitable for further finishes and allow complete curing before application of concrete hardener and densifier. See Section 079200.

3.3 General

- A. Apply materials in accordance with manufacturer's instructions.

3.4 Preparation

- A. Protect adjacent non-coated areas from drips, overflow, and overspray; avoid contact with metal, glass, and painted surfaces; immediately remove excess material.

3.5 Concrete Polishing

- A. Grind and polish in multiple passes with each full pass in direction perpendicular to previous pass.
- B. Fill gaps, voids, and pop-outs during grinding operation.
- C. Apply densifier and hardener at specified rates and intervals.
- D. Final Polished Concrete Aggregate Exposure: Not to exceed CPC Class A - Cement Fines; cement fines, 85 to 95 percent; fine aggregates, 5 to 15 percent based on visual observation of overall area of polished floor versus Polished Concrete Aggregate Exposure Chart.
- E. Final Polished Concrete Appearance: CPC Level 2 - Satin, image clarity value 10 to 39 percent with haze index less than 10.

3.6 Protective Treatment

- A. Apply coatings in accordance with manufacturer's instructions. Match approved mock-ups for color, texture, sealing, and workmanship.
- B. Apply manufacturer's recommended protective treatment material to clean, dry slab after mechanically polishing.
 - 1. Medium gloss protective treatment:
- C. Clean spills on slab surfaces immediately, with manufacturer's recommended chemicals and absorptive materials.
- D. No haze, white residue, streaking, or burnish marks permitted.

3.7 Protection

- A. Do not permit traffic over unprotected concrete floor surface until fully cured.

END OF SECTION 033543

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SECTION 042000 - UNIT MASONRY

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Brick.
 - 2. Concrete masonry units.
 - 3. Decorative concrete masonry units, Ground Face.
 - 4. Mortar and grout.
 - 5. Steel reinforcing bars.
 - 6. Masonry-joint reinforcement.
 - 7. Ties and anchors.
 - 8. Embedded flashing.
 - 9. Miscellaneous masonry accessories.
 - 10. Graffiti Repellent Coating.
 - a. Interior and Exterior Locations. Refer to drawings for locations.
- B. Products Installed but not Furnished under This Section:
 - 1. Steel lintels in unit masonry.
 - 2. Steel shelf angles for supporting unit masonry.
 - 3. Cavity wall insulation.

1.3 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).
- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- B. Shop Drawings: For the following:
 - 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
 - 2. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315. Show elevations of reinforced walls.
 - 3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
- C. Samples for Initial Selection:
 - 1. Decorative CMUs, in the form of small-scale units.
 - 2. Brick: Infills are to match existing adjacent brick. Contractor to provide brick for Architect to review in the field.
 - 3. Colored mortar.
 - 4. Weep holes/cavity vents.
- D. Samples for Verification: For each type and color of the following:
 - 1. Accessories embedded in masonry.

1.6 INFORMATIONAL SUBMITTALS

- A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.
 - 1. Submittal is for information only. Receipt of list does not constitute approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.
- B. Qualification Data: For testing agency.
- C. Material Certificates: For each type and size of the following:
 - 1. Masonry units.
 - a. Include material test reports substantiating compliance with requirements.
 - 2. Integral water repellent used in CMUs and Mortar.
 - 3. Cementitious materials. Include name of manufacturer, brand name, and type.
 - 4. Mortar admixtures.
 - 5. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
 - 6. Grout mixes. Include description of type and proportions of ingredients.
 - 7. Reinforcing bars.
 - 8. Joint reinforcement.
 - 9. Anchors, ties, and metal accessories.
- D. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91/C 91M for air content.
 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.
- E. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ASCE 6.
- F. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
1. Build mockup as shown on Drawings.
 - a. Include a sealant-filled joint at least 16 inches (400 mm) long in each mockup.
 - b. Include through-wall flashing.
 - c. Metal Stud backup: Include metal studs, sheathing, water-resistive barrier, sheathing joint-and-penetration treatment, veneer anchors, flashing, cavity drainage material, and weep holes in exterior masonry-veneer wall mockup.
 - d. Masonry backup: Include masonry backup, sheathing, water-resistive barrier, sheathing joint-and-penetration treatment, veneer anchors, flashing, cavity drainage material, and weep holes in exterior masonry-veneer wall mockup.
 2. Clean one-half of exposed faces of mockups with masonry cleaner as indicated.
 3. Protect accepted mockups from the elements with weather-resistant membrane.
 4. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.
 - a. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.
 - b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.9 FIELD CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 - 1. Extend cover a minimum of 24 inches (600 mm) down both sides of walls, and hold cover securely in place.
 - 2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches (600 mm) down face next to unconstructed wythe, and hold cover in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.
- E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
- B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

2.2 PERFORMANCE REQUIREMENTS

- A. Provide unit masonry that develops indicated net-area compressive strengths at 28 days.
 1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.

2.3 UNIT MASONRY, GENERAL

- A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.
- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.
- C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.
 1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.4 BRICK UNITS

- A. Face Brick: ASTM C216, Grade SW, Type FBX. Modular size 2 1/4"h x 3 5/8"d x 7 5/8"l.

1. **Brick Veneer BV1:** Basis of Design: Belden Brick, in the following colors and mix percentage:
 - a. #661 Velour Modular, 30 %.
 - b. Greystone Velour Modular, 60 %.
 - c. Sea Grey Velour Modular, 10 %.
2. **Brick Veneer BV2:** Basis of Design: Belden Brick, in the following color:
 - a. Sea Grey Modular.
3. Compressive Strength: Minimum 3000 psi.
4. Initial Rate of Absorption: Less than 30g/30 sq. in. per minute when tested per ASTM C67.
5. Efflorescence: Provide brick that has been tested according to ASTM C67 and is rated 'not effloresced'.
6. Size, Color, Texture and Dimensions: Match adjacent existing brick. Architect to approve samples.

2.5 CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
 2. Provide square-edged units for outside corners unless otherwise indicated.
- B. Integral Water Repellent: Provide units made with integral water repellent for exposed units.
 1. Integral Water Repellent: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested according to ASTM E 514/E 514M as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive, with test period extended to 24 hours, shall show no visible water or leaks on the back of test specimen.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) [ACM Chemistries](#); RainBloc.
 - 2) [BASF Corporation-Construction Systems](#); Rheopel Plus.
 - 3) [Grace Construction Products; W.R. Grace & Co. -- Conn.](#); Dry-Block.
 2. Locations of Use: All Exterior Locations.
- C. CMUs: ASTM C 90.
 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2800 psi (19.3 MPa) .
 2. Density Classification: Medium weight.
 3. Size (Width): Manufactured to dimensions 3/8 inch (10 mm) less than nominal dimensions. Refer to drawings for sizes.

4. Exposed Faces: Provide color and texture matching the range represented by Architect's sample.
- D. Decorative CMUs: ASTM C 90. Ground Face CMU.
 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2800 psi (19.3 MPa).
 2. Density Classification: Lightweight.
 3. Size (Width): 4 inch and 8 inch. Refer to drawings for locations.
 4. Size (hxL): 8 inch x 16 inch.
 5. Pattern and Texture:
 - a. Standard pattern, ground-face finish.
 - 1) Westbrook Block - Color 131.

2.6 MORTAR AND GROUT MATERIALS

- A. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- B. Mortar Cement: ASTM C 1329/C 1329M.
 1. Products: Subject to compliance with requirements, provide the following:
 - a. [Lafarge North America Inc.](#); Lafarge Mortar Cement.
- C. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979/C 979M. Use only pigments with a record of satisfactory performance in masonry mortar.
- D. Aggregate for Mortar: ASTM C 144.
 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
 2. For joints less than 1/4 inch (6 mm) thick, use aggregate graded with 100 percent passing the No. 16 (1.18-mm) sieve.
 3. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
- E. Aggregate for Grout: ASTM C 404.
- F. Epoxy Pointing Mortar: ASTM C 395, epoxy-resin-based material formulated for use as pointing mortar for glazed or pre-faced masonry units (and approved for such use by manufacturer of units); in color indicated or, if not otherwise indicated, as selected by Architect from manufacturer's colors.
- G. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:

- a. [Euclid Chemical Company \(The\); an RPM company](#); Accelguard 80.
 - b. [Grace Construction Products; W.R. Grace & Co. -- Conn.](#); Morset.
- H. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs containing integral water repellent from same 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. [ACM Chemistries](#); RainBloc for Mortar.
 - b. [BASF Corporation-Construction Systems](#); Rheopel Mortar Admixture.
 - c. [Grace Construction Products; W.R. Grace & Co. -- Conn.](#); Dry-Block Mortar Admixture.
 2. Locations of Use: All exterior locations.
- I. Water: Potable.

2.7 REINFORCEMENT

- A. Uncoated-Steel Reinforcing Bars: ASTM A 615/A 615, Grade 60.
- B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch (3.77-mm) steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.
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. [Dur-O-Wal; a Hohmann & Barnard company](#); D/A 810, D/A 812 or D/A 817.
 - b. [Heckmann Building Products, Inc.](#); No. 376 Rebar Positioner.
 - c. [Hohmann & Barnard, Inc.](#); #RB or #RB-Twin Rebar Positioner.
- C. Masonry-Joint Reinforcement, General: ASTM A 951/A 951M.
1. Interior Walls: Mill- galvanized carbon steel.
 2. Exterior Walls: Hot-dip galvanized carbon steel.
 3. Wire Size for Side Rods: 0.148-inch (3.77-mm) diameter.
 4. Wire Size for Cross Rods: 0.148-inch (3.77-mm) diameter.
 5. Wire Size for Veneer Ties: 0.148-inch (3.77-mm) diameter.
 6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches (407 mm) o.c.
 7. Provide in lengths of not less than 10 feet (3 m), with prefabricated corner and tee units.
- D. Masonry-Joint Reinforcement for Single-Wythe Masonry: Ladder type with single pair of side rods.
- E. Masonry-Joint Reinforcement for Multiwythe Masonry:

1. Adjustable (two-piece) type, ladder design, with one side rod at each face shell of backing wythe and with separate adjustable ties with pintle-and-eye connections having a maximum horizontal play of 1/16 inch (1.5 mm) and maximum vertical adjustment of 1-1/4 inches (32 mm). Size ties to extend at least halfway through facing wythe but with at least 5/8-inch (16-mm) cover on outside face. Ties have hooks or clips to engage a continuous horizontal wire in the facing wythe.
- F. Masonry-Joint Reinforcement for Veneers Anchored with Seismic Masonry-Veneer Anchors: Single 0.187-inch- (4.76-mm-) diameter, hot-dip galvanized carbon-steel continuous wire.

2.8 TIES AND ANCHORS

- A. General: Ties and anchors shall extend at least 1-1/2 inches (38 mm) into veneer but with at least a 5/8-inch (16-mm) cover on outside face.
- B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
 1. Hot-Dip Galvanized, Carbon Steel Wire: ASTM A 82/A 82M, with ASTM A 153/A 153M, Class B-2 coating.
- C. Corrugated-Metal Ties: Not allowed.
- D. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
 1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch- (6.35-mm-) diameter, hot-dip galvanized steel wire. Mill-galvanized wire may be used at interior walls unless otherwise indicated.
 2. Tie Section: Triangular-shaped wire tie made from 0.187-inch- (4.76-mm-) diameter, hot-dip galvanized steel wire. Mill-galvanized wire may be used at interior walls unless otherwise indicated.
- E. Partition Top Anchors: 0.105-inch- (2.66-mm-) thick metal plate with a 3/8-inch- (9.5-mm-) diameter metal rod 6 inches (152 mm) long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.
 1. Provide Top Anchors at all locations where new CMU partitions end at the underside of roof deck or at the underside for structure.
- F. Rigid Anchors: Fabricate from steel bars 1-1/2 inches (38 mm) wide by 1/4 inch (6.35 mm) thick by 24 inches (610 mm) long, with ends turned up 2 inches (51 mm) or with cross pins unless otherwise indicated.
 1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M.
- G. Adjustable Masonry-Veneer Anchors:

1. General: Provide anchors that allow vertical adjustment but resist a 100-lbf (445-N) load in both tension and compression perpendicular to plane of wall without deforming or developing play in excess of 1/16 inch (1.5 mm).
2. Fabricate sheet metal anchor sections and other sheet metal parts from 0.075-inch- (1.90-mm-) thick steel sheet, galvanized after fabrication.
3. Fabricate wire ties from 0.187-inch- (4.76-mm-) diameter, hot-dip galvanized-steel wire unless otherwise indicated.
4. Screw-Attached, Masonry-Veneer Anchors: Wire tie and a sheet metal anchor section, 1-1/4 inches (32 mm) wide by 9 inches (229 mm) long, with screw holes top and bottom and with raised rib-stiffened strap, 5/8 inch (16 mm) wide by 5-1/2 inches (140 mm) long, stamped into center to provide a slot between strap and base for inserting wire tie.
 - a. Basis-of-Design Product: Subject to compliance with requirements, provide [Hohmann & Barnard, Inc](#); DW-10.
 - b. Uses: Use in locations without rigid insulation.
5. Screw-Attached, Masonry-Veneer Anchors: Wire tie and a gasketed sheet metal anchor section, 1-1/4 inches (32 mm) wide by 6 inches (152 mm) long, with screw holes top and bottom; top and bottom ends bent to form pronged legs of length to match thickness of insulation or sheathing; and raised rib-stiffened strap, 5/8 inch (16 mm) wide by 6 inches (152 mm) long, stamped into center to provide a slot between strap and base for inserting wire tie. Self-adhering, modified bituminous gasket fits behind anchor plate and extends beyond pronged legs.
 - a. Basis-of-Design Product: Subject to compliance with requirements, provide [Hohmann & Barnard, Inc](#) or comparable pro; X-SEAL Anchor.
6. Polymer-Coated, Steel Drill Screws for Steel Studs: ASTM C 954 except manufactured with hex washer head and neoprene or EPDM washer, No. 10 (4.83-mm) diameter by length required to penetrate steel stud flange with not less than three exposed threads, and with organic polymer coating with salt-spray resistance to red rust of more than 800 hours according to ASTM B 117.

2.9 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:
 1. Stainless Steel: ASTM A 240/A 240M or ASTM A 666, Type 304, 0.016 inch (0.40 mm) thick.
 2. Fabricate continuous flashings in sections 96 inches (2400 mm) long minimum, but not exceeding 12 feet (3.7 m). Provide splice plates at joints of formed, smooth metal flashing.
 3. Fabricate metal drip edges from stainless steel. Extend at least 3 inches (76 mm) into wall and 1/2 inch (13 mm) out from wall, with outer edge bent down 30 degrees and hemmed.
 4. Solder metal items at corners.

- B. Flexible Flashing: Use the following unless otherwise indicated:
 - 1. Stainless Steel Fabric: 304 stainless steel sheet bonded to polymeric fabric with adhesive backing. Use only where flashing is fully concealed in masonry.
 - a. Basis-of-Design Product: Subject to compliance with requirements, provide Hohmann & Barnard, Inc.; Mighty Flash SA.
- C. Solder and Sealants for Sheet Metal Flashings:
 - 1. Solder for Stainless Steel: ASTM B 32, Grade Sn96, with acid flux of type recommended by stainless-steel sheet manufacturer.
 - 2. Elastomeric Sealant: ASTM C 920, chemically curing silicone sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and remain watertight.
- D. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.
- E. Termination Bars for Flexible Flashing, Concealed within Cavity Wall: Stainless steel bars 0.075 inch by 1 inch (1.90 mm by 25 mm).

2.10 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene or urethane or PVC.
- B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt felt).
- D. Weep/Cavity Vent Products: Use the following unless otherwise indicated:
 - 1. Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, full height and width of head joint and depth 1/8 inch (3 mm) less than depth of outer wythe; in color selected from manufacturer's standard.
 - a. Basis-of-Design Product: Subject to compliance with requirements, provide Hohmann & Barnard Inc; QV - Quadro-Vent. Color to be selected by the Architect.
- E. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide [Mortar Net USA, Ltd](#) ; Mortar Net.

2. Configuration: Provide one of the following:
 - a. Strips, full depth of cavity and 10 inches (250 mm) high, with dovetail-shaped notches 7 inches (175 mm) deep that prevent clogging with mortar droppings.

2.11 GRAFFITI REPELLENT COATING

- A. Topical Coating: Water and Graffiti Repellent, coating when applied will not alter color or appearance of masonry or stone.
- B. Basis of Design: Prosoco Sure Klean; Blok-Guard & Graffiti Control 9.
- C. **Locations of Use:**
 1. **All surfaces of exposed Decorative CMU within 8 feet above grade, sidewalks, and landings.**
 2. **Interior CMU locations as indicated.**
 3. **All surfaces of brick veneer within 8 feet above grade, sidewalks, and landings.**
 4. **All cast stone surfaces.**
- D. Install coating after masonry and cast stone has been cleaned. Install per manufacturers recommendations.

2.12 MASONRY CLEANERS

- A. Proprietary Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:
 - a. [PROSOCO, Inc](#); Sure Klean® 600.

2.13 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
 1. Do not use calcium chloride in mortar or grout.
 2. Use portland cement-lime mortar unless otherwise indicated.
 3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.
 - 1. For masonry below grade or in contact with earth, use Type M.
 - 2. For reinforced masonry, use Type S.
 - 3. For exterior, above-grade, load-bearing and nonload-bearing walls and parapet walls; for interior load-bearing walls; for interior nonload-bearing partitions; and for other applications where another type is not indicated, use Type S.
- D. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.
 - 1. Mix to match Architect's sample.
 - 2. Application: Use pigmented mortar for exposed mortar joints with the following units:
 - a. Decorative CMUs.
 - b. Locations of Brick infill to matched existing brick and mortar color.
- E. Grout for Unit Masonry: Comply with ASTM C 476.
 - 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
 - 2. Proportion grout in accordance with ASTM C 476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi
 - 3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

- B. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- C. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.

3.3 TOLERANCES

- A. Dimensions and Locations of Elements:
 - 1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch (12 mm) or minus 1/4 inch (6 mm).
 - 2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
 - 3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.
- B. Lines and Levels:
 - 1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2-inch (12-mm) maximum.
 - 2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
 - 3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.
 - 4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
 - 5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.
 - 6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet ((6 mm in 3 m),) or 1/2-inch (12-mm) maximum.
 - 7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch (1.5 mm) except due to warpage of masonry units within tolerances specified for warpage of units.
- C. Joints:
 - 1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).

2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch (3 mm).
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm). Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch (3 mm).
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch (1.5 mm) from one masonry unit to the next.

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern: Match existing.
- C. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- D. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.
- E. Build nonload-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
 1. Install compressible filler in joint between top of partition and underside of structure above.
 2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch (13-mm) clearance between end of anchor rod and end of tube. Space anchors 48 inches (1200 mm) o.c. unless otherwise indicated.
 3. At fire-rated partitions, or smoke stopped partitions, treat joint between top of partition and underside of structure above to comply with Section 078443 "Joint Firestopping."

3.5 MORTAR BEDDING AND JOINTING

- A. Lay CMUs as follows:
 1. Bed face shells in mortar and make head joints of depth equal to bed joints.
 2. Bed webs in mortar in all courses of piers, columns, and pilasters.
 3. Bed webs in mortar in grouted masonry, including starting course on footings.

4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
 5. Fully bed units and fill cells with mortar at anchors and ties as needed to fully embed anchors and ties in mortar.
- B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- D. Cut joints flush where indicated to receive air barriers unless otherwise indicated.

3.6 CAVITY WALLS

- A. Bond wythes of cavity walls together using one of the following methods as indicated:
1. Individual Metal Ties: Provide ties as shown installed in horizontal joints, but not less than one metal tie for 1.77 sq. ft. (0.16 sq. m) of wall area spaced not to exceed 16 inches (406 mm) o.c. horizontally and 16 inches (406 mm) o.c. vertically. Stagger ties in alternate courses. Provide additional ties within 12 inches (305 mm) of openings and space not more than 36 inches (915 mm) apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24 inches (610 mm) o.c. vertically.
 - a. Where bed joints of wythes do not align, use adjustable-type (two-piece-type) ties.
 2. Masonry-Joint Reinforcement: Installed in horizontal mortar joints.
 - a. Where bed joints of wythes do not align, use adjustable-type (two-piece-type) reinforcement with continuous horizontal wire in facing wythe attached to ties.
 3. Masonry-Veneer Anchors: Comply with requirements for anchoring masonry veneers.
- B. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.
- C. Apply vapor barrier to cavity face of backup, or face of sheathing of stud backup, as indicated.
- D. Installing Cavity Wall Insulation: Place small dabs of adhesive, spaced approximately 12 inches (300 mm) o.c. both ways, on inside face of insulation boards, or attach with plastic fasteners designed for this purpose. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.

1. Fill cracks and open gaps in insulation with crack sealer compatible with insulation and masonry.

3.7 ANCHORED MASONRY VENEERS

- A. Anchor masonry veneers to wall framing and concrete backup with masonry-veneer anchors to comply with the following requirements:
 1. Fasten screw-attached anchors through insulation/sheathing to wall framing and to concrete backup with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
 2. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
 3. Space anchors as indicated, but not more than 16 inches (406 mm) o.c. vertically and 25 inches (635 mm) o.c. horizontally, with not less than one anchor for each 2.67 sq. ft. (0.25 sq. m) of wall area. Install additional anchors within 12 inches (305 mm) of openings and at intervals, not exceeding 36 inches (914 mm), around perimeter.
- B. Provide not less than 2 inches (50 mm) of airspace between back of masonry veneer and face of insulation.
 1. Keep airspace clean of mortar droppings and other materials during construction. Bevel beds away from airspace, to minimize mortar protrusions into airspace. Do not attempt to trowel or remove mortar fins protruding into airspace.

3.8 MASONRY-JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).
 1. Space reinforcement not more than 16 inches (406 mm) o.c.
 2. Space reinforcement not more than 8 inches (203 mm) o.c. in foundation walls and parapet walls.
 3. Provide reinforcement not more than 8 inches (203 mm) above and below wall openings and extending 12 inches (305 mm) beyond openings in addition to continuous reinforcement.
- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- D. Provide continuity at corners by using prefabricated L-shaped units.
- E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.9 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

3.10 CONTROL AND EXPANSION JOINTS

- A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
- B. Form control joints in concrete masonry using one of the following methods:
 - 1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout, and rake out joints in exposed faces for application of sealant.
 - 2. Install preformed control-joint gaskets designed to fit standard sash block.
 - 3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar, or rake out joint for application of sealant.
 - 4. Install temporary foam-plastic filler in head joints, and remove filler when unit masonry is complete for application of sealant.
- C. Provide horizontal, pressure-relieving joints by either leaving an airspace or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 079200 "Joint Sealants," but not less than 3/8 inch (10 mm).
 - 1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.11 LINTELS

- A. Install steel lintels where indicated.
- B. Provide minimum bearing of 8 inches (200 mm) at each jamb unless otherwise indicated.

3.12 FLASHING, WEEP HOLES, AND CAVITY VENTS

- A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install cavity vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.
- B. Install flashing as follows unless otherwise indicated:
 - 1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape.

2. At masonry-veneer walls, extend flashing through veneer, across airspace behind veneer, and up face of sheathing at least 8 inches (200 mm); with upper edge tucked under air barrier, lapping at least 4 inches (100 mm). Fasten upper edge of flexible flashing to sheathing through termination bar.
 3. At lintels and shelf angles, extend flashing a minimum of 6 inches (150 mm) into masonry at each end. At heads and sills, extend flashing 6 inches (150 mm) at ends and turn up not less than 2 inches (50 mm) to form end dams.
 4. Interlock end joints of ribbed sheet metal flashing by overlapping ribs not less than 1-1/2 inches (38 mm) or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.
 5. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall, and adhere flexible flashing to top of metal drip edge.
- C. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.
- D. Install weep holes in exterior wythes and veneers in head joints of first course of masonry immediately above embedded flashing.
1. Use specified weep/cavity vent products to form weep holes.
 2. Space weep holes 24 inches (600 mm) o.c. unless otherwise indicated.
- E. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.
- F. Install cavity vents in head joints in exterior wythes at spacing indicated. Use specified weep/cavity vent products to form cavity vents.

3.13 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 60 inches (1520 mm).

3.14 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
- B. Inspections: Special inspections according to Level C in TMS 402/ACI 530/ASCE 5.
 1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
 2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
 3. Place grout only after inspectors have verified proportions of site-prepared grout.
- C. Testing Prior to Construction: One set of tests.
- D. Testing Frequency: One set of tests for each 5000 sq. ft. (464 sq. m) of wall area or portion thereof.
- E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.
- F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.
- G. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content and compressive strength.
- H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

3.15 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
 3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
 5. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

END OF SECTION 042000

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SECTION 042000 - UNIT MASONRY

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Mortar and grout.
- B. Reinforcement and anchorage.

1.2 REFERENCE STANDARDS

- A. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2020.
- B. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2016a.
- C. ASTM C150/C150M - Standard Specification for Portland Cement; 2021.
- D. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a.
- E. ASTM C476 - Standard Specification for Grout for Masonry; 2020.
- F. ASTM C1714/C1714M - Standard Specification for Preblended Dry Mortar Mix for Unit Masonry; 2016.
- G. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2016.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all relevant installers.

1.4 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for masonry units, mortar, and masonry accessories.
- C. Shop Drawings: Provide shop drawings the following:

1. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315. Show elevations of reinforced walls.
- D. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar units, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1
- E. Submit samples for masonry and mortar, illustrating color and texture.
- F. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

- A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.
- B. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.7 FIELD CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 - 1. Extend cover a minimum of 24 inches down both sides of walls, and hold cover securely in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
- D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 PRODUCTS

2.1 UNIT MASONRY, GENERAL

- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed work.
- B. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.

2.2 CONCRETE MASONRY UNITS

- A. Concrete Block: Comply with referenced standards and as follows:
 - 1. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depths as indicated on drawings for specific locations.
 - 2. Load-Bearing Units: ASTM C90, normal weight.

2.3 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C150/C150M, Type I; color as required to produce approved color sample.
- B. Water: Clean and potable.
- C. Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C1714/C1714M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
 - 1. Type: Types as scheduled in this section.
 - 2. Color: Mineral pigments added as required to produce approved color sample.
- D. Packaged Dry Material for Grout for Masonry: Premixed cementitious materials and dried aggregates; capable of producing grout of the specified strength in accordance with ASTM C476 with the addition of water only.

2.4 REINFORCEMENT AND ANCHORAGE

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi), deformed billet bars; uncoated.
- B. Joint Reinforcement: Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere, unless otherwise indicated.

2.5 MORTAR AND GROUT MIXING

- A. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.
 - 1. Masonry below grade and in contact with earth: Type M.
 - 2. Exterior, loadbearing masonry: Type S.
 - 3. Exterior, non-loadbearing masonry: Type S.
 - 4. Interior, loadbearing masonry: Type N.

Colored Mortar: Proportion selected pigments and other ingredients to match Architect's sample, without exceeding manufacturer's recommended pigment-to-cement ratio.

- B. Grout: ASTM C476; consistency required to fill completely volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches.
- C. Admixtures: Add to mixture at manufacturer's recommended rate and in accordance with manufacturer's instructions; mix uniformly.
- D. Mixing: Use mechanical batch mixer and comply with referenced standards.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive masonry.
- B. Verify that related items provided under other sections are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.2 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied for installation under other sections.
- B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.3 COLD AND HOT WEATHER REQUIREMENTS

- A. Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

3.4 COURSING

- A. Establish lines, levels, and coursing indicated. Protect from displacement.

- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Concrete Masonry Units:
 - 1. Bond: Running.
 - 2. Coursing: One unit and one mortar joint to equal 8 inches.
 - 3. Mortar Joints: Concave.

3.5 PLACING AND BONDING

- A. Lay hollow masonry units with face shell bedding on head and bed joints.
- B. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- C. Remove excess mortar and mortar smears as work progresses.
- D. Interlock intersections and external corners.
- E. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- F. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

3.6 BUILT-IN WORK

- A. As work progresses, install built-in metal door frames and anchor bolts and other items to be built into the work and furnished under other sections.
- B. Install built-in items plumb, level, and true to line.
- C. Bed anchors of metal door frames in adjacent mortar joints. Fill frame voids solid with grout.
 - 1. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.
- D. Do not build into masonry construction organic materials that are subject to deterioration.

3.7 TOLERANCES

- A. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.
- B. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.
- C. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- D. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
- E. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.

3.8 CUTTING AND FITTING

- A. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.9 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 014000 - Quality Requirements.

3.10 CLEANING

- A. Remove excess mortar and mortar droppings.
- B. Replace defective mortar. Match adjacent work.
- C. Clean soiled surfaces with cleaning solution.
- D. Use non-metallic tools in cleaning operations.

3.11 PROTECTION

- A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION 042000

CSArch
Project No. 215.2402

Binghamton City School District
2024 Capital Project

SECTION 047200 - CAST STONE MASONRY

PART 1 GENERAL

1.1 Section Includes

- A. Architectural cast stone.
- B. Units required are:
 - 1. Exterior wall units, including sills.

1.2 Reference Standards

- A. ACI CODE-318 - Building Code Requirements for Structural Concrete and Commentary; 2019 (Reapproved 2022).
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- C. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2022.
- D. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement; 2019.
- E. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement; 2025.
- F. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2022.
- G. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2018.
- H. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.
- I. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revision.
- J. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2019, with Editorial Revision (2022).
- K. ASTM C1364 - Standard Specification for Architectural Cast Stone; 2023, with Editorial Revision (2024).

1.3 Submittals

- A. Product Data: Test results of cast stone components made previously by the manufacturer.
- B. Shop Drawings: Include elevations, dimensions, layouts, profiles, cross sections, reinforcement, exposed faces, arrangement of joints, anchoring methods, anchors, and piece numbers.
- C. Mortar Color Selection Samples.
- D. Verification Samples: Pieces of actual cast stone components not less than 6 inches square, illustrating range of color and texture to be anticipated in components furnished for the project.
- E. Manufacturer's Qualification Data: Documentation showing compliance with specified requirements.

1.4 Quality Assurance

- A. Manufacturer Qualifications:
 - 1. A firm with a minimum of 5 years experience producing cast stone of types required for project.
 - 2. Current producer member of the Cast Stone Institute or the Architectural Precast Association.

1.5 Delivery, Storage, and Handling

- A. Deliver cast stone components secured to shipping pallets and protected from damage and discoloration. Protect corners from damage.
- B. Number each piece individually to match shop drawings and schedule.
- C. Store cast stone components and installation materials in accordance with manufacturer's instructions.
- D. Store cast stone components on pallets with nonstaining, waterproof covers. Ventilate under covers to prevent condensation. Prevent contact with dirt.
- E. Protect cast stone components during handling and installation to prevent chipping, cracking, or other damage.
- F. Store mortar materials where contamination can be avoided.
- G. Schedule and coordinate production and delivery of cast stone components with unit masonry work to optimize on-site inventory and to avoid delaying the work.

PART 2 PRODUCTS

2.1 Architectural Cast Stone

- A. Cast Stone: Architectural concrete product manufactured to simulate appearance of natural limestone, complying with ASTM C1364.
 - 1. Compressive Strength: As specified in ASTM C1364; calculate strength of pieces to be field cut at 80 percent of uncut piece.
 - 2. Freeze-Thaw Resistance: Demonstrated by laboratory testing in accordance with ASTM C1364.
 - 3. Surface Texture: Fine grained texture, with no bugholes, air voids, or other surface blemishes visible from distance of 20 feet.
 - 4. Color: Match sample on file at Architect 's office.
 - 5. Remove cement film from exposed surfaces before packaging for shipment.
- B. Shapes: Provide shapes indicated on drawings.
 - 1. Variation from Any Dimension, Including Bow, Camber, and Twist: Maximum of plus/minus 1/8 inch or length divided by 360, whichever is greater, but not more than 1/4 inch.
 - 2. Unless otherwise indicated on drawings, provide:
 - a. Wash or slope of 1:12 on exterior horizontal surfaces.
 - b. Drips on projecting components, wherever possible.
 - c. Raised fillets at back of sills and at ends to be built in.
- C. Reinforcement: Provide reinforcement as required to withstand handling and structural stresses; comply with ACI CODE-318.
 - 1. Pieces More than 24 inches in Any Dimension: Provide full length two-way reinforcement of cross-sectional area not less than 0.25 percent of unit cross-sectional area.

2.2 Materials

- A. Portland Cement: ASTM C150/C150M.
 - 1. For Units: Type I, white or gray as required to match Architect 's sample.
 - 2. For Mortar: Type I or II, except Type III may be used in cold weather.
- B. Coarse Aggregate: ASTM C33/C33M, except for gradation; granite, quartz, or limestone.
- C. Fine Aggregate: ASTM C33/C33M, except for gradation; natural or manufactured sands.
- D. Admixtures: ASTM C494/C494M.
- E. Water: Potable.
- F. Reinforcing Bars: ASTM A615/A615M, Grade 40 (40,000 psi), deformed bars, galvanized.

1. Galvanized in accordance with ASTM A767/A767M, Class I.
- G. Steel Welded Wire Reinforcement: ASTM A1064/A1064M, galvanized or ASTM A884/A884M, epoxy coated.
- H. Embedded Anchors, Dowels, and Inserts: Type 304 stainless steel, of type and size as required for conditions.
- I. Shelf Angles and Similar Structural Items: Hot-dip galvanized steel per ASTM A123/A123M, of shapes and sizes as required for conditions.
- J. Mortar: Portland cement-lime, as specified in Section 040511 ; do not use masonry cement.
- K. Cleaner: General-purpose cleaner designed for removing mortar and grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces; approved for intended use by cast stone manufacturer and by cleaner manufacturer for use on cast stone and adjacent masonry materials.

PART 3 EXECUTION

3.1 Examination

- A. Examine construction to receive cast stone components. Notify Architect if construction is not acceptable.
- B. Do not begin installation until unacceptable conditions have been corrected.

3.2 Installation

- A. Install in accordance with manufacturer's instructions.
- B. Mechanically anchor cast stone units indicated; set remainder in mortar.
- C. Setting:
 1. Drench cast stone components with clear, running water immediately before installation.
 2. Set units in a full bed of mortar unless otherwise indicated.
 3. Fill joints with mortar, rake all joints to 1/2 depth and fill with backer rod and sealant.
 4. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.

3.3 Tolerances

- A. Joints: Make all joints 3/8 inch, except as otherwise detailed.
 1. Rake mortar joints 3/4 inch for pointing.

2. Remove excess mortar from face of stone before pointing joints.
3. Point joints with mortar in layers 3/8 inch thick and tool to a slight concave profile.
4. Leave the following joints open for sealant:
 - a. Head joints in top courses, including copings, parapets, cornices, sills, and steps. Horizontal joints, Sloped joints.
 - b. Joints in projecting units.
 - c. Joints between rigidly anchored units, including soffits, panels, and column covers.

B. Installation Tolerances:

1. Variation from Plumb: Not more than 1/8 inch in 10 feet or 1/4 inch in 20 feet or more.
2. Variation from Level: Not more than 1/8 inch in 10 feet or 1/4 inch in 20 feet, or 3/8 inch maximum.
3. Variation in Joint Width: Not more than 1/8 inch in 36 inches or 1/4 of nominal joint width, whichever is less.
4. Variation in Plane Between Adjacent Surfaces (Lipping): Not more than 1/16 inch difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.

3.4 Repair

- A. Repair chips and other surface damage noticeable when viewed in direct daylight at 20 feet.
- B. Repair with matching touch-up material provided by the manufacturer and in accordance with manufacturer's instructions.
- C. Repair methods and results subject to Architect 's approval.

3.5 Cleaning

- A. Keep cast stone components clean as work progresses.

3.6 Protection

- A. Protect completed work from damage.
- B. Clean, repair, or restore damaged or mortar-splashed work to condition of new work.

END OF SECTION 047200

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SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Structural steel framing members.
- B. Structural steel support members and struts.
- C. Base plates, shear stud connectors and expansion joint plates.
- D. Grouting under base plates.

1.2 RELATED REQUIREMENTS

- A. Section 053100 - Steel Decking: Support framing for small openings in deck.
- B. Section 055000 - Metal Fabrications: Steel fabrications affecting structural steel work.

1.3 REFERENCE STANDARDS

- A. AISC (MAN) - Steel Construction Manual; 2023.
- B. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges; 2022.
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- D. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.
- E. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished; 2018.
- F. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2023.
- G. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts; 2021a.
- H. ASTM A563M - Standard Specification for Carbon and Alloy Steel Nuts (Metric); 2021a.

- I. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel; 2021, with Editorial Revision.
- J. ASTM A992/A992M - Standard Specification for Structural Steel Shapes; 2022.
- K. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2023.
- L. ASTM E164 - Standard Practice for Contact Ultrasonic Testing of Weldments; 2019.
- M. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2023.
- N. ASTM F436/F436M - Standard Specification for Hardened Steel Washers Inch and Metric Dimensions; 2019.
- O. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength; 2020.
- P. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2020.
- Q. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021.
- R. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015, with Errata (2016).
- S. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel AC172; 2019.
- T. RCSC (HSBOLT) - Specification for Structural Joints Using High-Strength Bolts; Research Council on Structural Connections; 2020.
- U. SSPC-SP 3 - Power Tool Cleaning; 2018.

1.4 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
 - 2. Connections not detailed.
 - 3. Indicate cambers and loads.
 - 4. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.
- C. Manufacturer's Mill Certificate: Certify that products meet or exceed specified requirements.
- D. Mill Test Reports: Indicate structural strength, destructive test analysis and non-destructive test analysis.
- E. Fabricator Test Reports: Comply with ASTM A1011/A1011M.
- F. Materials Test Reports: Submit independent test results or engineered performance analysis of structural thermal-break pad performance in bearing or slip-critical connections where shear and moment loads are applied.
- G. Product Test Reports:
 - 1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 - 2. Direct-tension indicators.
 - 3. Tension-control, high-strength, bolt-nut-washer assemblies.
 - 4. Shear stud connectors.
 - 5. Shop primers.
 - 6. Nonshrink grout.

- 7. Post-Installed Anchors
- 8. Thermal break material
- H. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.
- I. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint whether prequalified or qualified by testing, including the following:
 - 1. Power source (constant current or constant voltage).
 - 2. Electrode manufacturer and trade name, for demand critical welds.
- J. Designer's Qualification Statement.
- K. Fabricator's Qualification Statement.

1.5 QUALITY ASSURANCE

- A. Fabricate structural steel members in accordance with AISC (MAN) "Steel Construction Manual."
- B. Fabricator: Company specializing in performing the work of this section with minimum 20 years of documented experience.
- C. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and no more than 12 months before start of scheduled welding work.
 - 1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8/D1.8M. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.
- D. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.

- E. Design connections not detailed on drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Steel Angles and Plates: ASTM A36/A36M.
- B. Steel W Shapes and Tees: ASTM A992/A992M.
- C. Rolled Steel Structural Shapes: ASTM A992/A992M.
- D. Steel Plates and Bars: ASTM A572/A572M, Grade 50 (345) high-strength, columbium-vanadium steel.
- E. Cold-Formed Structural Tubing: ASTM A500/A500M, Grade C.
- F. Pipe: ASTM A53/A53M, Grade B, Finish black.
- G. Shear Stud Connectors: Made from ASTM A108 Grade 1015 bars.
- H. High-Strength Structural Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, with matching compatible ASTM A563 or ASTM A563M nuts and ASTM F436/F436M washers.
- I. Tension Control Bolts: Twist-off type; ASTM F3125/F3125M.
- J. Unheaded Anchor Rods: ASTM F1554, Grade 36, plain, with matching ASTM A563 or ASTM A563M nuts and ASTM F436/F436M Type 1 washers.
- K. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- L. Grout: ASTM C1107/C1107M; Non-shrink; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
 - 1. Minimum Compressive Strength at 48 Hours: 2,000 pounds per square inch.
 - 2. Minimum Compressive Strength at 28 Days: 7,000 pounds per square inch.

- M. Shop and Touch-Up Primer: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.
- N. Touch-Up Primer for Galvanized Surfaces: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.
- O. TNEMEC Aerolon 971 Thermal Break Paint: Apply to steel at all locations where steel framing breaks the plane of the thermal envelope.

2.2 FABRICATION

- A. Shop fabricate to greatest extent possible.
- B. Continuously seal joined members by continuous welds. Grind exposed welds smooth.
- C. Fabricate connections for bolt, nut, and washer connectors.

2.3 FINISH

- A. Prepare structural component surfaces in accordance with SSPC-SP 3, unless noted otherwise as AESS thus requiring more stringent surface preparation.
- B. Shop prime structural steel members. Do not prime surfaces that will be field welded, in contact with concrete, or coated with TNEMEC Aerolon thermal break paint. For surfaces that will be fireproofed, coordinate shop primer requirements with fireproofing product manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that conditions are appropriate for erection of structural steel and that the work may properly proceed.

3.2 ERECTION

- A. Erect structural steel in compliance with AISC 303.
- B. Allow for erection loads and provide sufficient temporary bracing to maintain structure in safe condition, plumb, and in true alignment until completion of erection and installation of permanent bracing.

- C. Field weld components and shear studs indicated on shop drawings.
- D. Use carbon steel bolts only for temporary bracing during construction, unless otherwise specifically permitted on drawings. Install high-strength bolts in accordance with RCSC (HSBOLT) "Specification for Structural Joints Using High-Strength Bolts".
- E. Do not field cut or alter structural members without approval of Architect.
- F. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.
- G. Grout solidly between column plates and bearing surfaces, complying with manufacturer's instructions for nonshrink grout. Trowel grouted surfaces smooth, splaying neatly to 45 degrees.

3.3 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.

3.4 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 014000 - Quality Requirements.
- B. Welded Connections: Visually inspect all field-welded connections per Statement of Special Inspections, and physically test all complete joint penetration groove welds (CJP), using the following:
 - 1. Ultrasonic testing performed in accordance with ASTM E164.

END OF SECTION 051200

CSArch
Project No. 215.2402

Binghamton City School District
2024 Capital Project

1.1 SECTION 052100 - STEEL JOIST FRAMING

PART 1 GENERAL

2.1 SECTION INCLUDES

- A. Open web steel joists, with bridging, attached seats and anchors.

2.2 RELATED REQUIREMENTS

- A. Section 051200 - Structural Steel Framing: Grouting base plates and bearing plates. Superstructure framing.
- B. Section 053100 - Steel Decking: Bearing plates and angles.
- C. Section 055000 - Metal Fabrications: Non-framing steel fabrications attached to joists.
- D. Section 078100 - Applied Fire Protection: Fireproof protection of joist framing and metal deck systems.

2.3 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- B. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished; 2018.
- C. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2014, with Editorial Revision (2017).
- D. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts; 2015.
- E. ASTM A563M - Standard Specification for Carbon and Alloy Steel Nuts (Metric); 2007 (Reapproved 2013).
- F. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2019.

- G. ASTM F436/F436M - Standard Specification for Hardened Steel Washers Inch and Metric Dimensions; 2019.
- H. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2014 (Amended 2015).
- I. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015, with Errata (2016).
- J. FM (AG) - FM Approval Guide; current edition.
- K. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; 2018.
- L. RCSC (HSBOLT) - Specification for Structural Joints Using High-Strength Bolts; Research Council on Structural Connections; 2014, with Errata (2015).
- M. SJI 100 - Catalog of Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders; 2011.
- N. SJI Technical Digest No. 9 - Handling and Erection of Steel Joists and Joist Girders; 2008.
- O. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 2004.
- P. SSPC-SP 2 - Hand Tool Cleaning; 2018.
- Q. SSPC-SP 3 - Power Tool Cleaning; 2018.
- R. UL (DIR) - Online Certifications Directory; Current Edition.

2.4 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate standard designations, joist coding, configurations, sizes, spacings, cambers, locations of joists, joist leg extensions, bridging, connections, and attachments.
- C. Welders' Certificates: Submit manufacturer's certificates, certifying welders employed on the Work, verifying AWS qualification within the previous 12 months.

- D. Designer's Qualification Statement.
- E. Manufacturer's Qualification Statement.
- F. Fabricator's Qualification Statement.
- G. Erector's Qualification Statement.

2.5 QUALITY ASSURANCE

- A. Design connections not detailed on drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.
- B. Perform Work, including that for headers and other supplementary framing, in accordance with SJI 100 Standard Specifications Load Tables and SJI Technical Digest No. 9.
- C. Design and Installation Requirements: Comply with UL Assembly Design No. P710 where indicated on drawings.
- D. Fabricator Qualifications: A qualified steel fabricator that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel in accordance with IAS AC172.
- E. Erector Qualifications: Company specializing in performing the work of this section with minimum 10 years documented experience.

2.6 DELIVERY, STORAGE, AND HANDLING

- A. Transport, handle, store, and protect products to SJI requirements.

PART 2 PRODUCTS

3.1 MANUFACTURERS

- A. Steel Joists:
 - 1. Canam Group Inc
 - 2. Nucor-Vulcraft Group

3. New Millennium Building Systems
4. Substitutions: See Section 016000 - Product Requirements.

3.2 MATERIALS

- A. Open Web Joists: SJI Type K Joists:
 1. Provide bottom chord extensions as indicated.
 2. Minimum End Bearing on Steel Supports: Comply with referenced SJI standard.
 3. Minimum End Bearing on Concrete or Masonry Supports: Comply with referenced SJI standard.
- B. Open Web Joists: SJI Type LH Joists:
 1. Provide bottom chord extensions as indicated.
 2. Minimum End Bearing on Steel Supports: Comply with referenced SJI standards.
- C. High-Strength Structural Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, with matching compatible ASTM A563 or ASTM A563M nuts and ASTM F436/F436M washers.
- D. Structural Steel For Supplementary Framing and Joist Leg Extensions: ASTM A36/A36M.
- E. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- F. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

3.3 FABRICATION

- A. Frame special sized openings in joist web framing as detailed.

3.4 FINISH

- A. Shop prime joists as specified.
 1. Do not prime surfaces that will be fireproofed.

- B. Prepare surfaces to be finished in accordance with SSPC-SP 2.

PART 3 EXECUTION

4.1 EXAMINATION

- A. Verify existing conditions prior to beginning work.

4.2 ERECTION

- A. Erect joists with correct bearing on supports.
- B. Allow for erection loads. Provide sufficient temporary bracing to maintain framing safe, plumb, and in true alignment.
- C. Coordinate the placement of anchors for securing loose bearing members furnished as part of the work of this section.
- D. After joist alignment and installation of framing, field weld joist seats to steel bearing surfaces.
- E. Install supplementary framing for floor and roof openings greater than 18 inches.
- F. Do not permit erection of decking until joists are braced, bridged, and secured or until completion of erection and installation of permanent bridging and bracing.
- G. Do not field cut or alter structural members without approval of joist manufacturer.
- H. After erection, prime welds, damaged shop primer, damaged galvanizing, and surfaces not shop primed , except surfaces specified not to be primed.

4.3 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch.
- B. Maximum Offset From True Alignment: 1/4 inch.

4.4 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 014000 - Quality Requirements.

END OF SECTION 052100

SECTION 053100 - STEEL DECKING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Roof deck.
- B. Composite floor deck.
- C. Supplementary framing for openings up to and including 18 inches.
- D. Bearing plates and angles.

1.2 RELATED REQUIREMENTS

- A. Section 032000 - Concrete Reinforcing.
- B. Section 033000 - Cast-in-Place Concrete: Concrete topping over metal deck.
- C. Section 042000 - Unit Masonry: Placement of anchors for bearing plates embedded in unit masonry assemblies.
- D. Section 051200 - Structural Steel Framing: Support framing for openings larger than 18 inches and shear stud connectors.
- E. Section 051200 - Structural Steel Framing: Placement of embedded steel anchors for bearing plates in cast-in-place concrete.
- F. Section 052100 - Steel Joist Framing: Support framing for openings larger than 18 inches and shear stud connectors.
- G. Section 052100 - Steel Joist Framing: Placement of embedded steel anchors for bearing plates and joist seats in cast-in-place concrete.

1.3 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

- C. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015, with Errata (2016).
- D. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; 2018.
- E. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel AC172; 2019.
- F. ICC-ES AC70 - Acceptance Criteria for Power-Actuated Fasteners Driven into Concrete, Steel and Masonry Elements; 2019, with Editorial Revision (2021).
- G. SDI (DM) - Publication No.30, Design Manual for Composite Decks, Form Decks, and Roof Decks; 2007.
- H. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 2004.
- I. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic); 2019.

1.4 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittals procedures.
- B. Product Data: Provide deck profile characteristics, dimensions, structural properties, and finishes.
- C. Shop Drawings: Indicate deck plan, support locations, projections, openings, reinforcement, pertinent details, and accessories.
- D. Certificates: Certify that products furnished meet or exceed specified requirements.
- E. Submit manufacturer's installation instructions.
- F. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within the previous 12 months.
- G. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified steel fabricator that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel in accordance with IAS AC172.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Cut plastic wrap to encourage ventilation.
- B. Separate sheets and store deck on dry wood sleepers; slope for positive drainage.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Steel Deck:
 - 1. Nucor-Vulcraft Group; ____: www.vulcraft.com/#sle.
 - 2. New Millennium Building Systems: www.newmill.com/.
 - 3. Substitutions: See Section 016000 - Product Requirements.

2.2 STEEL DECK

- A. Roof Deck: Non-composite type, fluted steel sheet:
 - 1. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade 40/275, with G90/Z275 galvanized coating.
 - 2. Primer: Shop coat of manufacturer's standard primer paint over cleaned and phosphatized substrate.
 - 3. Structural Properties: As Indicated.
 - a. Span Design: Multiple.
 - 4. Minimum Base Metal Thickness: 18 gauge, .0474 inch.
 - 5. Nominal Height: 1 1/2 inch.

6. Profile: Fluted, SDI WR
 7. Formed Sheet Width: 36 inch.
 8. Side Joints: Lapped, mechanically fastened.
 9. End Joints: Lapped, welded.
- B. Composite Floor Deck: Fluted steel sheet embossed to interlock with concrete:
1. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade 50/340, Class 1, 2, or 4, with G60/Z180 galvanized coating.
 - a. 50 ksi yield strength.
 2. Structural Properties: As Indicated.
 3. Span Design: Triple.
 4. Minimum Base Metal Thickness: 18 gauge, .0474 inch.
 5. Nominal Height: 2 inches.
 6. Profile: Fluted, SDI WR.
 7. Formed Sheet Width: 36 inch.
 8. Side Joints: Lapped, mechanically fastened.
 9. End Joints: Lapped, welded.

2.3 ACCESSORY MATERIALS

- A. Bearing Plates and Angles: ASTM A36/A36M steel, galvanized per ASTM A123/A123M.
- B. Stud Shear Connectors: Made from ASTM A108 Grade 1015 bars.
- C. Welding Materials: AWS D1.1/D1.1M.
- D. Fasteners: Galvanized hardened steel, self tapping.
- E. Powder Actuated Mechanical Fasteners: Steel; with knurled shank and forged ballistic point. Comply with applicable requirements of ICC-ES AC70.

- F. Mechanical Fasteners: Steel; hex washer head, self-drilling, self-tapping.
 - 1. Design Requirements for Sidelap Connections: Provide number and type of fasteners that comply with the applicable requirements of SDI (DM) design method for roof deck and floor deck applications and ICC-ES AC43.
- G. Weld Washers: Mild steel, uncoated, 3/4 inch outside diameter, 1/8 inch thick.
- H. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- I. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, complying with VOC limitations of authorities having jurisdiction.

2.4 FABRICATED DECK ACCESSORIES

- A. Sheet Metal Deck Accessories: Metal closure strips, wet concrete stops, and cover plates, 22 gauge, 0.0299 inch thick sheet steel; of profile and size as indicated; finished same as deck.
- B. Valley and ridge plates, gauge and location as indicated.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions prior to beginning work.

3.2 INSTALLATION

- A. Erect metal deck in accordance with SDI Design Manual and manufacturer's instructions. Align and level.
- B. On concrete and masonry surfaces provide minimum 4 inch bearing.
- C. All steel deck has been designed to be continuous over three spans minimum, and shall bear at least 1 ½ inches on steel supports. For one or two span conditions, the Contractor shall provide shoring as required, or furnish higher gage deck as required to support all the applicable loads. Contractor shall submit alternate for approval.

Contractor shall ensure that construction loads on steel deck do not exceed SDI published construction load criteria.

- D. At mechanically fastened male/female side laps fasten at 24 inches on center maximum.
- E. Drive mechanical sidelap connectors completely through adjacent lapped sheets; positively engage adjacent sheets with minimum three-thread penetration.
- F. Weld deck in accordance with AWS D1.3/D1.3M.
- G. Locate deck bundles to prevent overloading of supporting members.
- H. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
- I. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- J. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- K. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- L. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- M. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. mechanically fasten to substrate to provide a complete deck installation.
 - 1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.
- N. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

- O. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated.
- P. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.
- Q. At deck openings from 6 inches to 18 inches in size, provide 2 by 2 by 1/4 inch steel angle reinforcement. Place angles perpendicular to flutes; extend minimum two flutes beyond each side of opening and fusion weld to deck at each flute.
- R. At deck openings greater than 18 inches in size, provide steel angle reinforcement. as specified in Section 051200.
- S. Where deck (other than cellular deck electrical raceway) changes direction, install 6 inch minimum wide sheet steel cover plates, of same thickness as deck. Fusion weld 12 inches on center maximum.
- T. At floor edges, install concrete stops upturned to top surface of slab, to contain wet concrete. Provide stops of sufficient strength to remain stationary without distortion.
- U. At openings between deck and walls, columns, and openings, provide sheet steel closures and angle flashings to close openings.
- V. Weld stud shear connectors through steel deck to structural members below.
- W. Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with touch-up primer.

END OF SECTION 053100

CSArch
Project No. 215.2402

Binghamton City School District
2024 Capital Project

SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Formed steel stud exterior wall and interior wall framing.
- B. Formed steel stud soffits, fascias, and ceiling assemblies.

1.2 RELATED REQUIREMENTS

- A. Section 053100 - Steel Decking.

1.3 REFERENCE STANDARDS

- A. AISI S100-12 - North American Specification for the Design of Cold-Formed Steel Structural Members; 2012.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- D. ASTM C955 - Standard Specification for Cold-Formed Steel Structural Framing Members; 2018, with Editorial Revision.
- E. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015, with Errata (2016).
- F. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; 2018.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with work of other sections that is to be installed in or adjacent to the metal framing system, including but not limited to structural anchors, cladding anchors, utilities, insulation, and firestopping.

1.5 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.

- B. Product Data: Provide data on standard framing members; describe materials and finish, product criteria, limitations.
- C. Product Data: Provide manufacturer's data on factory-made framing connectors, showing compliance with requirements.
- D. Shop Drawings: Indicate component details, framed openings, bearing, anchorage, loading, welds, and type and location of fasteners, and accessories or items required of related work.
 - 1. Indicate stud and ceiling joist layout.
 - 2. Describe method for securing studs to tracks and for bolted framing connections.
 - 3. Design data:
 - a. Design Calculations and Shop drawings signed and sealed by a professional structural engineer.
 - 4. Calculations for loadings and stresses of specially fabricated framing, signed and sealed by a professional structural engineer.
 - 5. Details and calculations for factory-made framing connectors, signed and sealed by a professional structural engineer.
- E. Manufacturer's Installation Instructions: Indicate special procedures, conditions requiring special attention .
- F. Designer's Qualification Statement.
- G. Manufacturer's Qualification Statement.
- H. SSMA Manufacturer Qualification: Submit documentation of manufacturer association membership.

1.6 QUALITY ASSURANCE

- A. Designer Qualifications: Design framing system under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.

- B. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, and with minimum three years of documented experience.
- C. Manufacturer Qualifications: Member of Steel Stud Manufacturers Association (SSMA): www.ssma.com/#sle.
- D. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Metal Framing:
 - 1. ClarkDietrich; ____: www.clarkdietrich.com/#sle.
 - 2. Marino; ____: www.marinoware.com/#sle.
 - 3. The Steel Network, Inc; ____: www.SteelNetwork.com/#sle.
 - 4. Substitutions: See Section 016000 - Product Requirements.
- B. Framing Connectors and Accessories:
 - 1. Same manufacturer as metal framing.

2.2 FRAMING SYSTEM

- A. Provide primary and secondary framing members, bridging, bracing, plates, gussets, clips, fittings, reinforcement, and fastenings as required to provide a complete framing system.
- B. Design Requirements: Provide completed framing system having the following characteristics:
 - 1. Design: Calculate structural characteristics of cold-formed steel framing members according to AISI S100-12.

2. Structural Performance: Design, engineer, fabricate, and erect to withstand specified design loads for project conditions within required limits.
3. Design Loads: In accordance with applicable codes.
 - a. Wind Loads: As indicated.
4. Live load deflection meeting the following, unless otherwise indicated:
 - a. Exterior Walls: Maximum horizontal deflection under wind load of 1/240 of span, or 1/600 for walls with brick/stone veneer or EIFS.
 - b. Design non-axial loadbearing framing to accommodate not less than 1 vertical deflection.
5. Able to tolerate movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.
6. Able to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

2.3 FRAMING MATERIALS

- A. Studs and Track: ASTM C955; studs formed to channel, C- or Sigma-shaped with punched web; U-shaped track in matching nominal width and compatible height.
 1. Gauge and Depth: As indicate on drawings, or if not indicated, as required to meet specified performance levels.
 2. Galvanized in accordance with ASTM A653/A653M, G90/Z275 coating.
- B. Jamb Studs: Engineered, C-shaped with wide flanges, designed to replace conventional double-stud framing at openings.
- C. Header: Engineered one-member or two-member assembly, with wide flanges, designed to replace conventional box or nested header framing at openings.
 1. Jamb Mounting Clips: Manufacturer's standard.
- D. Framing Connectors: Factory-made, formed steel sheet.

1. Material: ASTM A653/A653M SS Grade 33 and 40 (minimum), with G90/Z275 hot dipped galvanized coating for base metal thickness less than 10 gauge, 0.1345 inch, and factory punched holes and slots.
2. Structural Performance: Maintain load and movement capacity required by applicable code, when evaluated in accordance with AISI S100-12.
3. Movement Connections: Provide mechanical anchorage devices that accommodate movement using slotted holes, shouldered screws or screws and anti-friction or stepped bushings, while maintaining structural performance of framing. Provide movement connections where indicated on drawings.
 - a. Where continuous studs bypass elevated floor slab, connect stud to slab in manner allowing vertical and horizontal movement of slab without affecting studs; allow for minimum movement of 1 inch.
 - b. Where top of stud wall terminates below structural floor or roof, connect studs to structure in manner allowing vertical and horizontal movement of slab without affecting studs; allow for minimum movement of 1 inch.
 - c. Provide top track with long leg track and head of wall movement connectors; minimum track length of 10 feet.
4. Fixed Connections: Provide non-movement connections for tie-down to foundation, floor-to-floor tie-down, roof-to-wall tie-down, joist hangers, gusset plates, and stiffeners.
5. Wall Stud Bridging Connections: Provide mechanical load-transferring devices that accommodate wind load torsion and weak axis buckling induced by axial compression loads. Provide bridging connections where indicated on the drawings.

2.4 FASTENERS

- A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers: Hot dip galvanized per ASTM A153/A153M.
- B. Anchorage Devices: Powder actuated.

- C. Welding: Comply with AWS D1.1/D1.1M.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.
- B. Verify field measurements and adjust installation as required.

3.2 INSTALLATION OF STUDS

- A. Install components in accordance with manufacturers' instructions and ASTM C1007 requirements.
- B. Align floor and ceiling tracks; locate to wall layout. Secure in place with fasteners at maximum 24 inches on center. Coordinate installation of sealant with floor and ceiling tracks.
- C. Place studs at 16 inches on center; not more than 2 inches from abutting walls and at each side of openings. Connect studs to tracks using clip and tie method.
- D. Construct corners using minimum of three studs. Install double studs at wall openings, door and window jambs.
- E. Coordinate placement of insulation in multiple stud spaces made inaccessible after erection.
- F. Install intermediate studs above and below openings to align with wall stud spacing.
- G. Provide deflection allowance in stud track, directly below horizontal building framing at non-load bearing framing.
- H. Attach cross studs to studs for attachment of fixtures anchored to walls.
- I. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.
- J. Touch-up field welds and damaged galvanized surfaces with primer.

END OF SECTION 054000

SECTION 055000 - METAL FABRICATIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Shop fabricated steel items.

1.2 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- C. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2018.
- D. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- F. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2020.
- G. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2022).
- H. AWS D1.2/D1.2M - Structural Welding Code - Aluminum; 2014, with Errata (2020).
- I. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel AC172; 2019.
- J. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 2004.
- K. SSPC-SP 2 - Hand Tool Cleaning; 2024.

1.3 SUBMITTALS

- A. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
 - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

- B. Designer's Qualification Statement.
- C. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.4 QUALITY ASSURANCE

- A. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and AWS D1.2/D1.2M and dated no more than 12 months before start of scheduled welding work.

PART 2 PRODUCTS

2.1 MATERIALS - STEEL

- A. Steel Sections: ASTM A36/A36M.
- B. Plates: ASTM A283/A283M.
- C. Mechanical Fasteners: Same material as or compatible with materials being fastened; type consistent with design and specified quality level.
- D. Bolts, Nuts, and Washers: ASTM A307, Grade A, plain.
- E. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- F. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

2.2 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- D. Furnish components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.3 FABRICATED ITEMS

- A. Ledge Angles, Shelf Angles, Channels, and Plates Not Attached to Structural Framing: For support of metal decking; prime paint finish.
- B. Lintels: As detailed; prime paint finish.

- C. Elevator Hoistway Divider Beams: Beam sections; prime paint finish.
- D. Slotted Channel Framing: Fabricate channels and fittings from structural steel complying with the referenced standards; factory-applied, rust-inhibiting thermoset acrylic enamel finish.

2.4 FINISHES - STEEL

- A. Prime paint steel items.
 - 1. Exceptions: Galvanize items to be embedded in concrete and items to be embedded in masonry.
- B. Prepare surfaces to be primed in accordance with SSPC-SP2.
- C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- D. Prime Painting: One coat.
- E. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft galvanized coating.
- F. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.
- G. Slotted Channel Framing: ASTM A653/A653M, Grade 33.

2.5 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch.
- C. Maximum Misalignment of Adjacent Members: 1/16 inch.
- D. Maximum Bow: 1/8 inch in 48 inches.
- E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.2 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.

3.3 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Field weld components as indicated on drawings.
- D. Perform field welding in accordance with AWS D1.1/D1.1M.
- E. Obtain approval prior to site cutting or making adjustments not scheduled.
- F. After erection, prime welds, abrasions, and surfaces not shop primed , except surfaces to be in contact with concrete.

3.4 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION 055000

SECTION 055100 - METAL STAIRS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Stairs with concrete treads.
- B. Structural steel stair framing and supports.
- C. Shop primed, field painted.

1.2 REFERENCE STANDARDS

- A. AISC 201 - AISC Certification Program for Structural Steel Fabricators, Standard for Steel Building Structures; 2006.
- B. ASTM A6/A6M - Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling; 2023.
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- D. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
- E. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2018.
- F. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2024.
- G. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2018a.
- H. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2022.
- I. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2020.
- J. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021.

- K. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2022).
- L. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel AC172; 2019.
- M. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 2004.
- N. SSPC-SP 2 - Hand Tool Cleaning; 2024.

1.3 SUBMITTALS

- A. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.
 - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
 - 2. Include the design engineer's seal and signature on each sheet of shop drawings.
- B. Design Data: As required by authorities having jurisdiction.
- C. Design Data, Seismic Performance: Submit documentation that stairs meet performance requirements specified.
- D. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.
- E. Designer's Qualification Statement.
- F. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is certified under AISC 201, or
- G. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.4 QUALITY ASSURANCE

- A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located, or personnel under direct supervision of such an engineer.
- B. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and dated no more than 12 months before start of scheduled welding work.
- C. Fabricator Qualifications:
 - 1. A qualified steel fabricator that is certified by the American Institute for Steel Construction (AISC) under AISC 201, or

2. A qualified steel fabricator that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel in accordance with IAS AC172.

PART 2 PRODUCTS

2.1 METAL STAIRS - GENERAL

- A. Metal Stairs: Provide stairs of the design specified, complete with landing platforms, vertical and horizontal supports, railings, and guards, fabricated accurately for anchorage to each other and to building structure.
 1. Regulatory Requirements: Provide stairs and railings that comply with most stringent requirements of local, state, and federal regulations; where requirements of Contract Documents exceed those of regulations, comply with Contract Documents.
 2. Handrails: Comply with applicable accessibility requirements of ADA Standards.
 3. Structural Design: Provide complete stair and railing assemblies that comply with the applicable local code.
 - a. Stair Capacity: Uniform live load of 100 lb/sq ft and a concentrated load of 300 lb with deflection of stringer or landing framing not to exceed 1/360 of span.
 4. Dimensions: As indicated on drawings.
 5. Shop assemble components; disassemble into largest practical sections suitable for transport and access to site.
 6. No sharp or rough areas on exposed travel surfaces and surfaces accessible to touch.
 7. Separate dissimilar metals using paint or permanent tape.
- B. Metal Jointing and Finish Quality Levels:
 1. Architectural: All joints as inconspicuous as possible, whether welded or mechanical.
 - a. Welded Joints: Continuously welded and ground smooth and flush.
 - b. Exposed Edges and Corners: Eased to small uniform radius.
 - c. Metal Surfaces to be Painted: Sanded or ground smooth, suitable for highest quality gloss finish.
- C. Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.
- D. Anchors and Related Components: Same material and finish as item to be anchored, except where specifically indicated otherwise; provide all anchors and fasteners required.

2.2 METAL STAIRS WITH CONCRETE TREADS

- A. Jointing and Finish Quality Level: Architectural, as defined above.
- B. Risers: Closed.
- C. Treads: Metal pan with field-installed concrete fill.
 - 1. Concrete Depth: 1-1/2 inches, minimum.
 - 2. Tread Pan Material: Steel sheet.
 - 3. Tread Pan Thickness: As required by design; 14 gauge, 0.075 inch minimum.
 - 4. Pan Anchorage to Stringers: Welded to carrier angles welded to stringers.
 - 5. Concrete Reinforcement: Welded wire mesh.
 - 6. Concrete Finish: Steel troweled.
- D. Risers: Same material and thickness as tread pans.
 - 1. Riser/Nosing Profile: Vertical riser with underside of nosing sloped up from bottom of tread pan at not less than 60 degrees from horizontal, with rounded top of nosing of minimum radius.
 - 2. Perforated riser: Basis of Design: McNichols itme no. 1614381641, 1/4" round
 - 3. Nosing Depth: Not more than 1-1/2 inch overhang.
 - 4. Nosing Return: Flush with top of concrete fill, not more than 1/2 inch wide.
- E. Stringers: Rolled steel channels.
 - 1. Stringer Depth: as indicated.
 - 2. End Closure: Sheet steel of same thickness as risers welded across ends.
- F. Landings: Same construction as treads, supported and reinforced as required to achieve design load capacity.
- G. Finish: Shop- or factory-prime painted.
- H. Under Side of Stair: Exposed to view, to be finished same as specified for other exposed to view surfaces.

2.3 MATERIALS

- A. Steel Sections: ASTM A36/A36M.
- B. Steel Plates: ASTM A6/A6M or ASTM A283/A283M.
- C. Ungalvanized Steel Sheet: Hot- or cold-rolled, except use cold-rolled where finished work will be exposed to view.
 - 1. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Designation CS (commercial steel).
 - 2. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Designation CS (commercial steel).
- D. Perforated Plate:

1. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Designation CS (commercial steel).
- E. Concrete Fill: Portland cement Type I, 3000 psi 28 day strength, 2 to 3 inch slump, unless otherwise specified.
- F. Concrete Reinforcement: Mesh type as detailed, galvanized.

2.4 ACCESSORIES

- A. Steel Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, and galvanized to ASTM A153/A153M where connecting galvanized components.
- B. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- C. Shop and Touch-Up Primer: SSPC-Paint 15, and comply with VOC limitations of authorities having jurisdiction.

2.5 SHOP FINISHING

- A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- B. Do not prime surfaces in direct contact with concrete or where field welding is required.
- C. Prime Painting: Use specified shop- and touch-up primer.
 1. Preparation of Steel: In accordance with SSPC-SP 2 Hand Tool Cleaning.
 2. Number of Coats: One.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.2 PREPARATION

- A. When field welding is required, clean and strip primed steel items to bare metal.
- B. Supply items required to be cast into concrete and embedded in masonry with setting templates.

3.3 INSTALLATION

- A. Install components plumb and level, accurately fitted, free from distortion or defects.
- B. Provide anchors, plates, angles, hangers, and struts required for connecting stairs to structure.

- C. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- D. Provide welded field joints where specifically indicated on drawings. Perform field welding in accordance with AWS D1.1/D1.1M.
- E. Other field joints may be either welded or bolted provided the result complies with the limitations specified for jointing quality levels.
- F. Obtain approval prior to site cutting or creating adjustments not scheduled.
- G. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

3.4 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.

END OF SECTION 055100

SECTION 055133 - METAL LADDERS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Shop-fabricated metal ladders, galvanized including all components.

1.2 REFERENCE STANDARDS

- A. ANSI A14.3 - American National Standard for Ladders -- Fixed -- Safety Requirements; 2008 (Reaffirmed 2018).
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- D. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2024.
- E. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2018.
- F. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.
- G. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2021.
- H. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2020.
- I. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021.
- J. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2022).
- K. AWS D1.2/D1.2M - Structural Welding Code - Aluminum; 2014, with Errata (2020).
- L. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel AC172; 2019.
- M. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic); 2019.
- N. SSPC-SP 2 - Hand Tool Cleaning; 2024.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
 - 2. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
- B. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.
- C. Designer's Qualification Statement.
- D. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.4 QUALITY ASSURANCE

- A. Design ladder under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.
- B. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and AWS D1.2/D1.2M and dated no more than 12 months before start of scheduled welding work.
- C. Fabricator Qualifications: A qualified steel fabricator that is accredited by IAS AC172.

PART 2 PRODUCTS

2.1 MATERIALS - STEEL Glavanized.

- A. Steel Sections: ASTM A36/A36M.
- B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.
- C. Plates: ASTM A283/A283M.
- D. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.
- E. Mechanical Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.
- F. Bolts, Nuts, and Washers: ASTM A307, plain.
- G. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

- H. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.2 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Continuously seal joined members by intermittent welds and plastic filler.
- D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.3 FABRICATED LADDERS

- A. Ladders: Steel; in compliance with ANSI A14.3; with mounting brackets and attachments; prime paint finish. Provide as follows unless otherwise detailed.
 - 1. Side Rails: 3/8 by 2 inches members spaced at 20 inches.
 - 2. Rungs: One inch diameter solid round bar spaced 12 inches on center.
 - 3. Space rungs 7 inches from wall surface.
 - 4. Ladder Safety Devices: See Section 077200 Roof Accessories for safety devices.

2.4 FINISHES - STEEL

- A. Prime paint steel items.
- B. Prepare surfaces to be primed in accordance with SSPC-SP2.
- C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- D. Prime Painting: One coat.
- E. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.5 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch maximum difference in diagonal measurements.

- B. Maximum Offset Between Faces: 1/16 inch.
- C. Maximum Misalignment of Adjacent Members: 1/16 inch.
- D. Maximum Bow: 1/8 inch in 48 inches.
- E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.2 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.3 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Field weld components as indicated on drawings.
- D. Perform field welding in accordance with AWS D1.1/D1.1M.
- E. Obtain approval prior to site cutting or making adjustments not scheduled.
- F. After erection, prime welds, abrasions, and surfaces not shop primed , except surfaces to be in contact with concrete.

3.4 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION 055133

SECTION 057300 - DECORATIVE METAL RAILINGS

PART 1 GENERAL

1.1 Section Includes

- A. Railing systems.

1.2 Reference Standards

- A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- C. ASTM A554 - Standard Specification for Welded Stainless Steel Mechanical Tubing; 2021.
- D. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.
- E. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings; 2021.
- F. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2020.
- G. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021.
- H. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2022).
- I. NAAMM AMP 500-06 - Metal Finishes Manual; 2006.
- J. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 2004.

1.3 Submittals

- A. Product Data: Submit manufacturer's product data, including description of materials, components, finishes, fabrication details, anchors, and accessories.
- B. Shop Drawings: Indicate railing system elevations and sections, details of profile, dimensions, sizes, connection attachments, anchorage, size and type of fasteners, and accessories. Indicate anchor and joint locations, brazed connections, transitions, and terminations.
 - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

2. Include design engineer's seal and signature on each sheet of shop drawings.
- C. Delegated Design Documents: Drawings and calculations sealed by Designer.
- D. Manufacturer's Instructions: Indicate installation.
- E. Designer's qualification statement.
- F. Fabricator's qualification statement.
- G. Welders' qualification statement.

1.4 Quality Assurance

- A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located or personnel under direct supervision of engineer.
- B. Welder Qualifications: Welding processes and welding operators certified in accordance with AWS B2.1/B2.1M within 12 months of scheduled welding work.

1.5 Delivery, Storage, and Handling

- A. Deliver materials in factory-provided protective coverings and packaging.
- B. Protect materials against damage during transit, delivery, storage, and installation at site.
- C. Inspect materials upon delivery for damage. Replace damaged items.
- D. Prior to installation, store materials and components under cover in dry location.

1.6 Field Conditions

- A. Ambient Conditions:
 1. Do not install railings until project is enclosed and ambient temperature of space is minimum 65 degrees F and maximum 95 degrees F.
 2. Maintain ambient temperature of space at minimum 65 degrees F and maximum 95 degrees F for 24 hours before, during, and after railing installation.

PART 2 PRODUCTS

2.1 RAILING SYSTEMS

- A. General: Factory- or shop-fabricated to suit project conditions, for proper connection to building structure, and in largest sizes practical for delivery to site.
- B. Performance Requirements:

1. Structural Requirements: Design and fabricate railings and anchorages to resist loads without failure, damage, or permanent set.
 - a. Handrail and Top Rails: Applying loads simultaneously not required:
 - 1) Distributed Load: 50 lbf/ft minimum, applied horizontally and vertically at top of handrail.
 - 2) Concentrated Load: 200 lbf, minimum, when applied to handrail horizontally and vertically.
 - b. Infill:
 - 1) Concentrated Load: 50 lbf, minimum, when applied to infill horizontally and vertically.
- C. Performance Requirements: Applying loads simultaneously not required; design and fabricate railings and anchorages to resist loads without failure, damage, or permanent set, including:
 1. Lateral Force: 75 lb minimum, when tested in accordance with ASTM E935.
 2. Distributed Load: 50 lbf/ft minimum, applied vertically and horizontally at top of handrail, when tested in accordance with ASTM E935.
 3. Concentrated Loads: 200 lb minimum, applied to handrail horizontally and vertically, in accordance with ASTM E935.
- D. Assembly: Use slip-on, nonweld mechanical fittings, flanges, escutcheons, and wall brackets to join lengths, seal open ends, and conceal exposed mounting bolts and nuts.
- E. Joints: Machined smooth with hairline seams; tightly fitted and secured.
- F. Field Connections: Provide sleeves to accommodate site assembly and installation.
- G. Metal Railing: Engineered, post-supported railing system with metal infill.
 1. Configuration: Guardrail with separate handrail.
 2. Top Rail: steel.
 3. Grip Rail: Round, stainless steel, 1-1/2-inch diameter.
 4. Wall-Mounted Components: Support railing with 1-1/2-inch clearance from wall using the following:
 5. Handrail Brackets: Same metal as railing.
 6. Fasteners: Concealed.
 7. Infill at Picket Railings: Vertical pickets.
 - a. Horizontal Spacing: Maximum 4 inches on center.
 - b. Material: Steel tube.
 - c. Shape: Square.
 - d. Top Mounting: Welded to underside of top rail.
 - e. Bottom Mounting: As indicated on drawings.
 8. End and Intermediate Posts: As shown on drawings.
 - a. Mounting: Welded.
- H. Wall-Mounted Handrail:

1. 1-1/2-inch diameter stainless steel; No.4 satin finish.
2. Handrail Brackets: Manufacturer's standard stainless steel brackets.
 - a. Mounting: Wall.
 - b. Finish: No.4 satin finish.
3. Comply with ADA Standards.

2.2 Materials

- A. Stainless Steel Components: ASTM A666/A666M, Type 304.
 1. Stainless Steel Tubing: ASTM A554, Type 304, 16-gauge, 0.0625-inch minimum metal thickness, 1-1/2-inch diameter.
- B. Steel Components:
 1. Sections, Shapes, Plate and Bar: ASTM A36/A36M.
 2. Welding Materials: AWS D1.1/D1.1M.

2.3 Fabrication

- A. Welded and Brazed Joints: Make visible joints butt tight, flush, and hairline; use methods that avoid discoloration and damage of finish; grind smooth, polish, and restore to required finish.
 1. Ease exposed edges to small uniform radius.
 2. Welded Joints:

2.4 Finishes

- A. General: Comply with NAAMM AMP 500-06.
 1. Complete mechanical finishes before fabrication. After fabrication, finish joints, bends, abrasions, and surface blemishes to match sheet.
 2. Protect mechanical finishes on exposed surfaces from damage.
 3. Apply organic and anodic finishes to formed metal after fabrication.
 4. Appearance: Limit variations in appearance of adjacent pieces to one-half of range represented in approved samples. Noticeable variations in same piece are not acceptable. Install components within range of approved samples to minimize contrast.
- B. Steel Finishes:
 1. Provide uncoated steel.
 2. Primer: Compatible with organic coating; shop-applied.
- C. Stainless Steel Finishes:
 1. Remove tool marks, die marks, and stretch lines before finishing.
 2. Directional Satin: No.4.

3. After polishing, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

2.5 Accessories

- A. Welding Fittings: Factory- or shop-welded from matching pipe or tube; joints and seams ground smooth.
- B. Anchors and Fasteners: Provide anchors, fasteners, and other attachment devices required to attach to structure.
- C. Shop and Touch-Up Primer: SSPC-Paint 15; comply with VOC limitations of authorities having jurisdiction.

PART 3 EXECUTION

3.1 Examination

- A. Verify that substrate and site conditions are acceptable and ready to receive work.
- B. Verify field dimensions of locations and areas to receive work.
- C. Notify Architect immediately of conditions that would prevent satisfactory installation.
- D. Do not proceed with work until detrimental conditions are corrected.

3.2 Preparation

- A. Protection of In-Place Conditions: Protect existing work before proceeding with installation.
- B. Review installation drawings before beginning installation. Coordinate diagrams, templates, instructions, and directions for installation of anchorages and fasteners.
- C. Clean surfaces to receive railings. Remove materials and substances detrimental to installation.

3.3 Installation

- A. Install in accordance with manufacturer's instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects, and with tight joints, except where necessary for expansion.
- C. Anchor securely to structure.
- D. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

- E. Weld connections that cannot be shop welded due to size limitations.
 - 1. Weld in accordance with AWS D1.1/D1.1M.
 - 2. Match shop welding and bolting.
 - 3. Clean welds, bolted connections, and abraded areas.
 - 4. Touch up shop primer and factory-applied finishes.
- F. Isolate dissimilar materials with bituminous coating, bushings, grommets, or washers to prevent electrolytic corrosion.

3.4 Tolerances

- A. Maximum Variation From Plumb: 1/4 inch per floor level, noncumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

3.5 Cleaning

- A. Remove protective film from exposed metal surfaces.
- B. Metal: Clean exposed metal finishes with potable water and mild detergent in accordance with manufacturer recommendations; do not use abrasive materials or chemicals, detergents, or other substances that may damage material or finish.

3.6 Protection

- A. Protect installed components and finishes from damage after installation.
- B. Repair damage to exposed, making finishes indistinguishable from undamaged areas.
- C. Replace finishes and components that have irreparable damage. Ensure damaged areas are indistinguishable from undamaged finishes and surfaces.

END OF SECTION 057300

SECTION 061000 - ROUGH CARPENTRY

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Nonstructural dimension lumber framing.
- B. Rough opening framing for doors, windows, and roof openings.
- C. Sheathing.
- D. Underlayment.
- E. Roof-mounted curbs.
- F. Roofing nailers.
- G. Preservative treated wood materials.
- H. Fire retardant treated wood materials.
- I. Miscellaneous framing and sheathing.
- J. Communications and electrical room mounting boards.
- K. Concealed wood blocking, nailers, and supports.
- L. Miscellaneous wood nailers, furring, and grounds.

1.2 REFERENCE STANDARDS

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
- B. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing; 2003 (Reapproved 2017).
- C. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2017.
- D. ASTM D2898 - Standard Practice for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing; 2010 (Reapproved 2017).
- E. ASTM D3498 - Standard Specification for Adhesives for Field-Gluing Wood Structural Panels (Plywood or Oriented Strand Board) to Wood Based Floor System Framing; 2019a.

- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
- G. AWPA U1 - Use Category System: User Specification for Treated Wood; 2025.
- H. NELMA (SGR) - Standard Grading Rules for Northeastern Lumber; 2021.
- I. PS 1 - Structural Plywood; 2023.

1.3 SUBMITTALS

- A. Product Data: Provide technical data on Exterior Sheathing.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.
- B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, and installation.

PART 2 PRODUCTS

2.1 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

- A. Grading Agency: Northeastern Lumber Manufacturers Association; NELMA (SGR).
- B. Sizes: Nominal sizes as indicated on drawings, S4S.
- C. Moisture Content: S-dry or MC19.
- D. Stud Framing (2 by 2 through 2 by 6):
 - 1. Species: Douglas Fir-Larch.
 - 2. Grade: No. 2.
- E. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
 - 1. Lumber: S4S, No. 2 or Standard Grade.
 - 2. Boards: Standard or No. 3.

2.2 CONSTRUCTION PANELS

- A. Wall Sheathing: Glass mat faced gypsum, ASTM C1177/C1177M, 5/8 inch Type X fire resistant.
 - 1. Edges: Square.
 - 2. Products:
 - a. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond eXP Fire-Shield Sheathing: www.goldbondbuilding.com/#sle.

- B. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

2.3 ACCESSORIES

- A. Fasteners and Anchors:
 - 1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
 - 2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.
 - 3. Anchors: Toggle bolt type for anchorage to hollow masonry.
- B. Sill Gasket on Top of Foundation Wall: 1/4 inch thick, plate width, closed cell plastic foam from continuous rolls.
- C. Sill Flashing: See Section 076200.
- D. Subfloor Adhesives: Gap-filling construction adhesive for bonding wood structural panels to wood-based floor system framing; complying with ASTM D3498.
- E. General Purpose Construction Adhesives: Comply with ASTM C557.

2.4 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWWA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
 - 1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
 - 2. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWWA standards.
- B. Fire Retardant Treatment:
 - 1. Exterior Type: AWWA U1, Category UCFB, Commodity Specification H, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D2898.
 - a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
 - b. Treat exterior rough carpentry items.

- c. Do not use treated wood in direct contact with the ground.
- C. Preservative Treatment:
 - 1. Preservative Pressure Treatment of Lumber Above Grade: AWP A U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
 - a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
 - b. Treat lumber exposed to weather.
 - c. Treat lumber in contact with roofing, flashing, or waterproofing.
 - d. Treat lumber in contact with masonry or concrete.
 - e. Treat lumber less than 18 inches above grade.
 - f. Treat lumber in other locations as indicated.
 - 2. Preservative Pressure Treatment of Plywood Above Grade: AWP A U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative.
 - a. Kiln dry plywood after treatment to maximum moisture content of 19 percent.
 - b. Treat plywood in contact with roofing, flashing, or waterproofing.
 - c. Treat plywood in contact with masonry or concrete.
 - d. Treat plywood less than 18 inches above grade.
 - e. Treat plywood in other locations as indicated.

PART 3 EXECUTION

3.1 PREPARATION

- A. Where wood framing bears on cementitious foundations, install full width sill flashing continuous over top of foundation, lap ends of flashing minimum of 4 inches and seal.
- B. Install sill gasket under sill plate of framed walls bearing on foundations; puncture gasket cleanly to fit tightly around protruding anchor bolts.
- C. Coordinate installation of rough carpentry members specified in other sections.

3.2 INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.3 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to authorities having jurisdiction may be used in lieu of solid wood blocking.
- C. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.
- D. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- E. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
- F. Provide the following specific nonstructural framing and blocking:
 - 1. Cabinets and shelf supports.
 - 2. Wall brackets.
 - 3. Handrails.
 - 4. Grab bars.
 - 5. Towel and bath accessories.
 - 6. Wall-mounted door stops.
 - 7. Chalkboards and marker boards.

3.4 ROOF-RELATED CARPENTRY

- A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.
- B. Provide wood curb at each roof opening except where prefabricated curbs are specified and where specifically indicated otherwise; form corners by alternating lapping side members.

3.5 INSTALLATION OF CONSTRUCTION PANELS

- A. Subflooring/Underlayment Combination: Glue and nail to framing; staples are not permitted.
- B. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples.
- C. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.

1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
3. Install adjacent boards without gaps.
4. Size and Location: As indicated on drawings.

3.6 TOLERANCES

- A. Framing Members: 1/4 inch from true position, maximum.
- B. Surface Flatness of Floor: 1/8 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.
- C. Variation from Plane, Other than Floors: 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.7 CLEANING

- A. Do not leave wood, shavings, sawdust, etc. on the ground or buried in fill.
- B. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION 061000

SECTION 064023 - INTERIOR ARCHITECTURAL WOODWORK AND FINISH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Interior standing and running trim, miscellaneous wood trim.
 - 2. Wood veneer display cabinets, seating areas, wall finishes and associated components.
 - 3. Wood veneer panels and millwork.

1.3 DEFINITIONS

- A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction before woodwork installation.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated, including cabinet hardware and accessories, finishing materials and processes.
 - 1. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
 - 1. Reproduction of Contract Document Drawings by Architect will not be accepted as shop drawing submittal.
 - 2. Show details at 3"=1'-0" whenever item is smaller than 30" x 42". Show details no smaller than 3/4" per foot.

3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
4. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, and other items installed in architectural woodwork.
5. Show veneer leaves with dimensions, grain direction, exposed face, and identification numbers indicating the flitch and sequence within the flitch for each leaf.
6. Show locations of plastic laminate finishes and colors.

C. Samples for Verification:

1. Lumber with or for transparent finish, not less than 4 inches wide by 12 inches long, for each species and cut, finished on 1 side and 1 edge.
2. Plastic laminates, 6 by 6 inches min., for each type, color, pattern, and surface finish, with 1 sample applied to core material, and specified edge material applied to 1 edge.
3. Thermoset decorative-panels, 6 by 6 inches, for each type, color, pattern, and surface finish, with edge banding on 1 edge.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and fabricator.
- B. Product Certificates: For each type of product, signed by product manufacturer.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
- B. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production of interior architectural woodwork with sequence-matched wood veneers of transparent-finished wood doors that are required to be of same species as woodwork. Refer to Section "Wood Flush Doors" for information regarding matching with doors.
- C. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for Custom Grade interior architectural woodwork for all materials, construction, finishes, installation, and all other requirements.
- D. Fire-Test-Response Characteristics: Where fire-retardant materials or products are indicated, provide materials and products with specified fire-test-response

characteristics as determined by testing identical products per test method indicated by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.

- E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
- F. General: Unless noted below provide materials with a minimum Class C flame spread rating as tested under ASTM E84, with smoke developed less than 450.
 - 1. Provide Class A material in kitchens, storerooms, maintenance and custodial areas and assembly areas (gymnasiums, auditoriums, Media Center, LGI).

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.
 - 2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and

coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.9 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Provide materials that comply with requirements of AWI's quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
- B. Solid Wood Species and Cut for Transparent Finish:
 - 1. Maple, plain sawn.
- C. Veneer Wood Species and Cut for Transparent Finish: Maple, Plain Saw.
 - 1. Matching of Adjacent Veneer Leaves: Slip match
 - 2. Veneer Matching within Panel Face: Balance matched.
- D. Softwood Plywood: DOC PS 1.
- E. Wood Species for Opaque Finish including Veneer Plywood: Poplar.
- F. Wood Products: Comply with the following:
 - 1. Medium-Density Fiberboard: ANSI A208.2, Grade 130, made with binder containing no urea formaldehyde. Substrate for melamine finishes unless noted otherwise. Substrate for fire-retardant veneer cabinetry and where indicated in Drawings.
 - 2. High-Density Particleboard: ANSI A208.1, Grade M-2-Exterior Glue. Substrate for laminate products unless noted otherwise. Product shall contain no urea formaldehyde. High-Density Particleboard shall be 47 psf minimum density for this Project.
 - 3. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.

- G. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.
- H. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.
 - 1. Colors and Patterns: As selected by the Architect.
- I. Tempered Float Glass for Cabinet Doors: ASTM C 1048, Kind FT, Condition A, Type I, Class 1 (clear) with exposed edges seamed before tempering, 3/8" thick, or as required by operating system.
- J. Tempered Float Glass for Cabinet Shelves: ASTM C 1048, Kind FT, Condition A, Type I, Class 1 (clear), Quality-Q3; with exposed edges seamed before tempering, 1/2" thick.

2.2 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this Articles that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified.
 - 1. Do not use treated materials that do not comply with requirements of referenced woodworking standard or that are warped, discolored, or otherwise defective.
 - 2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
 - 3. Identify fire-retardant-treated materials with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Comply with performance requirements of AWPA C20 (lumber) and AWPA C27 (plywood). Use the following treatment type:
 - 1. Interior Type A: Low-hygroscopic formulation.
 - 2. Mill lumber after treatment within limits set for wood removal that do not affect listed fire-test-response characteristics, using a woodworking plant certified by testing and inspecting agency.
 - 3. Mill lumber before treatment and implement special procedures during treatment and drying processes that prevent lumber from warping and developing discolorations from drying sticks or other causes, marring, and other defects affecting appearance of treated woodwork.

4. Kiln-dry materials before and after treatment to levels required for untreated materials.
- C. Fire-Retardant Particleboard: Panels complying with the following requirements, made from softwood particles and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 25 or less per ASTM E 84.
1. For panels 3/4 inch thick and less, comply with ANSI A208.1 for Grade M-2 except for the following minimum properties: modulus of rupture, 1600 psi; modulus of elasticity, 300,000 psi; internal bond, 80 psi and screw-holding capacity on face and edge, 250 and 225 lbf, respectively.
 2. For panels 13/16 to 1-1/4 inches thick, comply with ANSI A208.1 for Grade M-1 except for the following minimum properties: modulus of rupture, 1300 psi; modulus of elasticity, 250,000 psi; linear expansion, 0.50 percent; and screw-holding capacity on face and edge, 250 and 175 lbf, respectively.
- D. Fire-Retardant Fiberboard: Medium-density fiberboard panels complying with ANSI A208.2, made from softwood fibers, synthetic resins, and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 200 or less per ASTM E 84.

2.3 DISPLAY CABINET

- A. Adjustable Shelf Standards and Supports at Display Cabinets:
1. Vertical Shelf Standards: 5/8" wide by 13/32" deep metallic finish (Knappe and Vogt KV 80 in "titanium") 5' lengths cut to fit in available space.
 2. Shelf Brackets: metallic finish (Knappe and Vogt KV 180 in "titanium").
 - a. Bracket depth: 12 inch.
- B. Glass Shelving:
1. 3/8" thick tempered clear glass shelves in the following dimensions:
 - a. 12"d
- C. Glass Doors:
1. Basis of Design: CR Laurence Co.; CRL-Blumcraft Sating Anodized 1301 Series Display Case Door.
 2. 3/8" thick tempered clear glass doors.
 3. Surface mounted pivots for door operation.

4. Locking; key all alike. Provide three keys.

2.4 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.
- B. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln dried to less than 15 percent moisture content.
- C. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.
- D. Low-Emitting Materials: Adhesives shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- E. VOC Limits for Installation Adhesives: Installation adhesives shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 1. Wood Glues: 30 g/L.
 2. Multipurpose Construction Adhesives: 70 g/L.
 3. Contact Adhesive: 250 g/L.
- F. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.
 1. Adhesive for Bonding Edges: Hot-melt adhesive.

2.5 FABRICATION, GENERAL

- A. Interior Woodwork Grade: Unless otherwise indicated, provide Custom-grade interior woodwork complying with referenced quality standard.
- B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.
- C. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.

- D. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 1. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.
- E. Shop-cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
 - 1. Seal edges of openings in countertops with a coat of varnish.
- F. Install glass to comply with applicable requirements in Division 8 Section "Glazing" and in GANA's "Glazing Manual".

2.6 INTERIOR STANDING AND RUNNING TRIM FOR TRANSPARENT FINISH

- A. Grade: Custom
- B. Wood Species and Cut of Solid Hardwood:
 - 1. Exposed running trim shall be Maple hardwood, quarter-sliced.
 - a. Notify Architect immediately if indicated hardwood species and cut do not match existing exposed trim in the same area of the building. Match to existing exposed wood trim is the design intent by Architect. Therefore, approval to other wood species than named herein this Section and to other cut than named herein this Section must be obtained in writing from Architect.
 - b. If no other architectural woodwork is located in same area of building, provide premium grade maple hardwood with quarter-sliced cut as selected by Architect.
- C. Use solid hardwood trim unless noted otherwise for hardwood veneer on Drawings. For trim items wider than available lumber, use veneered construction. Do not glue for width. Provide continuous 3/4-inch minimum Maple hardwood with quarter-sliced cut for required edge banding of veneered construction. Overlap hardwood edge band with veneer at trim face.

- D. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.
- E. Assemble casings in plant except where limitations of access to place of installation require field assembly.
- F. Assemble moldings in plant to maximum extent possible. Miter corners in plant and prepare for field assembly with bolted fittings designed to pull connections together.

2.7 SHOP FINISHING

- A. Grade: Provide finishes of same grades as items to be finished.
- B. General: Finish architectural woodwork at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.
- C. Finishing Materials: Products shall comply with the testing and product requirements of the California Department of Health Services "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- D. Shop Priming: Shop apply the prime coat including backpriming, if any, for transparent-finished items specified to be field finished.
- E. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.
 - 1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of paneling and to end-grain surfaces. Concealed surfaces of plastic-laminate-clad woodwork do not require backpriming when surfaced with plastic laminate, backing paper, or thermoset decorative panels.
- F. Transparent Finish:
 - 1. Grade: Custom.
 - 2. AWI Finish System: Catalyzed polyurethane.
 - 3. Staining: Match approved sample for color.
 - 4. Wash Coat for Stained Finish: Apply wash-coat sealer to woodwork made from closed-grain wood before staining and finishing.
 - 5. Filled Finish for Open-Grain Woods: After staining (if any), apply paste wood filler to open-grain woods and wipe off excess. Tint filler to match stained wood.

- a. Apply wash-coat sealer after staining and before filling.
6. Sheen: Semigloss, 46-60 gloss units measured on 60-degree gloss meter per ASTM D 523.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.
- B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

- A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.
- B. Assemble woodwork and complete fabrication at Project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.
- C. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).
- D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Fire-Retardant-Treated Wood: Handle, store, and install fire-retardant-treated wood to comply with chemical treatment manufacturer's written instructions, including those for adhesives used to install woodwork.
- F. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.
- G. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 96 inches long, except where shorter single-length pieces are necessary.

1. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base if finished.
 2. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches (3 mm in 2400 mm).
- H. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean woodwork on exposed and semi-exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 064023

SECTION 068316 - FIBERGLASS REINFORCED PANELING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Fiberglass reinforced plastic panels.
 - 1. Locations: Typical at all Custodian sinks, provide 4' high around all sides, unless otherwise indicated.

1.2 REFERENCE STANDARDS

- A. ASTM D5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels; 2022.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

1.3 SUBMITTALS

- A. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store panels flat, indoors, on a clean, dry surface. Remove packaging and allow panels to acclimate to room temperature for 48 hours prior to installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Fiberglass Reinforced Plastic Panels:
 - 1. Marlite, Inc: www.marlite.com/#sle.

2.2 PANEL SYSTEMS

- A. Wall Panels:
 - 1. Panel Size: 4 by 8 feet.
 - 2. Panel Thickness: ___ inch.
 - 3. Surface Design: Embossed.

4. Color: White.
5. Attachment Method: Adhesive only, sealant joints, no trim.

2.3 MATERIALS

- A. Panels: Fiberglass reinforced plastic (FRP), complying with ASTM D5319.
 1. Surface Burning Characteristics: Maximum flame spread index of 25 and smoke developed index of 450; when system tested in accordance with ASTM E84.
- B. Adhesive: Type recommended by panel manufacturer.
- C. Sealant: Type recommended by panel manufacturer; white.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions and substrate flatness before starting work.
- B. Verify that substrate conditions are ready to receive the work of this section.

3.2 INSTALLATION - WALLS

- A. Install panels in accordance with manufacturer's instructions.
- B. Cut and drill panels with carbide tipped saw blades, drill bits, or snips.
- C. Apply adhesive to the back side of the panel using trowel as recommended by adhesive manufacturer.
- D. Apply panels to wall with seams plumb and pattern aligned with adjoining panels.
- E. Install panels with manufacturer's recommended gap for panel field and corner joints.
- F. Seal gaps at floor, ceiling, and between panels with applicable sealant to prevent moisture intrusion.
- G. Remove excess sealant after paneling is installed and prior to curing.

END OF SECTION 068316

SECTION 070150.16 - MAINTENANCE CLEANING OF MEMBRANE ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pressure washing of roof membrane including membrane flashings, with full water reclamation.

1.2 ACTION SUBMITTALS

- A. Product Data: For cleaning compounds.

1.3 INFORMATIONAL SUBMITTALS

- A. Work Plan: For maintenance cleaning, including description of means and methods for water reclamation.

1.4 QUALITY ASSURANCE

- A. Operator Qualifications: Trained and approved by manufacturer of cleaning equipment, with a record of successful roofing membrane cleaning.
- B. Regulatory Requirements: Comply with governing EPA regulations. Comply with hauling and disposal regulations of authorities having jurisdiction.

1.5 PROJECT / FIELD CONDITIONS

- A. Owner will occupy portions of building immediately below roof area to be maintained. Conduct operations so Owner's operations are not disrupted. Provide Owner with not less than 72 hours' notice of activities that may affect Owner's operations.
- B. Protect building to be cleaned, adjacent buildings, walkways, site improvements, exterior plantings, and landscaping from damage or soiling from maintenance operations.
- C. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.

PART 2 - PRODUCTS

2.1 CLEANING SYSTEM OPERATORS

- A. Source Limitations: Engage a qualified roofing maintenance cleaning firm to perform cleaning of membrane roofing.
- B. Approved Operators: RoofTec Cleaning Systems, Tremco CPG Inc., Beachwood OH, (800) 562-2728.

2.2 PERFORMANCE REQUIREMENTS

- A. Water Reclamation: Provide maintenance cleaning of membrane roofing that provides 100 percent reclamation of cleaning water and complies with applicable provisions of the US EPA National Pollutant Discharge Elimination System (NPDES) program and requirements of local authorities having jurisdiction.

2.3 MATERIALS

- A. Pre-cleaning Treatment: Detergent-free.
 - 1. Product: Tremco, RoofTec PREKLEEN.
- B. Pressure Wash Cleaning Solution: VOC, detergent, phosphate, and surfactant free.
 - 1. Product: Tremco, RoofTec RENEW Cleaner.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Comply with warranty requirements of existing roof membrane manufacturer.
- B. Shut off rooftop utilities and service piping before beginning the Work.
- C. Test existing roof drains to verify that they are not blocked or restricted. Immediately notify Owner of any blockages or restrictions.
- D. Coordinate with Owner to shut down air-intake equipment in the vicinity of the Work. Cover air-intake louvers before proceeding with maintenance cleaning work that could affect indoor air quality or activate smoke detectors in the ductwork.
- E. Maintain roof drains in functioning condition to ensure roof drainage at end of each workday. Prevent debris from entering or blocking roof drains and conductors.

3.2 MAINTENANCE CLEANING OF ROOF MEMBRANE

- A. Pretreat membrane and flashings when recommended by cleaning equipment manufacturer based upon site assessment of membrane condition.
- B. Apply pressure wash cleaning solution onto membrane and flashing surfaces.
- C. Pressure wash membrane and flashings using equipment and methods recommended in writing by cleaning equipment manufacturer for specific application. Utilize rotating wash head equipment operated at not less than 2,000 psi (13,800 kPa). Use equipment utilizing vacuum removal of wash water and residues.

3.3 DISPOSAL

- A. Collect cleaning water and associated cleaning compounds and residual material and process to meet US EPA and local environmental requirements for legal discharge.

END OF SECTION

SECTION 070150.74 - REHABILITATION OF SINGLE PLY ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Roof membrane coating preparation.
2. Application of reinforced fluid-applied roof membrane and flashings over existing fully adhered PVC membrane roof.

1.2 ROOFING CONFERENCES

A. Roofing Rehabilitation Preinstallation Conference: Conduct conference at Project site to review methods and procedures related to roofing system.

1. Meet with Owner; Architect; roofing coating materials manufacturer's representative; roofing rehabilitation Installer including project manager and foreman; and installers whose work interfaces with or affects rehabilitation including installers of roof accessories and roof-mounted equipment requiring removal and replacement as part of the Work.
2. Review temporary protection requirements for existing roofing system that is to remain uncoated, during and after installation.
3. Review methods and procedures related to re-coating preparation, including coating manufacturer's written instructions.
4. Review roof drainage during each stage of coating and review roof drain plugging and plug removal procedures.
5. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
6. Review base flashings, special roofing details, drainage, penetrations, equipment curbs, and condition of other construction that will affect coating.
7. Review HVAC shutdown and sealing of air intakes.
8. Review shutdown of fire-suppression, -protection, and -alarm and -detection systems.
9. Review procedures for asbestos removal or unexpected discovery of asbestos-containing materials.
10. Review governing regulations and requirements for insurance and certificates if applicable.

11. Review existing conditions that may require notification of Owner before proceeding.

1.3 MATERIALS OWNERSHIP

- A. Demolished materials shall become Contractor's property and shall be removed from Project site.

1.4 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D1079 "Standard Terminology Relating to Roofing and Waterproofing" and glossary in NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" for definition of terms related to roofing work in this Section.
- B. Roofing Coating Preparation: Existing roofing that is to remain and be prepared to accept restorative coating application.
- C. Patching: Removal of a portion of existing membrane roofing system from deck or removal of selected components and accessories from existing membrane roofing system and replacement with similar materials.
- D. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and reinstalled.
- E. Existing to Remain: Existing items of construction that are not indicated to be removed.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product specified.

1.6 INFORMATIONAL SUBMITTALS

- A. Contractor's Product Certificate: Submit signed certification, on company letterhead, indicating products intended for Work of this Section, including product names and numbers and manufacturers' names, with statement indicating that products to be provided meet the requirements of the Contract Documents.
- B. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 1. Indicate that proposed system components are compatible.
 2. Provide manufacturer's UL listing certificate for roofing system.
- C. Qualification Data: For Installer, Manufacturer, and Roofing Inspector.

1. Letter written for this Project indicating manufacturer approval of Installer to apply specified products and provide specified warranty.
 - D. Warranties: Unexecuted sample copies of special warranties.
 - E. Photographs or Video Recordings: Show existing conditions of adjoining construction and site improvements, including exterior and interior finish surfaces, which might be misconstrued as having been damaged by rehabilitation operations. Submit before Work begins.
 - F. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, and for dust control. Indicate proposed locations and construction of barriers.
 - G. Inspection Reports: Reports of Roofing Inspector. Include weather conditions, description of work performed, tests performed, defective work observed, and corrective actions required and carried out.
 1. Submit report within 48 hours after inspection.
 - H. Manufacturer's Instructions: Submit copy of manufacturer's written installation instructions for specified roofing system.
- 1.7 CLOSEOUT SUBMITTALS
- A. Maintenance Data: To include in maintenance manuals.
 - B. Warranties: Executed copies of approved warranty forms.
- 1.8 QUALITY ASSURANCE
- A. Installer Qualifications: An employer of workers trained and certified by manufacturer, including a full-time on-site supervisor with a minimum of three years' experience installing products similar to those specified, able to communicate verbally with Contractor, Architect, and employees, and the following:
 1. Qualified by the manufacturer to install manufacturer's product and furnish warranty of type specified.
 2. Installer shall have installed 5 previous projects of comparable size, scope, and complexity in the past 5 years.
 - B. Manufacturer Qualifications: Primary product manufacturer that is UL listed for roofing system identical to that specified for this Project with minimum five years' experience in manufacture of comparable products in successful use in similar applications, and able to furnish warranty with provisions matching specified requirements.

1. Approval of Other Manufacturers and Comparable Products: Submit the following in accordance with project substitution requirements, within time allowed for substitution review:
 - a. Product data, including certified independent test data indicating compliance with requirements.
 - b. Samples of each component.
 - c. Sample submittal from similar project.
 - d. Project references: Minimum of five installations of specified products not less than five years old, with Owner contact information.
 - e. Sample warranty.
 - C. Roofing Inspector Qualifications: A technical representative of manufacturer not engaged in the sale of products and experienced in the installation and maintenance of the specified roofing system, qualified to perform roofing observation and inspection specified in Field Quality Control Article, to determine Installer's compliance with the requirements of this Project, and approved by the manufacturer to issue warranty certification. The Roofing Inspector shall be one of the following:
 1. An authorized full-time technical employee of the manufacturer.
 2. An independent party certified as a Registered Roof Observer by the International Institute of Building Enclosure Consultants (formerly the Roof Consultants Institute) retained by the Contractor or the Manufacturer and approved by the Manufacturer.
 - D. Manufacturer's Installation Instructions: Obtain and maintain on-site access to manufacturer's written recommendations and instructions for installation of products.
- 1.9 FIELD CONDITIONS
- A. Weather Limitations: Proceed with rehabilitation work only when existing and forecasted weather conditions permit Work to proceed without water entering into existing roofing system or building.
 1. Store all materials prior to application at temperatures recommended by manufacturer.
 2. Apply coatings within range of ambient and substrate temperatures recommended by manufacturer.
 3. Do not apply roofing in snow, rain, fog, or mist.
 - B. Protect building to be rehabilitated, adjacent buildings, walkways, site improvements, exterior plantings, and landscaping from damage or soiling from rehabilitation operations.

- C. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.
- D. Daily Protection: Coordinate installation of roofing so insulation and other components of roofing system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.
- E. Owner will occupy portions of building immediately below re-coating area. Conduct re-coating so Owner's operations will not be disrupted. Provide Owner with not less than 72 hours' notice of activities that may affect Owner's operations.

1.10 WARRANTY

- A. Manufacturer's Warranty: Roof System Manufacturer's standard form in which Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within warranty period, as follows.
 - 1. Form of Warranty: Manufacturer's standard warranty form.
 - 2. Scope of Warranty: Work of this Section and including sheet metal details and termination details installed by the roof system Installer and approved by the Roof System Manufacturer.
 - 3. Warranty Period: 20 years from date of completion.
- B. Manufacturer Inspection Services: By manufacturer's technical representative, to report maintenance responsibilities to Owner necessary for preservation of Owner's warranty rights. The cost of manufacturer's inspections is included in the Contract Sum.
 - 1. Inspections to occur in following years: 2, 5, 10 and 15 following completion.
- C. Installer Warranty: Installer's warranty signed by Installer, as follows.
 - 1. Form of Warranty: Form included in Project Manual.
 - 2. Scope of Warranty: Work of this Section.
 - 3. Warranty Period: 2 years from date of completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: The roof system specified in this Section is based upon products of Tremco CPG Inc, Beachwood, OH, (800) 562-2728, www.tremcoroofing.com that are named in other Part 2 articles. Provide specified products or comparable products of one of the following.

1. Sika..
2. Kamper..

- B. Source Limitations: Obtain components for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Rehabilitated roofing shall withstand exposure to weather without failure or leaks due to defective manufacture or installation.
1. Accelerated Weathering: Roofing system shall withstand 5000 hours of exposure when tested according to ASTM G152, ASTM G154, or ASTM G155.
- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.
- C. Exterior Fire-Test Exposure: Roofing system exterior fire-test exposure performance following application of rehabilitation coating shall be not be less than that of the preredhabilitated roof performance when tested in accordance with ASTM E108 or UL 790, based upon manufacturer's tests of identical applications.

2.3 MATERIALS, GENERAL

- A. General: Rehabilitation materials recommended by roofing system manufacturer for intended use and compatible with components of existing membrane roofing system.
- B. Infill Materials: Where required to replace test cores and to patch existing roofing, use infill materials matching existing membrane roofing system materials, unless otherwise indicated.
- C. Temporary Roof Drainage: Design and selection of materials for temporary roof drainage are responsibilities of the Contractor.

2.4 FLUID-APPLIED ROOFING MEMBRANE COATING

- A. Polyurethane Elastomeric Fluid-Applied System: Two-coat fluid-applied roofing membrane formulated for application over prepared existing roofing substrate.
1. Polyurethane Roof Coating System Base Coat: Single-part moisture-curing, for use with a compatible top coat.
 - a. Basis of design product: Tremco, AlphaGuard MTS Base Coat.

- b. Combustion Characteristics, UL790: Maintains combustion characteristics of existing roof system.
 - c. Volatile Organic Compounds (VOC), maximum, ASTM D3960: 50 g/L.
 - d. Accelerated Weathering, 5000 hours, ASTM G154: Pass.
 - e. Hardness, Shore A, minimum, ASTM D2240: 85.
 - f. Solids, by volume, ASTM D2697, minimum: 87 percent.
 - g. Minimum Thickness, Base Coat on Smooth Surface: 48 mils (1.22 mm) wet.
 - 2. Polyurethane roof coating system top coat, low odor low VOC single-part, for application over compatible base coat.
 - a. Basis of design product: Tremco, AlphaGuard MTS Top Coat.
 - b. Combustion Characteristics, UL790: Maintains combustion characteristics of existing roof system.
 - c. Volatile Organic Compounds (VOC), maximum, ASTM D3960: 50 g/L.
 - d. Solar Reflectance Index (SRI), ASTM E1980: For white, not less than 108.
 - e. Accelerated Weathering, 5000 hours, ASTM G154: Pass.
 - f. Hardness, Shore A, minimum, ASTM D2240: 85.
 - g. Solids, by volume, ASTM D2697: 87.
 - h. Minimum Thickness: 32 mils (0.81 mm) wet over cured base coat.
 - i. Minimum Thickness, Slip-Resistant Coat: 20 mils (0.50 mm) wet.
 - j. Color: White.
- B. Primers:
- 1. Primer for Asphaltic and Single-Ply Membranes: Water-based, polymer-modified quick-dry low odor primer.
 - a. Basis of design product: Tremco, AlphaGuard WB Primer.
 - b. Volatile Organic Compounds (VOC), maximum, ASTM D3960: 1 g/L.
 - c. Solids, by weight: 70 percent.
 - 2. Primer for Non-Porous Surfaces: Single-part, water based primer to promote adhesion of urethanes to metals, PVC and other non-porous surfaces.
 - a. Basis of design product: Tremco, AlphaGuard M-Prime.
 - b. Volatile Organic Compounds (VOC), maximum, ASTM D3960: 22 g/L.
 - c. Nonvolatile Content, minimum, ASTM D2369: 5 percent.
 - d. Density at 77 deg F (25 deg C): 8.3 lb/gal (1kg/L).
 - 3. Primer for Intercoat and Substrate Adhesion: Single-part, quick-drying primer to promote adhesion of urethane products to previous urethane coats and to other approved surfaces.

- a. Basis of design product: Tremco, Geogard Primer.
- b. Volatile Organic Compounds (VOC), maximum, ASTM D3960: 100 g/L.
- c. Coverage Rate, 400 sq. ft/ gal. (10 m²/ L): 4 mils (0.10 mm) wet.

C. Fluid-Applied Roofing Reinforcing Fabric:

- 1. Polyester Reinforcing Fabric: 100 percent stitch-bonded mildew-resistant polyester fabric intended for reinforcement of compatible fluid-applied membranes and flashings.
 - a. Basis of design product: Tremco, Permafab.
 - b. Tensile Strength, Minimum, ASTM D5034 (2-inch): MD - 110 lbs (49.8 kg); XMD - 60 lbs (27.2 kg) avg.
 - c. Elongation, Minimum, ASTM D5034 (1-inch): MD - 25 percent; XMD - 100 percent.
 - d. Tear Strength, Minimum, ASTM D5587: MD - 20 lbs (9.0 kg) avg; XMD - 20 lbs (9.0 kg) avg.
 - e. Weight: 3 oz./sq. yd (102 g/sq. m).

2.5 AUXILIARY ROOFING REHABILITATION MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with existing roofing system and roofing coating system.
- B. Seam Sealer: Waterproof seam and patching material compatible with applied coating.
 - 1. Seam Sealer: Aromatic polyurethane sealer, single-component, high solids, moisture curing, formulated for compatibility and use with a variety of roofing and flashing substrates.
 - a. Basis of design product: Tremco, GEOGARD Seam Sealer.
 - b. Volatile Organic Compounds (VOC), maximum, ASTM D3960: 189 g/L.
 - c. Tensile Strength, ASTM D412: 270 psi (1860 kPa).
 - d. Tear Strength, ASTM D412: 35 pli (6.13 kNm).
 - e. Elongation, ASTM D412: 220 percent.
 - f. Color: Gray.
- C. Joint Sealant: Elastomeric joint sealant compatible with applied coating, with movement capability appropriate for application.
 - 1. Joint Sealant, Polyurethane: ASTM C920, Type S, Grade NS, Class 50 single-component moisture curing sealant, formulated for compatibility and use in dynamic and static joints; paintable.

- a. Basis of design product: Tremco, TremSEAL Pro.
- b. Volatile Organic Compounds (VOC), maximum, ASTM D3960: 40 g/L.
- c. Hardness, Shore A, ASTM C661: 40.
- d. Adhesion to Concrete, ASTM C794: 35 pli.
- e. Tensile Strength, ASTM D412: 350 psi (2410 kPa).
- f. Color: Closest match to substrate.

- D. Miscellaneous Accessories: Provide miscellaneous accessories recommended by roofing system manufacturer.

2.6 WALKWAYS

- A. Fluid-Applied Walkway Top Coat, Slip-Resistant: Second top coat with broadcast slip-resistant aggregate.
1. Color: As selected from manufacturer's standard colors.
 2. Granular Roofing Surfacing: Ceramic-coated roofing granules, No. 11 screen size with 100 percent passing No. 8 (2.36-mm) sieve and 98 percent of mass retained on No. 40 (0.425-mm) sieve.
 - a. Basis of design product: Granular Roofing Surfacing, Colored.
 - b. Aggregate application rate, average: 10 - 15 lb/100 sq ft (0.5 - 0.75 k/m²).
 - c. Color: As selected by Architect from manufacturer's standard colors.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine existing roofing substrates, with Installer present, for compliance with requirements and for other conditions affecting application and performance of roof coatings
1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance.
 2. Verify compatibility with and suitability of substrates.
 3. Verify that substrates are visibly dry and free of moisture.
 4. Verify that roofing membrane surfaces have adequately aged to enable proper bond with base coat.
 5. Verify that roofing membrane is free of blisters, splits, open laps, indications of shrinkage, and puncture damage or other indications of impending roof system failure.
 6. Commencing application of coatings indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Protect existing roofing system that is indicated not to be rehabilitated, and adjacent portions of building and building equipment.
 - 1. Mask surfaces to be protected. Seal joints subject to infiltration by coating materials.
 - 2. Limit traffic and material storage to areas of existing roofing membrane that have been protected.
 - 3. Maintain temporary protection and leave in place until replacement roofing has been completed.
- B. Shut down air intake equipment in the vicinity of the Work in coordination with the Owner. Cover air intake louvers before proceeding with coating work that could affect indoor air quality or activate smoke detectors in the ductwork.
 - 1. Verify that rooftop utilities and service piping affected by the Work have been shut off before commencing Work.
- C. Maintain roof drains in functioning condition to ensure roof drainage at end of each workday. Prevent debris from entering or blocking roof drains and conductors. Use roof-drain plugs specifically designed for this purpose. Remove roof-drain plugs at end of each workday, when no work is taking place, or when rain is forecast.
 - 1. Do not permit water to enter into or under existing membrane roofing system components that are to remain.

3.3 ROOFING COATING PREPARATION

- A. Removal of Wet Insulation: Remove portions of roofing membrane with underlying wet insulation. Remove wet insulation, fill in tear-off areas to match existing insulation and membrane, and prepare patched membrane for application of roof coating as specified below.
- B. Repair of Ponding Areas: Repair areas indicated as ponding areas or areas of inadequate drainage by removing roof membrane, adding additional insulation as required to provide minimum slopes to drain required by roofing rehabilitation coating manufacturer, and replace membrane with material matching existing. Submit photographic report indicating compliance.
- C. Membrane Surface Preparation:
 - 1. Remove walkway pads and pavers from roofing membrane. Discard damaged pavers.

2. Remove blisters, ridges, buckles, roofing membrane fastener buttons projecting above the membrane, and other substrate irregularities from existing roofing membrane that would inhibit application of uniform, waterproof coating.
 3. Broom clean existing substrate.
 4. Substrate Cleaning: Clean substrate in accordance with requirements of Division 07 Section "Maintenance Cleaning of Membrane Roofing."
 5. Verify that existing substrate is dry before proceeding with application of coating. Spot check substrates with an electrical capacitance moisture-detection meter.
 6. Verify adhesion of new products.
- D. Existing Flashing and Detail Preparation: Repair flashings, gravel stops, copings, and other roof-related sheet metal and trim elements. Reseal joints, replace loose or missing fasteners, and replace components where required to leave in a watertight condition.
1. Do not damage metal counterflashings that are to remain. Replace metal counterflashings damaged during removal with counterflashings of same metal, weight or thickness, and finish.
 2. Roof Drains: Remove drain strainer and clamping ring. Grind metal surfaces down to clean, bare, metal.
- E. Surface Priming: Prime surfaces to receive fluid-applied coating using coating manufacturer's recommended product for surface material. Apply at application rate recommended by manufacturer.
1. Ensure primer does not puddle and substrate has complete coverage.
 2. Allow to cure completely prior to application of coating.
- F. Membrane Repair: Repair membrane at locations with irregularities using seam sealer mastic and reinforcing fabric.

3.4 FLUID-APPLIED FLASHING APPLICATION

- A. Fluid-Applied Flashing and Detail Base Coat Application: Complete base coat and fabric reinforcement at parapets, curbs, penetrations, and drains prior to application of field of fluid-applied membrane. Apply base coat in accordance with manufacturer's written instructions.
1. Apply base coat on prepared and primed surfaces and spread coating evenly. Extend coating minimum of 8 inches (200 mm) up vertical surfaces and 4 inches (100 mm) onto horizontal surfaces.
 2. Back roll to achieve minimum coating thickness indicated on Part 2 product listing, unless greater thickness is recommended by manufacturer; verify thickness of base coat as work progresses.

3. Reinforcing Fabric: Embed fabric reinforcement into wet base coat. Lap adjacent flashing pieces of fabric minimum 3 inches (75 mm) along edges and 6 inches (150 mm) at end laps.
 - a. Roll surface of fabric reinforcing to completely embed and saturate fabric. Leave finished base coat with fabric free of pin holes, voids, or openings.
4. Roof Drains: Install base coat onto surrounding membrane surface and metal drain bowl flange. Install target piece of fabric reinforcement immediately into wet base coat and roll to fully embed and saturate fabric. Reinstall clamping ring and strainer following application of top coat. Replace broken drain ring clamping bolts.

3.5 FLUID-APPLIED MEMBRANE APPLICATION

- A. Fluid-Applied Membrane Base Coat: Apply base coat to field of membrane in accordance with manufacturer's written instructions.
 1. Apply base coat on prepared and primed surfaces and spread coating evenly.
 2. Back roll to achieve minimum coating thickness indicated on Part 2 product listing, unless greater thickness is recommended by manufacturer; verify thickness of base coat as work progresses.
 3. Fabric Reinforcement: Embed fabric reinforcement into wet base coat. Lap adjacent pieces of fabric minimum 3 inches (75 mm) along edges and 6 inches (150 mm) at end laps.
 - a. Roll surface of fabric reinforcing to completely embed and saturate fabric. Leave finished base coat with fabric free of pin holes, voids, or openings.
- B. Fluid-Applied Membrane Top Coat: Apply top coat to field of membrane and flashings uniformly in a complete, continuous installation.
 1. Allow base coat to cure prior to application of top coat.
 2. Following curing of base coat and prior to application of top coat, sand raised or exposed edges of fabric reinforcement.
 3. Prime base coat prior to application of top coat if top coat is not applied within 72 hours of the base coat application, using manufacturer's recommended primer.
 4. Apply top coat extending coating up vertical surfaces and out onto horizontal surfaces. Install top coat over field base coat and spread coating evenly.
 5. Back roll to achieve minimum coating thickness indicated on Part 2 product listing, unless greater thickness is recommended by manufacturer; verify thickness of base coat as work progresses.
 6. Avoid foot traffic on new fluid-applied membrane for a minimum of 24 hours.

3.6 WALKWAY INSTALLATION

- A. Install walkways following application of coating. Locate as indicated, or as directed by Owner.
- B. Slip-Resistant Walkway Topcoat: Apply walkway second topcoat following application and curing of top coat. Locate as indicated on Drawings.
 - 1. Mask walkway location with tape.
 - 2. Prime first top coat prior to application of walkway top coat if walkway top coat is not applied within 72 hours of the first top coat application, using manufacturer's recommended primer.
 - 3. Apply walkway topcoat and back roll to achieve minimum coating thickness indicated on Part 2 product listing, unless greater thickness is recommended by manufacturer; verify thickness of base coat as work progresses.
 - 4. Broadcast Slip-Resistant Top Coat Aggregate in wet top coat at rate indicated in Part 2 product listing or as otherwise recommended by coating manufacturer.
 - a. Back roll aggregate and top coat creating even dispersal of aggregate. Remove masking immediately.

3.7 FIELD QUALITY CONTROL

- A. Roofing Inspector: Contractor shall engage a qualified roofing inspector to perform roof tests and inspections and to prepare test reports.
 - 1. Engage a qualified roofing inspector for a minimum of every other day on site, to perform roof tests and inspections and to prepare start up, interim, and final reports. Roofing Inspector's quality assurance inspections shall comply with criteria established in Quality Control and Quality-assurance Guidelines for the Application of Membrane Roof Systems."
- B. Roof Inspection: Contractor shall engage roofing system manufacturer's technical personnel to inspect roofing installation, and submit report. Notify Architect 48 hours in advance of dates and times of inspections. Inspect work as follows:
 - 1. Upon completion of preparation of first component of work, prior to application of re-coating materials.
 - 2. Following application of re-coating to flashings and application of base coat to field of roof.
 - 3. Upon completion of re-coating but prior to re-installation of other roofing components.

- C. Repair fluid-applied membrane where test inspections indicate that they do not comply with specified requirements.
- D. Arrange for additional inspections, at Contractor's expense, to verify compliance of replaced or additional work with specified requirements.

3.8 PROTECTING AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period.
- B. Correct deficiencies in or remove coating that does not comply with requirements, repair substrates, and reapply coating.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 070150.74

SECTION 071400 - FLUID-APPLIED WATERPROOFING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Modified polymer elastomeric fluid-applied waterproofing.
 - 1. Locations: All below grade foundations, and locations indicated.

1.2 REFERENCE STANDARDS

- A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2015 (Reapproved 2022).
- B. ASTM C836/C836M - Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course; 2018 (Reapproved 2022).
- C. ASTM D2370 - Standard Test Method for Tensile Properties of Organic Coatings; 2016 (Reapproved 2021).
- D. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022a, with Editorial Revision (2023).

1.3 SUBMITTALS

- A. Product Data: Provide data for membrane, surface conditioner, flexible flashings, joint cover sheet, and joint and crack sealants.
- B. Shop Drawings: Indicate special joint or termination conditions and conditions of interface with other materials.
- C. Certificate: Certify that products meet or exceed specified requirements.
- D. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention, and acceptable installation temperatures.
- E. Manufacturer's qualification statement.
- F. Installer's qualification statement.
- G. Warranty:
 - 1. Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

2. Submit installer's certification that installation complies with warranty conditions for the waterproofing membrane.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.5 MOCK-UPS

- A. Construct mock-up consisting of 100 sq ft of horizontal waterproofed panel to represent finished work including internal and external corners, drainage panel, base flashings, control joints, expansion joints, counterflashings, and protective cover.
- B. Locate where directed.
- C. Mock-up may remain as part of work.

1.6 FIELD CONDITIONS

- A. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application and until cured.

1.7 WARRANTY

- A. Contractor to correct defective work within a five-year period after Date of Substantial Completion; remove and replace materials concealing waterproofing at no cost to Owner.
- B. Provide five year manufacturer warranty against failure of waterproofing to resist penetration of water, except where such failures are the result of structural failures of building.
 1. Hairline cracking of concrete due to temperature change or concrete shrinkage is not considered a structural failure.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Fluid-Applied Waterproofing:
 1. Carlisle Coatings & Waterproofing: www.carlisleccw.com/#sle.

2.2 PRODUCT TYPES

- A. Modified Polymer Elastomeric Fluid-Applied Waterproofing:
 - 1. Cover with protection board in below grade locations.

2.3 MATERIALS

- A. Modified Polymer Elastomeric Fluid-Applied Waterproofing: Fluid-applied, single-component, moisture-reacted, elastomeric, modified polymer waterproof membrane complying with ASTM C836/C836M
 - 1. Product:
 - a. Carlisle Coatings & Waterproofing Inc; MiraSEAL.
 - 2. Cured Thickness: 60 mil, 0.060 inch, minimum.
 - 3. Suitable for installation over concrete substrates.
 - 4. Tensile Strength: 95 psi, minimum, measured in accordance with ASTM D2370.
 - 5. Ultimate Elongation: 350 percent, minimum, measured in accordance with ASTM D2370.
 - 6. Hardness: 10, plus or minus 3, measured in accordance with ASTM C661 using Shore A durometer.
 - 7. Water Vapor Transmission: 0.06 perm inch, maximum, measured in accordance with ASTM E96/E96M.
 - 8. Reinforcing: 1.18 oz/sq yd spunbonded polyester fabric.
 - a. Thickness: 7.1 mil, 0.0071 inch.
 - b. Width: 36 inches.
 - c. Product:
 - 1) Carlisle Coatings & Waterproofing, Inc; CCW-500 Reinforcing Fabric.
 - 9. Protection Board: Provide type capable of preventing damage to waterproofing due to backfilling and construction traffic for either horizontal (H) or vertical (V) applications.
 - a. Thickness: 90 mil, 0.090 inch, minimum.
 - b. High-density, rigid, expanded polystyrene foam board.
 - c. Product:
 - 1) Carlisle Coatings & Waterproofing Inc; CCW Protection Board-V.
 - 10. Adhesives, Sealants, Tapes, and Accessories: As indicated below or by waterproofing manufacturer in accordance with requirements.

2.4 ACCESSORIES

- A. Seaming Materials: As recommended by waterproofing manufacturer.
- B. Membrane Sealant: As recommended by waterproofing manufacturer.
- C. Adhesives: As recommended by waterproofing manufacturer.

- D. Thinner and Cleaner: As recommended by adhesive manufacturer, compatible with fluid-applied waterproofing.
- E. Sealant for Cracks and Joints In Substrates: Resilient elastomeric joint sealant compatible with substrates and waterproofing materials, as recommended by waterproofing manufacturer.
- F. Backer Rods: Closed-cell polyethylene foam rod, as recommended by waterproofing manufacturer.
- G. Primer: Synthetic rubber solvent-based primer and surface cleaner.
 - 1. Product:
 - a. Carlisle Coatings & Waterproofing Inc; Sure-Seal HP-250 Primer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting this work.
- B. Verify substrate surfaces are free of frozen matter, dampness, loose particles, cracks, pits, projections, penetrations, or foreign matter detrimental to adhesion or application of waterproofing system.
- C. Verify that substrate surfaces are smooth, free of honeycomb or pitting, and not detrimental to full contact bond of waterproofing materials.
- D. Verify that items penetrating surfaces to receive waterproofing are securely installed.
- E. Where existing conditions are responsibility of another installer, notify Architect of unsatisfactory conditions.
- F. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Protect adjacent surfaces from damage not designated to receive waterproofing.
- B. Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions; vacuum substrate clean.
- C. Do not apply waterproofing to surfaces unacceptable to waterproofing manufacturer.
- D. Fill nonmoving joints and cracks with a filler compatible with waterproofing materials.
- E. Seal moving cracks with sealant and nonrigid filler, using procedures recommended by sealant and waterproofing manufacturers.

- F. Prepare building expansion joints at locations as indicated on drawings.
- G. Install cant strips at inside corners.

3.3 INSTALLATION

- A. Install fluid-applied waterproofing in accordance with manufacturers instructions and applicable requirements.
- B. Apply primer or surface conditioner at a rate recommended by manufacturer; protect conditioner from rain or frost until dry.
- C. At joints and cracks less than 1/2 inch in width including joints between horizontal and vertical surfaces, apply 12 inch wide strip of joint cover sheet.
- D. At joints from 1/2 inch to 1 inch in width, loop joint cover sheet down into joint between 1-1/4 inch to 1-3/4 inch, and extend sheet at least 6 inches on either side of expansion joint.
- E. Center joint cover sheet over joints, roll sheet into 1/8 inch thick coating of waterproofing material and apply second coat over sheet extending at least 6 inches beyond sheet edges.
- F. Extend membrane over cants and up intersecting surfaces at membrane perimeter minimum 6 inches above horizontal surface for first ply and ____ inches at subsequent plies laid in shingle fashion.
- G. Apply extra thickness of waterproofing material at corners, intersections, and angles.
- H. Flexible Flashings: Seal items watertight that penetrate through waterproofing membrane.
- I. Seal membrane and flashings to adjoining surfaces.
 - 1. Install termination bar along edges.

3.4 INSTALLATION - DRAINAGE COMPOSITE and PROTECTION BOARD

- A. Immediately after cooling, dust membrane with tack-reducing surfacing at rate of approximately 10 lb per 100 sq ft.
- B. After membrane has cooled, but before it becomes dusty, apply separation sheet and lap joints to ensure complete coverage.
- C. Place protection board directly against cooled membrane; butt joints, and scribe and cut boards around projections, penetrations, and interruptions.
- D. Adhere protection board to substrate with compatible adhesive.

3.5 PROTECTION

- A. Do not permit traffic over unprotected or uncovered membrane.

END OF SECTION 071400

SECTION 071616 - CRYSTALLINE WATERPROOFING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Crystalline waterproofing.
- B. Preparation of surfaces.

1.2 REFERENCE STANDARDS

- A. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 50 mm [2 in.] Cube Specimens); 2023.
- B. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating; 2005 (Reapproved 2017).
- C. ASTM D4259 - Standard Practice for Preparation of Concrete by Abrasion Prior to Coating Application; 2024.
- D. COE CRD-C 48 - Handbook for Concrete and Cement Standard Test Method for Water Permeability of Concrete; 1992.
- E. NSF 61 - Drinking Water System Components - Health Effects; 2022, with Errata.
- F. UL (DIR) - Online Certifications Directory; Current Edition.
- G. NRCA (WM) - The NRCA Waterproofing Manual; 2021.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Test data showing hydraulic permeability.
 - 2. Preparation instructions and recommendations.
 - 3. Storage and handling requirements and recommendations.
 - 4. Installation methods.
 - 5. Details for waterproofing at joints, intersections, and other special conditions.
- B. Manufacturer's qualification statement.
- C. Installer's qualification statement.
- D. Specimen warranty.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least three years of documented experience and providing technical representative to visit project site.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Take necessary precautions to keep cementitious materials dry.

1.6 FIELD CONDITIONS

- A. Maintain environmental conditions, such as temperature, humidity, and ventilation within limits recommended by manufacturer for acceptable results; do not install products under environmental conditions outside the manufacturer's indicated limits.

1.7 WARRANTY

- A. Installer Warranty: Provide 2-year warranty commencing on the Date of Substantial Completion for correcting leaking waterproofing, unless leakage is caused by structural failure, structural movement, or other causes beyond the installer's control. Complete forms in Owner's name and register with installer.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Crystalline Waterproofing:
 - 1. Xypex Chemical Corporation; XYPEX Concentrate: www.xypex.com/#sle.

2.2 ASSEMBLIES

- A. Crystalline Waterproofing for Concrete Building Surfaces:
 - 1. Interior side of elevator pits.

2.3 MATERIALS

- A. Crystalline Waterproofing: Portland cement, quartz or silica sand, and other active chemicals that when applied to surface of concrete forms insoluble crystals in capillary pores preventing passage of liquids, while having no adverse effect on normal properties of concrete.
 - 1. Water Permeability of Applied Concrete: No measurable leakage or water flow at pressure ranging from 175 psi to 200 psi when tested in accordance with COE CRD-C 48, using at least 2-inch thick sample, and with applied surface preparation and installation in accordance with NRCA (WM).
 - 2. Compressive Strength: At least 3600 psi at test age of 28 days in accordance with ASTM C109/C109M test method.
 - 3. Toxicity: Non-toxic.
 - a. Potable Water and Drinking Water Safe: Provide UL (DIR) listed and labeled waterproofing; tested to be safe for use in potable and drinking water applications in accordance with NSF 61.
 - b. USDA-approved for use in food plants.
 - 4. Color: Gray.
- B. Plugging Compound: Ready-mixed cementitious compound meeting requirements and approved by waterproofing manufacturer, resistant to water but vapor permeable for horizontal, vertical, and overhead surfaces not exposed to vehicular traffic and compatible with substrate.
- C. Patching Compound: Ready-mixed cementitious mortar approved by waterproofing manufacturer for patching or filling tie holes, reveals, honeycombs, or other damaged cementitious surfaces and compatible with substrate.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
 - 1. Remove dust, dirt, mortar, efflorescence, grease, oils, paint, form-release agents, and curing compounds in accordance with ASTM D4258.
- B. Prepare surfaces using methods recommended by manufacturer for achieving best result for substrate under project conditions, and consider use of sandblasting, water blasting, or acid etching as recommended.

1. Troweled Finish: Prepare concrete surface by abrasive cleaning in accordance with ASTM D4259 before coating application.
- C. Plug water leaks.
- D. Patch holes, construction joints, and cracks; remove defective concrete.
- E. Obtain approval of manufacturer's field representative before beginning installation.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's written instructions, maintain environmental conditions required and recommended by manufacturer, and keep a copy of manufacturer's instructions on site.
- B. Coordinate waterproofing installation with installation of products that must penetrate waterproofed surfaces.
- C. Prevent excessive drying of surface.
 1. Cure waterproofing for at least three days, or length of time required by manufacturer, with water spray and adequate air circulation.
 2. Do not use chemical curing agents unless explicitly approved by waterproofing manufacturer.

3.4 PROTECTION

- A. Protect from damage by weather; do not cover with vapor impermeable sheathing or films unless air circulation is provided.
- B. Touch-up, repair or replace damaged waterproofing after Date of Substantial Completion.

END OF SECTION 071616

SECTION 072100 - THERMAL INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Board insulation at cavity wall construction, perimeter foundation wall, and underside of floor slabs.
- B. Batt insulation in wall construction.
- C. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

1.2 REFERENCE STANDARDS

- A. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2023.
- B. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2024.
- C. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2023a.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
- E. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 Degrees C; 2024c.

1.3 SUBMITTALS

- A. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.4 FIELD CONDITIONS

- A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.1 APPLICATIONS

- A. Insulation Under Concrete Slabs: Extruded polystyrene (XPS) board.
- B. Insulation at Perimeter of Foundation: Extruded polystyrene (XPS) board.
- C. Insulation Inside Masonry Cavity Walls: Polyisocyanurate board.
- D. Insulation in Metal Framed Walls: Batt insulation with no vapor retarder.

2.2 FOAM BOARD INSULATION MATERIALS

- A. Extruded Polystyrene (XPS) Board Insulation: Comply with ASTM C578 with either natural skin or cut cell surfaces.
 - 1. Type and Compressive Resistance: Type IV, 25 psi (173 kPa), minimum.
 - 2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
 - 3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
 - 4. Type and Thermal Resistance, R-value: Type IV, 5.0 (0.88), minimum, per 1 inch thickness at 75 degrees F mean temperature.
 - 5. Board Edges: Square.
 - 6. Type and Water Absorption: Type IV, 0.3 percent by volume, maximum, by total immersion.
 - 7. Location: Below Grade and under slab locations.
 - 8. Products:
 - a. Kingspan Insulation LLC; GreenGuard XPS Type IV, 25 psi: www.kingspan.com/#sle.
 - b. Owens Corning Corporation; FOAMULAR Type 250 Extruded Polystyrene (XPS) Insulation: www.ocbuildingspec.com/#sle.
- B. Polyisocyanurate (ISO) Board Insulation: Rigid cellular foam, comply with ASTM C1289.
 - 1. Classifications:
 - 2. Board Size: 48 inch by 96 inch.
 - 3. Board Thickness: 2.5 inch.
 - 4. Board Edges: Square.

2.3 MINERAL FIBER BLANKET INSULATION MATERIALS

- A. Flexible Glass Fiber Blanket Thermal Insulation: Preformed insulation, complying with ASTM C665; friction fit.
 - 1. Flame Spread Index: 75 or less, when tested in accordance with ASTM E84.
 - 2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
 - 3. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.

4. Formaldehyde Content: Zero.
5. Facing: Aluminum foil, flame spread 25 rated; one side.
6. Products:
 - a. CertainTeed Corporation: www.certainteed.com/#sle.
 - b. Johns Manville: www.jm.com/#sle.
 - c. Owens Corning Corporation; EcoTouch PINK FIBERGLAS Insulation: www.ocbuildingspec.com/#sle.

2.4 ACCESSORIES

- A. Insulation for Miscellaneous Voids:
 1. Glass-Fiber Insulation: ASTM C 764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E 84.
 2. Spray Polyurethane Foam Insulation: ASTM C 1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E 84.
- B. Tape: Reinforced polyethylene film with acrylic pressure sensitive adhesive.
 1. Application: Sealing of interior circular penetrations, such as pipes or cables.
 2. Width: As required for application.
 3. Temperature Resistance: Range of minus 40 to 212 degrees F.
- C. Self-Adhered Transition Flashing: Multipurpose, self-adhered flashing with modified butyl adhesive, polyester fiber top sheet, and polypropylene interlayer.
 1. Application: Primerless adhesion for use as through-wall flashings and wall transitions to roof and below-grade systems.
 2. Thickness: 45 mil, 0.045 inch, nominal.
 3. Size: 6 inches wide, in rolls 75 feet long.
- D. Flashing Tape: Special reinforced film with high performance adhesive.
 1. Application: Window and door opening flashing tape.
 2. Width: As required for application.
- E. Sill Plate Sealer: Closed-cell foam tape with rubberized adhesive membrane; bridges gap between foundation structure and sill plate or skirt board.
 1. Width: 3-1/2 inches.
 2. Ultraviolet (UV) and Weathering Resistance: Approved in writing by manufacturer for up to 30 days of weather exposure.
- F. Insulation Fasteners: Impaling clip of galvanized steel with washer retainer and clips, to be adhered to surface to receive insulation, length to suit insulation thickness and substrate, capable of securely and rigidly fastening insulation in place.
- G. Nails or Staples: Steel wire; electroplated or galvanized; type and size to suit application.

- H. Adhesive: Type recommended by insulation manufacturer for application.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.
- B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.2 BOARD INSTALLATION AT FOUNDATION PERIMETER

- A. Adhere a 6 inches wide strip of polyethylene sheet over construction, control, and expansion joints with double beads of adhesive each side of joint.
 - 1. Tape seal joints.
 - 2. Extend sheet full height of joint.
- B. Apply adhesive to back of boards:
 - 1. Three continuous beads per board length.
- C. Install boards horizontally on foundation perimeter.
 - 1. Place boards to maximize adhesive contact.
 - 2. Install in running bond pattern.
 - 3. Butt edges and ends tightly to adjacent boards and to protrusions.
- D. Extend boards over expansion joints, unbonded to foundation on one side of joint.
- E. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.3 BOARD INSTALLATION AT EXTERIOR WALLS

- A. Adhere 6 inches wide strip of polyethylene sheet over expansion joints with double beads of adhesive each side of joint.
 - 1. Tape seal joints between sheets.
- B. Apply adhesive to back of boards:
 - 1. Three continuous beads per board length.
- C. Install boards horizontally on walls.
 - 1. Place boards to maximize adhesive contact.
 - 2. Install in running bond pattern.
 - 3. Butt edges and ends tightly to adjacent boards and protrusions.
- D. Extend boards over expansion joints, unbonded to wall on one side of joint.

- E. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.4 BOARD INSTALLATION AT CAVITY WALLS

- A. Adhere a 6 inches wide strip of polyethylene sheet over expansion joints with double beads of adhesive each side of joint.
 - 1. Tape seal joints between sheets.
- B. Apply adhesive to back of boards:
 - 1. Three continuous beads per board length.
- C. Install boards to fit snugly between wall ties.
- D. Install boards horizontally on walls.
 - 1. Place boards to maximize adhesive contact.
 - 2. Install in running bond pattern.
 - 3. Butt edges and ends tightly to adjacent boards and protrusions.
- E. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
- F. Place 6 inches wide polyethylene sheet at perimeter of wall openings, from adhesive vapor retarder bed to window and door frames, and tape seal in place to ensure continuity of vapor retarder and air seal.

3.5 BOARD INSTALLATION UNDER CONCRETE SLABS

- A. Place insulation under slabs on grade after base for slab has been compacted.
- B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
- C. Prevent insulation from being displaced or damaged while placing vapor retarder and placing slab.

3.6 BATT INSTALLATION

- A. Install insulation and vapor retarder in accordance with manufacturer's instructions.
- B. Install in interior wall spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

3.7 PROTECTION

- A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION 072100

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SECTION 072700 - AIR BARRIERS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Air barriers.

1.2 DEFINITIONS

- A. Air Barrier: Airtight barrier made of material that is virtually air impermeable but water vapor permeable, both to amount as specified, with sealed seams and sealed joints to adjacent surfaces.

1.3 REFERENCE STANDARDS

- A. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2021.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
- C. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2023.
- D. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials; 2021a.

1.4 SUBMITTALS

- A. Product Data: Provide data on material characteristics, performance criteria, and limitations.
- B. Shop Drawings: Provide drawings of special joint conditions.
- C. Manufacturer's Installation Instructions: Indicate preparation, installation methods, and storage and handling criteria.
- D. Installer's qualification statement.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience.

1.6 MOCK-UPS

- A. Construct air barrier mock-up, 3 feet long by 4 feet wide.
- B. Locate where directed.
- C. Mock-up may remain as part of work.

1.7 FIELD CONDITIONS

- A. Maintain temperature and humidity recommended by materials manufacturers before, during, and after installation.

PART 2 PRODUCTS

2.1 AIR BARRIER MATERIALS (AIR IMPERMEABLE AND WATER VAPOR PERMEABLE)

- A. Air Barrier, Fluid Applied: Vapor semi-permeable, elastomeric waterproofing.
 - 1. Air Barrier Coating:
 - a. Air Permeance: 0.004 cfm/sq ft, maximum, when tested in accordance with ASTM E2178.
 - b. Water Vapor Permeance: 11 perms, minimum, when tested in accordance with ASTM E96/E96M using Procedure B - Water Method, at 73.4 degrees F.
 - c. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less, Class A when tested in accordance with ASTM E84.
 - d. VOC Content: Zero.
 - e. Sealants, Tapes and Accessories: As recommended by coating manufacturer.
 - f. Products:
 - 1) Henry Company; Air-Bloc All Weather STPE: www.henry.com/#sle.
 - 2) Hohmann & Barnard, Inc; ENVIRO-BARRIER STPE: www.h-b.com/#sle.

2.2 ACCESSORIES

- A. Sealants, Tapes, and Accessories for Sealing Air Barrier and Adjacent Substrates: As indicated or in compliance with air barrier manufacturer's installation instructions.
- B. Sealant for Cracks and Joints In Substrates: Resilient elastomeric joint sealant compatible with substrate and air barrier materials.
- C. Primer: Liquid applied polymer.
- D. Flexible Flashing: Self-adhesive sheet flashing complying with ASTM D1970/D1970M, except slip resistance requirement waived if not installed on roof.
 - 1. Width: 4 inches.

2. Ultraviolet (UV) and Weathering Resistance: Approved by manufacturer for up to 30 days of weather exposure.
3. Products:
 - a. Henry Company; FortiFlash: www.henry.com/#sle.
 - b. Henry Company; FortiFlex Butyl: www.henry.com/#sle.
 - c. Henry Company; FortiFlash Butyl: www.henry.com/#sle.
- E. Sill Plate Sealer: Closed-cell foam tape with rubberized adhesive membrane; bridges gap between foundation structure and sill plate or skirt board.
 1. Width: 3-1/2 inches.
 2. Ultraviolet (UV) and Weathering Resistance: Approved by manufacturer for up to 30 days of weather exposure.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces and conditions are ready for work of this section.
- B. Where existing conditions are responsibility of another installer, notify Architect of unsatisfactory conditions.
- C. Do not proceed with this work until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.
- B. Clean and prime substrate surfaces to receive adhesives and sealants in accordance with manufacturer's installation instructions.

3.3 INSTALLATION

- A. Install materials in accordance with manufacturer's installation instructions.
- B. Air Barriers: Install continuous airtight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.
- C. Apply sealants and adhesives within recommended temperature range in accordance with manufacturer's installation instructions.
- D. Fluid-Applied Coatings or Membranes:
 1. Prepare substrate in accordance with manufacturer's installation instructions; treat joints in substrate and between dissimilar materials as indicated.

2. Use flashing to seal to adjacent construction and to bridge joints in coating substrate.

E. Openings and Penetrations in Exterior Air Barriers:

1. Install flashing over sills, covering entire sill frame member, extending at least 5 inches onto air barrier and at least 6 inches up jambs; mechanically fasten stretched edges.
2. At openings with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with sealing tape at least 4 inches wide; do not seal sill flange.
3. At openings with nonflanged frames, seal air barrier to each side of framing at opening using flashing at least 9 inches wide, and covering entire depth of framing.
4. At head of openings, install flashing under air barrier extending at least 2 inches beyond face of jambs; seal air barrier to flashing.
5. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.
6. Service and Other Penetrations: Form flashing around penetrating item and seal to air barrier surface.

3.4 PROTECTION

- A. Do not leave materials exposed to weather longer than recommended by manufacturer.

END OF SECTION 072700

SECTION 074113.16 - STANDING-SEAM METAL ROOF PANELS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Standing-seam metal roof panels.
 - 2. Roof Sheathing panels, as indicated.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Meet with Owner, Architect, Owner's insurer if applicable, metal panel Installer, metal panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal panels, including installers of roof accessories and roof-mounted equipment.
 - 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 3. Review methods and procedures related to metal panel installation, including manufacturer's written instructions.
 - 4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
 - 5. Review structural loading limitations of purlins and rafters during and after roofing.
 - 6. Review flashings, special details, drainage, penetrations, equipment curbs, and condition of other construction that affect metal panels.
 - 7. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
 - 8. Review temporary protection requirements for metal panel systems during and after installation.
 - 9. Review procedures for repair of metal panels damaged after installation.
 - 10. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.
- B. Shop Drawings:
 - 1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
 - 2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches (1:10).
- C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.
 - 1. Include similar Samples of trim and accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
 - 1. Metal Panels: 12 inches (305 mm) long by actual panel width. Include clips, fasteners, closures, and other metal panel accessories.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- C. Field quality-control reports.
- D. Sample Warranties: For special warranties.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. UL-Certified, Portable Roll-Forming Equipment: UL-certified, portable roll-forming equipment capable of producing metal panels warranted by manufacturer to be the same as factory-formed products. Maintain UL certification of portable roll-forming equipment for duration of work.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

1.8 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.9 COORDINATION

- A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.
- B. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including rupturing, cracking, or puncturing.
 - b. Deterioration of metals and other materials beyond normal weathering.
 - 2. Warranty Period: Two years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show 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 Delta E 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: 20 years from date of Substantial Completion.
- C. Special Weathertightness Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.
 1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Energy Performance: Provide roof panels that are listed on the EPA/DOE's ENERGY STAR "Roof Product List" for low-slope roof products.
- B. Energy Performance: Provide roof panels according to one of the following when tested according to CRRC-1:
 1. Three-year, aged Solar Reflectance Index of not less than 78 when calculated according to ASTM E1980.
- C. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:
 1. Wind Loads: As indicated on Drawings.
 2. Other Design Loads: As indicated on Drawings.
 3. Deflection Limits: For wind loads, no greater than 1/180 of the span.
- D. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) when tested according to ASTM E1680 at the following test-pressure difference:
 1. Test-Pressure Difference: 40 lbf/sq. ft. (75 Pa).
- E. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E1646 at the following test-pressure difference:
 1. Test-Pressure Difference: 40 lbf/sq. ft. (137 Pa).
- F. Roofing System Design: Provide roofing system that meets or exceeds the following:
 1. Design roof system to withstand 90 mph wind uplift for peak wind gust.
- G. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 STANDING-SEAM METAL ROOF PANELS

- A. Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.
 - 1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E1514.
- B. Structural Standing Seam Metal Roof Panels: Field fabricated roof panels.
 - 1. Basis of Design: Morin - A Kingspan Group Company; SymmeTry Roof Series, with Clip Relief.
 - 2. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 (Z275) coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 (Class AZM150) coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
 - a. Nominal Thickness: 0.034 inch (0.86 mm).
 - b. Exterior Finish: Three-coat Metallic fluoropolymer.
 - c. Color: Custom match to existing metal wall panel Fascia.
 - 3. Clips: Two-piece floating to accommodate thermal movement.
 - a. Material: 0.064-inch- (1.63-mm-) nominal thickness, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.
 - 4. Panel Coverage: 12 inches (305 mm).
 - 5. Panel Height: 1.5 inches (38 mm).

2.3 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 30 mils (0.76 mm) thick, consisting of slip-resistant, polyethylene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.

2.4 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C645; cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A792/A792M, Class AZ50 (Class AZM150) coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.
 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Panel Fasteners: Self-tapping screws designed to withstand design loads.
- E. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
 2. Joint Sealant: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
- F. Roof Sheathing: Exterior Grade sheathing, as acceptable by roofing manufacturer.

2.5 FABRICATION

- A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.
- C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

- D. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- E. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
 - 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 - 2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 - 3. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
 - 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 - 5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal panel manufacturer for application, but not less than thickness of metal being secured.

2.6 FINISHES

- 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: 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 same piece are unacceptable. 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.
- C. Steel Panels and Accessories:
 - 1. Three-Coat Metallic Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 2. Custom Color to be provided by the Architect.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
 - 1. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.
- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

3.3 INSTALLATION OF STANDING SEAM METAL ROOF PANELS

- A. Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 1. Shim or otherwise plumb substrates receiving metal panels.
 - 2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
 - 3. Install screw fasteners in predrilled holes.
 - 4. Locate and space fastenings in uniform vertical and horizontal alignment.
 - 5. Install flashing and trim as metal panel work proceeds.
 - 6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 - 7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
 - 8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners:
 - 1. Steel Panels: Use stainless steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.

- C. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.
- D. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.
- E. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.
 - 1. Install clips to supports with self-tapping fasteners.
 - 2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
 - 3. Watertight Installation:
 - a. Apply a continuous ribbon of sealant or tape to seal joints of metal panels, using sealant or tape as recommend in writing by manufacturer as needed to make panels watertight.
 - b. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
 - c. At panel splices, nest panels with minimum 6-inch (152-mm) end lap, sealed with sealant and fastened together by interlocking clamping plates.
- F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
 - 1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal roof panel manufacturers; or, if not indicated, types recommended by metal roof panel manufacturer.
- G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
 - 1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof and weather-resistant performance.

2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (610 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).
- H. Roof Curbs: Install flashing around bases where they meet metal roof panels.
- I. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

3.4 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align metal panel units within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines as indicated and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.5 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect metal roof panel installation, including accessories. Report results in writing.
- B. Remove and replace applications of metal roof panels where tests and inspections indicate that they do not comply with specified requirements.
- C. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.
- D. Prepare test and inspection reports.

3.6 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
- B. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074113.16

SECTION 074113 - METAL ROOF PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Vented Soffit Panels.

1.2 REFERENCE STANDARDS

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Storage and handling requirements and recommendations.
 - 2. Installation methods.
 - 3. Specimen warranty.
- B. Shop Drawings: Include layouts of panels, details of edge and penetration conditions, spacing and type of connections, flashings, underlayments, and special conditions.
 - 1. Show work to be field-fabricated or field-assembled.
- C. Selection Samples: For each roofing system specified, submit color chips representing manufacturer's full range of available colors and patterns.
- D. Warranty: Submit specified manufacturer's warranty and ensure that forms have been completed in Owner's name and are registered with manufacturer.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section and with at least three years of documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Provide strippable plastic protection on prefinished roofing panels for removal after installation.
- B. Store roofing panels on project site as recommended by manufacturer to minimize damage to panels prior to installation.

1.6 FIELD CONDITIONS

- A. Do not install panels, when surface, ambient air, or wind chill temperatures are below 45 degrees F.

1.7 WARRANTY

- A. Finish Warranty: Provide 5-year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking. Complete forms in Owner's name and register with warrantor.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Metal Soffit Panels Manufacturers:
 - 1. Elevate; UNA-CLAD UC-750 V-Groove Soffit Panel: www.holcimelevate.com/#sle.

2.2 ATTACHMENT SYSTEM

- A. Concealed System: Provide manufacturer's standard stainless steel or nylon-coated aluminum concealed anchor clips designed for specific system and engineered to meet performance requirements, including anticipated thermal movement.

2.3 FINISHES

- A. Fluoropolymer Coil Coating System: Polyvinylidene fluoride (PVDF) multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent PVDF resin, and at least 80 percent of coil coated metal surfaces having minimum total dry film thickness (DFT) of 0.9 mil, 0.0009 inch; color and gloss as selected by Architect from manufacturer's standard line.

2.4 ACCESSORIES

- A. Miscellaneous Sheet Metal Items: Provide flashings, trim, caps, and equipment curbs of the same material, thickness, and finish as used for the roofing panels. Items completely concealed after installation may optionally be made of stainless steel.
- B. Sealants:
 - 1. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
 - 2. Concealed Sealant: Non-curing butyl sealant or tape sealant.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Remove protective film from surface of roof panels immediately prior to installation; strip film carefully to avoid damage to prefinished surfaces.
- B. Separate dissimilar metals by applying a bituminous coating, self-adhering rubberized asphalt sheet, or other permanent method approved by metal roof panel manufacturer.

3.3 INSTALLATION

- A. Overall: Install system in accordance with approved shop drawings and metal manufacturer's instructions and recommendations, as applicable to specific project conditions; securely anchor components of roofing system in place allowing for thermal and structural movement.
 - 1. Minimize field cutting of panels. Where field cutting is required, use methods that will not distort panel profiles. Use of torches for field cutting is prohibited.
- B. Accessories: Install necessary components that are required for complete assembly, including flashings, trim, preformed crickets, caps, equipment curbs, rib closures, ridge closures, and similar roof accessory items.

3.4 CLEANING

- A. Clean exposed sheet metal work at completion of installation. Remove grease and oil films, excess joint sealer, handling marks, and debris from installation, leaving the work clean and unmarked, free from dents, creases, waves, scratch marks, or other damage to the finish.

3.5 PROTECTION

- A. Do not permit storage of materials or roof traffic on installed roof panels. Provide temporary walkways or planks as necessary to avoid damage to completed work. Protect roofing until completion of project.
- B. Touch-up, repair, or replace damaged roof panels or accessories before Date of Substantial Completion.

END OF SECTION 074113

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SECTION 075323 - ETHYLENE-PROPYLENE-DIENE-MONOMER ROOFING (EPDM)

PART 1 GENERAL

1.1 Section Includes

- A. EPDM membrane roofing system and accessories.
- B. Cover board.
- C. Insulation.
- D. Vapor retarder.
- E. Deck sheathing.

1.2 Reference Standards

- A. ANSI/SPRI/FM 4435/ES-1 - Test Standard for Edge Systems Used with Low Slope Roofing Systems; 2022.
- B. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2019, with Editorial Revision (2023).
- C. ASTM C209 - Standard Test Methods for Cellulosic Fiber Insulating Board; 2020.
- D. ASTM C473 - Standard Test Methods for Physical Testing of Gypsum Panel Products; 2024.
- E. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.
- F. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2017.
- G. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2023a.
- H. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics; 2016 (Reapproved 2023).
- I. ASTM D1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics; 2020.

- J. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2025.
- K. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.
- L. ASTM D4637/D4637M - Standard Specification for EPDM Sheet Used in Single-Ply Roof Membrane; 2015 (Reapproved 2021).
- M. ASTM D4811/D4811M - Standard Specification for Nonvulcanized (Uncured) Rubber Sheet Used as Roof Flashing; 2016 (Reapproved 2023).
- N. ASTM D5147/D5147M - Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Material; 2018.
- O. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
- P. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2024a.
- Q. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 Degrees C; 2024c.
- R. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials; 2021a.
- S. FM (AG) - FM Approval Guide; Current Edition.
- T. NRCA (RM) - The NRCA Roofing Manual; 2025.

1.3 Administrative Requirements

- A. Coordination:
 - 1. Coordinate with installation of associated counter flashings and roof drainage components installed under other sections.
 - 2. Coordinate installation with adjacent flashings and air barrier systems for compatibility and continuity.
- B. Preinstallation Meeting: Convene one week before starting work of this section.
 - 1. Agenda:
 - a. Sequence of construction.
 - b. Coordination with substrate preparation.
 - c. Roofing materials approved for use.
 - d. Coordination with installation of adjacent and covering materials.
 - e. Construction details.

2. Require attendance of parties directly influencing roofing work quality or affected by roofing work performance.

1.4 Submittals

- A. Product Data:
 1. Provide membrane manufacturer's printed data showing roofing system components comply with specified requirements and with membrane manufacturer's requirements and recommendations for system type specified; include data for each product used in conjunction with roofing membrane, including insulation and fasteners.
 2. Provide documentation showing roofing system is UL classified or FM approved where UL or FM requirements are specified; include data itemizing classified or approved system components.
- B. Shop Drawings: Indicate membrane manufacturer's standard details drawn to scale and customized for project for relevant conditions.
 1. Include flashings, base tie-ins, roof edges, terminations, expansion joints, penetrations, and drains.
 2. For tapered insulation, indicate project-specific layout, slopes, thicknesses, and dimensions.
- C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- D. Manufacturer's Instructions: Indicate installation of components; where instructions allow installation options, clearly indicate which option to use.
- E. Installer's qualification statement.
- F. Executed warranty.
- G. Specimen Warranty: Submit before starting work.

1.5 Quality Assurance

- A. Installer Qualifications: Company specializing in performing work of this section with minimum five years of documented experience installing specified system and having the following:
 1. Current Elevate Master Contractor status.
- B. Documents at Project Site: Maintain at project site one copy of manufacturer's installation instructions.

1.6 Delivery, Storage, and Handling

- A. Deliver products in manufacturer's original containers, dry and undamaged, with seals and labels intact and legible.
- B. Store materials clear of ground and moisture with weather-protective covering.
- C. Keep combustible materials away from ignition sources.
- D. Ensure storage and staging of materials does not exceed static and dynamic loadbearing capacities of roof decking.
- E. Protect foam insulation from direct exposure to sunlight.

1.7 Field Conditions

- A. Do not apply roofing membrane during unsuitable weather or when ambient conditions conflict with manufacturer's installation instructions.
- B. Schedule applications so no partially completed sections of roof are left exposed at end of workday.

1.8 Warranty

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Comply with warranty procedures required by manufacturer, including notifications, scheduling, and inspections.
- C. Manufacturer Warranty: Full system warranty; 30-year Platinum limited warranty covering membrane, roof insulation, and membrane accessories.
 - 1. Liability Limit: No dollar limitation.
 - 2. Scope of Coverage: Repair leaks in roofing system caused by:
 - a. Ordinary wear and tear of elements.
 - b. Manufacturing defects in Elevate brand materials.
 - c. Defective workmanship used to install materials.
 - d. Damage due to winds up to 90 mph.
 - e. Hail up to 2 inches in diameter.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Membrane Roofing System:
 - 1. Elevate: www.holcimelevate.com/#sle.
- B. Source Limitations: Furnish products produced by single manufacturer.

2.2 EPDM Membrane Roofing System

- A. Description: EPDM single-ply membrane.
 - 1. Membrane Attachment: Fully adhered.
 - 2. Provide assembly having Underwriters Laboratories, Inc. (UL) Class B fire hazard classification.
- B. Components, from Top of Roof Down:
 - 1. Membrane: Thickness as specified below.
 - 2. Cover Board: High-density polyisocyanurate; 1/2 inch thick; adhered.
 - 3. Insulation:
 - a. Maximum Board Thickness: 3 inches; use as many layers as necessary; stagger joints in adjacent layers.
 - b. Total System R-value: value as indicated in drawings, minimum.

2.3 Membrane Materials

- A. Roofing and Flashing Membrane: Cured synthetic single-ply membrane composed of EPDM with the following properties:
 - 1. Reinforcement: None; membrane complying with ASTM D4637/D4637M, Type I.
 - 2. Membrane and Flashing Color: Black.
 - 3. Thickness: 60 mils, 0.06 inch
 - 4. Nominal Thickness Tolerance: Plus/minus 10 percent.
 - 5. Products:
 - a. Elevate; RubberGard Platinum EPDM Membrane.
- B. Flashing Membrane: Self-curing, nonreinforced membrane composed of nonvulcanized EPDM rubber, complying with ASTM D4811/D4811M, Type II, with the following properties:
 - 1. Thickness: 55 mils, 0.055 inch.
 - 2. Product: Elevate; RubberGard EPDM FormFlash.
- C. Self-Adhesive Flashing Membrane: Semi-cured 45-mil, 0.045-inch EPDM membrane laminated to 35-mil, 0.035-inch EPDM tape adhesive.
 - 1. Product: Elevate; QuickSeam Flashing.
- D. Premolded Pipe Flashings: EPDM, molded for quick adaptation to different sized pipes.
 - 1. Product: Elevate; EPDM Pipe Flashing.
- E. Self-Adhesive Lap Splice Tape: 35 mil EPDM based, formulated for compatibility with EPDM membrane and high-solids primer.
 - 1. Product: Elevate; QuickSeam Splice Tape.
- F. Splice Adhesive: Manufacturer's recommended synthetic polymer-based, formulated for compatibility with EPDM membrane and metal surfaces.

- G. Bonding Adhesive: Manufacturer's recommended bonding adhesive, formulated for compatibility with EPDM membrane and other substrate materials, including masonry, wood, and insulation facings.
 - 1. Provide Low VOC formulation.
- H. Adhesive Primer: Manufacturer's recommended primer formulated for compatibility with EPDM membrane and tape adhesive.
 - 1. Provide low VOC formulation.
- I. Lap Sealant: Manufacturer's recommended lap sealant formulated for compatibility with primers and flashings.
- J. Seam Edge Treatment: Manufacturer's recommended EPDM rubber-based sealant, formulated for sealing exposed membrane edges at seams.
- K. Termination Bars: Aluminum bars with integral caulk ledge; 1.3 inches wide by 0.1 inch thick.
 - 1. Product: Elevate; Termination Bar.
- L. Roof Walkway Pads: EPDM, 0.3 inch thick and 30 by 30 inches with EPDM tape adhesive strips laminated to bottom.
 - 1. Product: Elevate; QuickSeam Walkway Pads.

2.4 Cover Boards

- A. High-Density Polyisocyanurate Cover Board: Water-resistant, high-density, closed-cell polyisocyanurate core with coated glass mat facers complying with ASTM C1289, Type II, Class 4 and the following characteristics:
 - 1. Thermal Value: R-value of 2.5, when tested in accordance with ASTM C518 and ASTM C177.
 - 2. Surface Water Absorption by Volume: 3 percent, maximum, when tested in accordance with ASTM C209.
 - 3. Compressive Strength: Grade 1, 120 psi, when tested in accordance with ASTM D1621.
 - 4. Density: 5 pcf, when tested in accordance with ASTM D1622.
 - 5. Factory Mutual approved for use with FM 1-60 and 1-90 rated roofing assemblies.
 - 6. Mold Growth Resistance: Zero growth, when tested in accordance with ASTM D3273 for minimum of four weeks.
 - 7. Product: Elevate; ISOGARD HD Cover Board.
- B. Glass-Mat Faced Gypsum Cover Boards: Noncombustible, water-resistant gypsum core with embedded glass mat facers, complying with ASTM C1177/C1177M, with the following additional characteristics:

1. Water Absorption: 10 percent maximum, when tested in accordance with ASTM C473.
2. Surface Burning Characteristics: Flame spread index of 0, smoke developed index of 0, when tested in accordance with ASTM E84.
3. Combustibility: Noncombustible, when tested in accordance with ASTM E136.
4. Factory Mutual approved for use with FM 1-60 and 1-90 rated roofing assemblies.
5. Mold Growth Resistance: Zero growth, when tested in accordance with ASTM D3273 for minimum of four weeks.
6. Products:
 - a. Georgia-Pacific; DensDeck: www.buildgp.com/densdeck/#sle.
 - b. USG; Securock UltraLight Glass-Mat Roof Board: www.usg.com/#sle.

2.5 Insulation

- A. Polyisocyanurate Board Insulation: Closed-cell polyisocyanurate foam laminated to facers, complying with ASTM C1289, Type II, Class 1, with the following additional characteristics:
 1. Compressive Strength: 20 psi when tested in accordance with ASTM D1621.
 2. Ozone Depletion Potential: Zero; made without CFC- or HCFC-blowing agents.
 3. Mold Growth Resistance: Zero growth, when tested in accordance with ASTM D3273 for minimum of four weeks.
 4. Product:
 - a. Elevate; ISOGARD GL Polyisocyanurate Insulation.
- B. Insulation Fasteners: Type and size as required by roof membrane manufacturer for roofing system and warranty; use only fasteners furnished by roof membrane manufacturer. **If fasteners are required for the base layer of insulation, reivew locations with the Architect. No fasteners are to be seen from inside the building in areas where the underside of the roof deck are exposed.**
- C. Adhesive for Insulation Attachment: Type as required by roof membrane manufacturer for roofing system and warranty; use only adhesives furnished by roof membrane manufacturer.

2.6 Vapor Retarder Materials

- A. Self-Adhering Membrane Vapor Retarder: SBS-modified bitumen adhesive, factory-laminated to tri-laminate woven, high-density polyethylene top surface with release liner.
 1. Thickness: 30 mils, 0.03 inch, minimum.
 2. Low-Temperature Flexibility: 0.0325 inch at minus 30 degrees F when tested in accordance with ASTM D5147/D5147M.

3. Air Permeance: 0.004 cfm/sq ft, maximum, when tested in accordance with ASTM E2178.
 4. Water Vapor Permeance: 0.04 perm, maximum, when tested in accordance with ASTM E96/E96M using Procedure B - Water Method.
 5. Water Penetration Resistance around Nails: Pass, when tested in accordance with ASTM D1970/D1970M.
 6. Product: Elevate; V-Force.
- B. Adhesive: As recommended by roofing membrane manufacturer.

2.7 Metal Accessories

- A. Metal Roof Edging and Fascia: Continuous metal edge member serving as termination of roof membrane and retainer for metal fascia; watertight with no exposed fasteners; mounted to roof edge nailer.
1. Wind Performance:
 - a. Membrane Pull-Off Resistance: 100 lb/ft, minimum, when tested in accordance with ANSI/SPRI/FM 4435/ES-1 using test method RE-1.
 - b. Fascia Pull-Off Resistance: At least minimum required when tested in accordance with ANSI/SPRI/FM 4435/ES-1 using test method RE-2.
 - c. Provide product listed in FM (AG) with at least FM 1-270 rating.
 2. Profile: as indicated.
 3. Fascia Face Height: refer to drawings for inches.
 4. Fascia Material and Finish: 24-gauge, 0.024-inch galvanized steel with Kynar 500 finish in manufacturer's standard color; matching concealed joint splice plates; factory-installed protective plastic film.
 5. Length: 144 inches.
 6. Anchor Bar Cleat: 20-gauge, 0.036-inch galvanized steel with prepunched holes.
 7. Fasteners: Factory-provided corrosion-resistant fasteners with drivers; no exposed fasteners permitted.
- B. Parapet Copings: Formed metal coping with galvanized steel anchor and support cleats for capping parapet wall; watertight, maintenance free, without exposed fasteners; butt-type joints with concealed splice plates; mechanically fastened as indicated; Elevate PTCF.
1. Wind Performance:
 - a. At least minimum required when tested in accordance with ANSI/SPRI/FM 4435/ES-1 using test method RE-3.
 2. Profile: as indicated.
 3. Material and Finish: 24-gauge, 0.024-inch thick galvanized steel with Kynar 500 finish in manufacturer's standard color; matching concealed joint splice plates; factory-installed protective plastic film.
 4. Dimensions:
 - a. Wall Width: As indicated on drawings.

- b. Length: 144 inches, minimum.
- 5. Anchor or Support Cleats: 20-gauge, 0.036-inch thick prepunched galvanized cleat with 12-inch wide stainless steel spring mechanically locked to cleat at 72 inches on center.
- 6. Fasteners: Factory-provided corrosion-resistant fasteners, with drivers; no exposed fasteners permitted.

PART 3 EXECUTION

3.1 Examination

- A. Examine roof deck to determine deck is sufficiently rigid to support installers and mechanical equipment so deflection will not strain or rupture roof components or deform deck.
- B. Verify surfaces and site conditions are ready to receive work. Correct defects in substrate before commencing with roofing work.
- C. Examine roof substrate to verify adequate slope to drains.
- D. Verify specifications and drawing details are workable and not in conflict with roofing manufacturer's recommendations and instructions; start of work constitutes acceptable project conditions and requirements.
- E. Verify wood nailers are installed according to manufacturer's instructions.

3.2 Preparation - General

- A. Take appropriate measures to ensure fumes from adhesive solvents are not drawn into building through air intakes.
- B. Before proceeding, ensure roof surface is clean, dry, and smooth and free of sharp edges, fins, roughened surfaces, loose or foreign materials, oil, grease, and other materials that may damage membrane.
- C. Fill surface voids in immediate substrate greater than 1/4-inch wide with fill material insulation approved by insulation and membrane manufacturers.
- D. Seal, grout, or tape deck joints where needed to prevent bitumen seepage into building.
- E. Wood Nailers: Provide wood nailers at perimeters and other locations where indicated on drawings.
 - 1. Install with 1/8-inch gap between each length and at each change of direction.
- F. Protect adjacent construction, property, vehicles, and persons from damage related to roofing work; repair or restore damage caused by roofing work.

1. Protect from spills and overspray from bitumen, adhesives, sealants, and coatings.
2. Protect metal, glass, plastic, and painted surfaces from bitumen, adhesives, and sealants within range of windborne overspray.
3. Protect finished areas of roofing system from roofing-related work traffic and traffic by other trades.

3.3 Installation - General

- A. Install roofing, insulation, flashings, and accessories in accordance with roofing manufacturer's published instructions and recommendations for specified roofing system. Where manufacturer provides no instructions or recommendations, follow NRCA (RM) written requirements and industry standards. Comply with federal, state, and local regulations.
- B. Obtain relevant instructions and maintain copies at project site for duration of installation period.
- C. Provide temporary closures to ensure moisture does not damage completed roofing. Use flashings, terminations, and temporary closures to provide watertight installation.

3.4 Installation - Vapor Retarder

- A. Before installing insulation, install vapor retarder directly over deck.
- B. Install vapor retarder in accordance with manufacturer's written instructions.
- C. Ensure penetrations and edge conditions are sealed to prevent moisture and air drive into roofing system.

3.5 Installation - Insulation

- A. Install insulation in accordance with manufacturer's written instructions.
- B. Install only as much insulation as can be covered with completed roofing system before end of day's work or before onset of inclement weather.
- C. Lay roof insulation in courses parallel to roof edges.
- D. Neatly and tightly fit insulation to penetrations, projections, and nailers, with gaps not greater than 1/4 inch. Fill gaps greater than 1/4 inch with acceptable insulation. Do not leave roofing membrane unsupported over space greater than 1/4 inch.
- E. Cold Adhesive Attachment: Apply in accordance with membrane manufacturer's instructions and recommendations; apply pressure to individual roof insulation boards to obtain maximum adhesive contact.

3.6 Installation - Cover Board

- A. Install in accordance with membrane manufacturer's instructions and recommendations.
- B. Cold Adhesive Attachment: Apply pressure to individual boards to obtain maximum adhesive contact.

3.7 Installation - Single-Ply Membrane

- A. Beginning at low point of roof, place membrane without stretching over substrate and allow to relax before attachment or splicing. Refer to membrane manufacturer's guidelines for minimum relaxation time.
- B. Lay out membrane pieces so field and flashing splices are installed to shed water.
- C. Install membrane without wrinkles and without gaps or fishmouths in seams; bond and test seams and laps in accordance with membrane manufacturer's instructions and details.
- D. Adhered Membrane: Bond membrane sheet to substrate using membrane manufacturer's recommended bonding material, application rate, and procedures.
- E. Edge Securement: Secure membrane at locations where membrane terminates or goes through angle change greater than 2 in 12 inches using mechanically-fastened reinforced perimeter fastening strips, plates, or metal edging as indicated in drawings, or as recommended by roofing manufacturer.
 - 1. Exceptions: Round pipe penetrations less than 18 inches in diameter and square penetrations less than 4 inches wide.

3.8 Installation - Flashing and Accessories

- A. Install flashings, including laps, splices, joints, bonding, adhesion, and attachment, as required by membrane manufacturer's recommendations and details.
- B. Metal Accessories: Install metal edgings, gravel stops, and copings in locations indicated on drawings, with horizontal leg of edge member over membrane, and flashing over metal onto membrane.
 - 1. Follow roofing manufacturer's instructions.
- C. Roofing Expansion Joints: Install as shown on drawings and as recommended by roofing manufacturer.
- D. Install weathertight flashing at walls, curbs, parapets, curbs, skylights, and other vertical and sloped surfaces.
 - 1. Extend flashing minimum 12 inches above membrane surface unless otherwise noted on drawings.
 - 2. Use longest practical flashing pieces.

3. Evaluate substrate and overlay; adjust installation procedure in accordance with membrane manufacturer's recommendations.
4. Complete splices between flashing and main roof sheet with specified splice adhesive before adhering flashing to vertical surfaces.

E. Roof Drains:

1. Taper insulation around drain to provide smooth transition from roof surface to drain. Use specified premanufactured tapered insulation with facer or suitable bonding surface to achieve slope; slope not to exceed manufacturer's recommendations.
2. Position membrane, then cut hole for roof drain to allow 1/2 to 3/4 inch of membrane to extend inside clamping ring past drain bolts.
3. Make round holes in membrane to align with clamping bolts; do not cut membrane back to bolt holes.
4. Apply sealant on top of drain bowl where clamping ring seats below membrane.
5. Install roof drain clamping ring and clamping bolts; tighten clamping bolts to achieve constant compression.

F. Flash penetrations passing through membrane; make flashing seals directly to penetration.

1. Pipes, Round Supports, and Similar Items: Flash with specified premolded pipe flashings wherever practical; otherwise, use specified self-curing elastomeric flashing.
2. Pipe Clusters and Unusual Shaped Penetrations: Provide penetration pocket at least 2 inches deep, with at least 1-inch clearance from penetration; fill with manufacturer's pourable sealer and slope to shed water.
3. Structural Steel Tubing: If corner radii are greater than 1/4 inch and longest side of tube does not exceed 12 inches, flash as for pipes; otherwise, provide standard curb with flashing.
4. Flexible and Moving Penetrations: Provide weathertight gooseneck set in sealant and secured to deck, flashed as recommended by manufacturer.
5. High-Temperature Surfaces: Protect elastomeric components from direct contact with hot surfaces using intermediate insulated sleeve as flashing substrate as recommended by membrane manufacturer when in-service temperature is or can be over 180 degrees F,

3.9 Installation - Finishing and Walkways

- A. Install walkways at access points to roof, around rooftop equipment requiring maintenance, and where indicated on drawings.
 1. Do not install walkway pads within 10 feet of roof edge or perimeter.
- B. Walkway Pads: Adhere to roofing membrane, spacing each pad at minimum of 1 inch and maximum of 3 inches from each other to allow for drainage.

1. If installation of walkway pads over field-fabricated splices or within 6 inches of splice edge cannot be avoided, adhere another layer of flashing over splice and extending beyond walkway pad minimum of 6 inches on either side.
2. Prime membrane, remove release paper on pad, press in place, and walk on pad to ensure adhesion.

3.10 Field Quality Control

- A. **Inspection by Manufacturer: Provide final inspection of roofing system by technical representative employed by roofing system manufacturer to inspect installation for warranty purposes, not a sales person.**
- B. Perform corrections necessary for issuance of warranty.

3.11 Cleaning

- A. Clean contaminants generated by roofing work from building and surrounding areas, including bitumen, adhesives, sealants, and coatings.
- B. Remove leftover materials, trash, debris, and equipment from project site and surrounding areas.

3.12 Protection

- A. Where construction traffic continues over finished roof panels, provide durable protection and replace or repair damaged roofing to original condition.

END OF SECTION 075323

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SECTION 075423 - THERMOPLASTIC-POLYOLEFIN ROOFING (TPO)

PART 1 GENERAL

1.1 Section Includes

- A. TPO membrane roofing system and accessories.
- B. Cover board.
- C. Insulation.

1.2 Reference Standards

- A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
- B. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2019, with Editorial Revision (2023).
- C. ASTM C209 - Standard Test Methods for Cellulosic Fiber Insulating Board; 2020.
- D. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.
- E. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2023a.
- F. ASTM C1549 - Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer; 2016 (Reapproved 2022).
- G. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics; 2016 (Reapproved 2023).
- H. ASTM D1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics; 2020.
- I. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.
- J. ASTM D6878/D6878M - Standard Specification for Thermoplastic Polyolefin-Based Sheet Roofing; 2021.
- K. NRCA (RM) - The NRCA Roofing Manual; 2025.

1.3 Administrative Requirements

- A. Preinstallation Meeting: Convene one week before starting work of this section.
 - 1. Agenda:
 - a. Sequence of construction.
 - b. Coordination with substrate preparation.
 - c. Roofing materials approved for use.
 - d. Compatibility of materials.
 - e. Coordination with installation of adjacent and covering materials.
 - f. Construction details.
 - 2. Require attendance of parties directly influencing roofing work quality or affected by roofing work performance.

1.4 Submittals

- A. Product Data:
 - 1. Provide membrane manufacturer's printed data showing roofing system components, including insulation and fasteners, comply with specified requirements and with membrane manufacturer's requirements and recommendations for system type specified; include data for each product used in conjunction with roofing membrane.
- B. Shop Drawings: Indicate membrane manufacturer's standard details, drawn to scale and customized for project for relevant conditions.
 - 1. Include flashings, base tie-ins, roof edges, terminations, expansion joints, penetrations, and drains.
- C. Installer's qualification statement.
- D. Executed warranty.
- E. Specimen Warranty: Submit prior to starting work.

1.5 Quality Assurance

- A. Installer Qualifications: Company specializing in performing work of this section with minimum five years of documented experience installing specified system and having the following:
 - 1. Current Elevate Master Contractor status.

1.6 Delivery, Storage, and Handling

- A. Deliver products in manufacturer's original containers, dry and undamaged, with seals and labels intact and legible.
- B. Store materials clear of ground and moisture with weather-protective covering.

- C. Keep combustible materials away from ignition sources.
- D. Ensure storage and staging of materials does not exceed static and dynamic loadbearing capacities of roof decking.
- E. Protect foam insulation from direct exposure to sunlight.

1.7 Field Conditions

- A. Do not apply roofing membrane during unsuitable weather or when ambient conditions conflict with manufacturer's installation instructions.
- B. Schedule applications so no partially completed sections of roof are left exposed at end of workday.

1.8 Warranty

- A. Comply with warranty procedures required by manufacturer, including notifications, scheduling, and inspections.
- B. System Warranty: Manufacturer's limited warranty covering membrane, roof insulation, and other specified system components for term indicated.
 - 1. Liability Limit: No dollar limitation.
 - 2. Scope of Coverage: Repair leaks in roofing system caused by:
 - a. Ordinary wear and tear of elements.
 - b. Manufacturing defect in Elevate brand materials.
 - c. Defective workmanship used to install materials.
 - d. Damage due to winds up to 90 mph.

PART 2 PRODUCTS

2.1 Manufacturers

- A. Membrane Roofing System:
 - 1. Elevate Roofing, Wall, and Lining Systems: www.holcimelevate.com/#sle.
- B. Insulation Manufacturer: Same manufacturer as roof membrane.

2.2 Membrane Roofing System

- A. Description: TPO single-ply membrane.
 - 1. Membrane Attachment: Fully adhered.
 - 2. Warranty: Full system warranty; 20-year Red Shield limited warranty covering membrane, roof insulation, and membrane accessories.
 - 3. Comply with applicable local building code requirements.

- a. Design to withstand wind uplift forces calculated with ASCE 7.
 - b. Design Wind Speed: In accordance with local building code and authorities having jurisdiction (AHJ).
 4. Provide assembly having Underwriters Laboratories, Inc. (UL) Class B fire hazard classification.
- B. Roofing System Components: Listed in order from top of roof down:
1. Membrane: Thickness as specified.
 2. Cover Board: High-density polyisocyanurate; 1/2 inch thick; adhered.
 3. Insulation:
 - a. Maximum Board Thickness: 3 inches; use as many layers as necessary; stagger joints in adjacent layers.
 - b. Total System R-value: value as indicated in drawings, minimum.

2.3 Membrane Materials

- A. Membrane: Flexible, heat-weldable sheet composed of TPO polymer and ethylene propylene rubber; complying with ASTM D6878/D6878M, with polyester weft-inserted reinforcement and the following additional characteristics:
1. Thickness: 0.06 inch plus/minus 10 percent, with coating thickness over reinforcement of 0.024 inch plus/minus 10 percent.
 2. Solar Reflectance: 0.79, minimum, when tested in accordance with ASTM C1549.
 3. Color: White.
 4. Products:
 - a. Elevate; UltraPly TPO.
- B. Formable Flashing: Nonreinforced, flexible, heat-weldable sheet, composed of TPO polymer and ethylene propylene rubber.
1. Thickness: 0.06 inch plus/minus 10 percent.
 2. Product: Elevate; UltraPly TPO Flashing.
- C. Bonding Adhesive: Manufacturer's recommended bonding adhesive formulated for compatibility with membrane and other substrate materials, including masonry, wood, and insulation facings.
- D. Cut Edge Sealant: Use manufacturer's recommended sealant for exposed membrane reinforcement.
- E. General Purpose Sealant: Manufacturer's recommended, one part, white.
- F. Molded Flashing Accessories: Unreinforced TPO membrane premolded to suit variety of flashing details, including pipe boots, inside corners, outside corners, etc.
1. Product: Elevate; UltraPly TPO Small and Large Pipe Flashing.

2.4 Cover Boards

- A. High-Density Polyisocyanurate Cover Board: Water-resistant, high-density, closed-cell polyisocyanurate core with coated glass mat facers complying with ASTM C1289, Type II, Class 4, and the following characteristics:
 - 1. Thermal Value: R-value of 2.5, when tested in accordance with ASTM C518 and ASTM C177.
 - 2. Surface Water Absorption by Volume: 3 percent, maximum, when tested in accordance with ASTM C209.
 - 3. Compressive Strength: Grade 1, 120 psi, when tested in accordance with ASTM D1621.
 - 4. Density: 5 pcf, when tested in accordance with ASTM D1622.
 - 5. Factory Mutual approved for use with FM 1-60 and 1-90 rated roofing assemblies.
 - 6. Mold Growth Resistance: Passing ASTM D3273.
 - 7. Product: Elevate; ISOGARD HD Cover Board.

2.5 Insulation

- A. Polyisocyanurate Board Insulation: Closed-cell polyisocyanurate foam laminated to facers, complying with ASTM C1289, Type II, Class 1, with the following additional characteristics:
 - 1. Compressive Strength: 20 psi when tested in accordance with ASTM D1621.
 - 2. Ozone Depletion Potential: Zero; made without CFC- or HCFC-blowing agents.
 - 3. Recycled Content: 19 percent post-consumer and 15 percent pre-consumer (post-industrial), average.
 - 4. Mold Growth Resistance: Passing ASTM D3273.
 - 5. Products:
 - a. Elevate; ISOGARD CG.

PART 3 EXECUTION

3.1 General

- A. Install roofing, insulation, flashings, and accessories in accordance with roofing manufacturer's published instructions and recommendations for specified roofing system. Where manufacturer provides no instructions or recommendations, follow NRCA (RM) written requirements and industry standards. Comply with federal, state, and local regulations.
- B. Obtain relevant instructions and maintain copies at project site for duration of installation period.
- C. Do not start work until preinstallation notice has been submitted to manufacturer.

- D. Provide temporary closures to ensure moisture does not damage completed roofing. Use flashings, terminations, and temporary closures to provide watertight installation.
- E. Protect adjacent construction, property, vehicles, and persons from damage related to roofing work; repair or restore damage caused by roofing work.
 - 1. Protect from spills and overspray from bitumen, adhesives, sealants, and coatings.
 - 2. Protect metal, glass, plastic, and painted surfaces from bitumen, adhesives, and sealants within range of windborne overspray.
 - 3. Protect finished areas of roofing system from roofing-related work traffic and traffic by other trades.

3.2 Examination

- A. Examine roof deck to determine deck is sufficiently rigid to support installers and mechanical equipment so deflection will not strain or rupture roof components or deform deck.
- B. Verify surfaces and site conditions are ready to receive work. Correct defects in substrate before commencing with roofing work.
- C. Examine roof substrate to verify adequate slope to drains.
- D. Verify specifications and drawing details are workable and not in conflict with roofing manufacturer's recommendations and instructions; start of work constitutes acceptable project conditions and requirements.

3.3 Preparation

- A. Take appropriate measures to ensure fumes from adhesive solvents are not drawn into building through air intakes.
- B. Before proceeding, ensure roof surface is clean, dry, and smooth and free of sharp edges, fins, roughened surfaces, loose or foreign materials, oil, grease, and other materials that may damage membrane.
- C. Fill surface voids in immediate substrate greater than 1/4-inch wide with fill material acceptable insulation to membrane manufacturer.

3.4 Insulation Installation

- A. Install insulation in accordance with manufacturer's written instructions.
- B. Install only as much insulation as can be covered with completed roofing system before end of day's work or before onset of inclement weather.
- C. Lay roof insulation in courses parallel to roof edges.

- D. Neatly and tightly fit insulation to penetrations, projections, and nailers, with gaps not greater than 1/4 inch. Fill gaps greater than 1/4 inch with manufacturer's recommended insulation. Do not leave roofing membrane unsupported over space greater than 1/4 inch.

3.5 Cover Board Installation

- A. Install in accordance with membrane manufacturer's instructions and recommendations.

3.6 Single-Ply Membrane Installation

- A. Beginning at low point of roof, place membrane without stretching over substrate and allow to relax before attachment or splicing. Refer to membrane manufacturer's guidelines for minimum relaxation time.
- B. Lay out membrane pieces so field and flashing splices are installed to shed water.
- C. Install membrane without wrinkles and without gaps or fishmouths in seams; bond and test seams and laps in accordance with membrane manufacturer's instructions and details.
- D. Adhered Membrane: Bond membrane sheet to substrate using membrane manufacturer's recommended bonding material, application rate, and procedures.

3.7 Flashing and Accessories Installation

- A. Install flashings, including laps, splices, joints, bonding, adhesion, and attachment, as required by membrane manufacturer's recommendations and details.
- B. Flashing at Walls, Curbs, and Other Vertical and Sloped Surfaces: Install weathertight flashing at walls, curbs, parapets, curbs, skylights, and other vertical and sloped surfaces.
 - 1. Extend flashing minimum 8 inches above membrane surface unless otherwise shown.
 - 2. Use longest practical flashing pieces.
 - 3. Evaluate substrate and overlay and adjust installation procedure in accordance with membrane manufacturer's recommendations.
 - 4. Complete splices between flashing and main roof sheet with specified splice adhesive before adhering flashing to vertical surfaces.
- C. Flashing at Penetrations: Flash penetrations passing through membrane; make flashing seals directly to penetration.
 - 1. Pipes, Round Supports, and Similar Items: Flash with specified premolded pipe flashings wherever practical; otherwise, use specified self-curing elastomeric flashing.

2. Pipe Clusters and Unusual Shaped Penetrations: Provide penetration pocket at least 2 inches deep, with at least 1-inch clearance from penetration; fill with manufacturer's pourable sealer, and slope to shed water.
3. Structural Steel Tubing: If corner radii are greater than 1/4 inch and longest side of tube does not exceed 12 inches, flash as for pipes; otherwise, provide standard curb with flashing.
4. Flexible and Moving Penetrations: Provide weathertight gooseneck set in sealant and secured to deck, flashed as recommended by manufacturer.

3.8 Field Quality Control

- A. Inspection by Manufacturer: Provide final inspection of roofing system by technical representative employed by roofing system manufacturer specifically to inspect installation for warranty purposes.
- B. Perform corrections necessary for issuance of warranty.

3.9 Cleaning

- A. Clean contaminants generated by roofing work from building and surrounding areas, including bitumen, adhesives, sealants, and coatings.
- B. Repair or replace building components and finished surfaces damaged or defaced due to work of this section; comply with recommendations of manufacturers of components and surfaces.
- C. Remove leftover materials, trash, debris, and equipment from project site and surrounding areas.

3.10 Protection

- A. Where construction traffic continues over finished roof panels, provide durable protection and replace or repair damaged roofing to original condition.

END OF SECTION 075423

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Manufactured sheet metal items, including flashings and counterflashings.
- B. Sealants for joints within sheet metal fabrications.

1.2 REFERENCE STANDARDS

- A. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- C. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.
- D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- E. CDA A4050 - Copper in Architecture - Handbook; Current Edition.
- F. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.3 SUBMITTALS

- A. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

1.4 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.
- B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with 5 years of documented experience.
- C. Sample Warranty: For special warranty.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- B. Prevent contact with materials that could cause discoloration or staining.

1.6 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 D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Sheet Metal Flashing and Trim Manufacturers:
 - 1. Fry Reglet Corporation; 2 piece counterflashing.

2.2 SHEET MATERIALS

- A. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24-gauge, 0.0239-inch thick base metal, shop pre-coated with PVDF coating.
 - 1. Fluoropolymer Coating: High performance organic powder coating, AAMA 2604; multiple coat, thermally cured fluoropolymer finish system.
 - 2. Color: To be provided by the Architect..
- B. Pre-Finished Aluminum: ASTM B209/B209M, 3005 alloy, H12 or H14 temper; 18 gauge, 0.040 inch thick; plain finish shop pre-coated with PVDF coating.
 - 1. Fluoropolymer Coating: High performance organic powder coating, AAMA 2604; multiple coat, thermally cured fluoropolymer finish system.
 - 2. Color: As selected by Architect from manufacturer's custom MICA colors.

2.3 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest possible lengths.

- C. Fabricate corners from one piece with minimum 18-inch long legs; seam for rigidity, seal with sealant.
- D. Fabricate flashings to allow toe to extend 2 inches over roofing gravel. Return and brake edges.

2.4 ACCESSORIES

- A. Fasteners: Stainless steel, with soft neoprene washers.
- B. Slip Sheet: Rosin sized building paper.
- C. Protective Backing Paint: Zinc molybdate alkyd.
- D. Concealed Sealants: Non-curing butyl sealant.
- E. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.2 PREPARATION

- A. Install surface mounted reglets true to lines and levels, and seal top of reglets with sealant.
- B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil, 0.015 inch.

3.3 INSTALLATION

- A. 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 uncoated-aluminum 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.
- B. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet (3 m) with no joints within 24 inches (600 mm) of corner or intersection.
 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.
 2. Use lapped expansion joints only where indicated on Drawings.
- C. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..
 1. 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.
- D. Apply plastic cement compound between metal flashings and felt flashings.
- E. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- F. Exterior Flashing Receivers: Install in accordance with manufacturer's recommendations, and in proper relationship with adjacent construction, and as follows:
 1. Secure receiver at perimeter of wall opening with adhesives or fasteners.
 2. Place flashing into receiver channel.
 3. Secure flashing with receiver clip.
- G. Seal metal joints watertight.

3.4 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.5 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean off excess sealants.

- C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal flashing and trim installation, 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.
- D. 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 076200

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SECTION 077100 - ROOF SPECIALTIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Manufactured roof specialties, including fascias and gravel stops.

1.2 REFERENCE STANDARDS

- A. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- B. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- C. ANSI/SPRI/FM 4435/ES-1 - Test Standard for Edge Systems Used with Low Slope Roofing Systems; 2022.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Meet with Owner, Architect, Owner's insurer if applicable, roofing-system testing and inspecting agency representative, roofing Installer, roofing-system manufacturer's representative, Installer, structural-support Installer, and installers whose work interfaces with or affects roof specialties, including installers of roofing materials and accessories.
 - 2. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
 - 3. Review special roof details, roof drainage, and condition of other construction that will affect roof specialties.

1.4 SUBMITTALS

- A. Product Data: Provide data on shape of components, materials and finishes, anchor types and locations.
- B. Shop Drawings: Indicate configuration and dimension of components, adjacent construction, required clearances and tolerances, and other affected work.
- C. Samples: Submit two appropriately sized samples of fascia.

- D. Product Certificates: For each type of roof specialty.
- E. Product Test Reports: For copings and roof-edge flashings, for tests performed by a qualified testing agency.
- F. Sample Warranty: For manufacturer's special warranty.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer offering products meeting requirements that are SPRI ES-1 tested to specified design pressure.
- B. Retain "Source Limitations" Paragraph below if required for Project. Coordinate with "Warranty" Article of this Section and requirements of Project roofing-membrane Section.
- C. Source Limitations: Obtain roof specialties approved by manufacturer providing roofing-system warranty specified in Section 075300.
- D. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and set quality standards for fabrication and installation.
 - 1. Build mockup of typical roof edge, including fascia, approximately 2 feet long, including supporting construction, seams, attachments, and accessories.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 WARRANTY

- A. Roofing-System Warranty: Roof specialties are included in warranty provisions in Section 075300.
- B. Special Warranty on Painted Finishes: Manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Roof Edge Flashings and Copings:
 - 1. Metal-Era Inc; Anchor-Tite Standard Fascia: www.metalera.com/#sle.
 - 2. Carlisle; SecurEdge 2000 Standard Fascia.

2.2 COMPONENTS

- A. Roof Edge Flashings: Factory fabricated to sizes required; corners mitered; concealed fasteners.
 - 1. Configuration: Fascia, and edge securement for roof membrane.
 - 2. Pull-Off Resistance: Tested in accordance with ANSI/SPRI/FM 4435/ES-1 using test methods RE-1 and RE-2 to positive and negative design wind pressure as defined by applicable local building code.
 - a. Design Pressure: Extended peak gust wind speed 90 MPH.
 - 3. Exposed Face Height: As indicated on drawings.
 - 4. Material: Formed aluminum sheet, 0.040 inch thick, minimum.
 - 5. Surface: Smooth, flat finish.
 - 6. Corners: Factory mitered and continuously welded.
 - 7. Splice Plates: Concealed, of same material, finish, and shape as fascia cover.
 - 8. Receiver: Extruded aluminum, 0.080 inch thick.
 - 9. Finish: Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (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.
 - 10. **Color: Custom color to match existing building components.**

2.3 FINISHES

- A. Fluoropolymer Coating: High Performance Organic Finish, AAMA 2604; multiple coat, thermally cured fluoropolymer finish system; color as indicated.

2.4 ACCESSORIES

- A. Sealant for Joints in Linear Components: As recommended by component manufacturer.
- B. Adhesive for Anchoring to Roof Membrane: Compatible with roof membrane and approved by roof membrane manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that deck, curbs, roof membrane, base flashing, and other items affecting work of this Section are in place and positioned correctly.

3.2 INSTALLATION

- A. Install components in accordance with manufacturer's instructions.
- B. Seal joints within components when required by component manufacturer.
- C. Anchor components securely.
- D. Coordinate installation of components of this section with installation of roofing membrane and base flashings.
- E. Coordinate installation of sealants and roofing cement with work of this section to ensure water tightness.

3.3 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder and sealants.
- C. Remove temporary protective coverings and strippable films as roof specialties are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain roof specialties in a clean condition during construction.
- D. Replace roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077100

SECTION 077123 - MANUFACTURED GUTTERS AND DOWNSPOUTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Pre-finished aluminum gutters and downspouts.
- B. Precast concrete splash pads.

1.2 REFERENCE STANDARDS

- A. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- B. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.
- C. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Comply with SMACNA (ASMM) for sizing components for rainfall intensity determined by a storm occurrence of 1 in 5 years.

1.4 SUBMITTALS

- A. Product Data: Provide data on prefabricated components.
- B. Shop Drawings: Indicate locations, configurations, jointing methods, fastening methods, locations, and installation details.
- C. Samples: Submit two samples, 4 inch long illustrating component design, finish, color, and configuration.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Stack material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope to drain.
- B. Prevent contact with materials that could cause discoloration, staining, or damage.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Gutters and Downspouts:
 - 1. Hickman Edge Systems; Wind Resistant Gutter: www.hickmanedgesystems.com/#sle.
 - 2. Metal-Era Inc; Seal-Tite WR Gutter: www.metalera.com/#sle.

2.2 MATERIALS

- A. Pre-Finished Aluminum Sheet: ASTM B209/B209M, .050 inch thick.
 - 1. Finish: Plain, shop pre-coated with Kynar 500 coating.
 - 2. Color: As selected from manufacturer's standard colors.
- B. Protective Backing Paint: Zinc molybdate alkyd.

2.3 COMPONENTS

- A. Gutters: CDA rectangular style profile.
- B. Downspouts: CDA rectangular profile.
- C. Connectors: Furnish required connector pieces for polyvinyl chloride (PVC) components.
- D. Anchors and Supports: Profiled to suit gutters and downspouts.
 - 1. Anchoring Devices: In accordance with CDA requirements.
 - 2. Gutter Supports: Brackets.
 - 3. Downspout Supports: Brackets.
- E. Fasteners: Galvanized steel, with soft neoprene washers.

2.4 FABRICATION

- A. Form gutters and downspouts of profiles and size indicated.
- B. Fabricate with required connection pieces.
- C. Form sections square, true, and accurate in size, in maximum possible lengths, free of distortion or defects detrimental to appearance or performance. Allow for expansion at joints.
- D. Hem exposed edges of metal.
- E. Fabricate gutter and downspout accessories; seal watertight.

2.5 FINISHES

- A. Fluoropolymer Coating: High Performance Organic Finish, AAMA 2604, multiple coat, thermally cured fluoropolymer finish system; color as indicated.

2.6 ACCESSORIES

- A. Splash Pads: Precast concrete type, profiles size(s) as indicated; minimum 3,000 psi compressive strength at 28 days, with minimum 5 percent air entrainment.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that surfaces are ready to receive work.

3.2 PREPARATION

- A. Paint concealed sheet metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to a minimum dry film thickness of 15 mil, 0.015 inch.

3.3 INSTALLATION

- A. Install gutters, downspouts, and accessories in accordance with manufacturer's instructions.
- B. Sheet Metal: Join lengths with formed seams sealed watertight. Flash and seal gutters to downspouts and accessories.
- C. Slope gutters 1/4 inch per foot .

END OF SECTION 077123

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SECTION 077200 - ROOF ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Roof curbs.
- B. Equipment rails.
- C. Roof hatches with access ladders and guardrails.

1.2 REFERENCE STANDARDS

- A. 29 CFR 1910.23 - Ladders; Current Edition.
- B. 29 CFR 1910.29 - Fall Protection Systems and Falling Object Protection - Criteria and Practices; Current Edition.
- C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
- D. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used.
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
 - 4. Maintenance requirements.
- B. Shop Drawings: Submit detailed layout developed for this project and provide dimensioned location and number for each type of roof accessory.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store products under cover and elevated above grade.

PART 2 PRODUCTS

2.1 ROOF CURBS

- A. Roof Curbs Manufacturers:
 - 1. LMCurbs; Roof Curbs: www.lmcurbs.com/#sle.
- B. Roof Curbs Mounting Assemblies: Factory fabricated hollow sheet metal construction, internally reinforced, and capable of supporting superimposed live and dead loads and designated equipment load with fully mitered and sealed corner joints welded or mechanically fastened, and integral counterflashing with top and edges formed to shed water.
 - 1. Roof Curb Mounting Substrate: Curb substrate consists of corrugated metal roof deck with insulation.
 - 2. Sheet Metal Material:
 - a. Aluminum: 0.080 inch minimum thickness, with 3003 alloy, and H14 temper.
 - 1) Finish: Powder coat.
 - 2) Color: As selected by Architect from manufacturer's standard line of colors.
- C. Equipment Rail Curbs: Straight curbs on each side of equipment, with top of curbs horizontal and level with each other for equipment mounting.
 - 1. Provide preservative treated wood nailers along top of rails.
 - 2. Height Above Finished Roof Surface: 8 inches, minimum.
 - 3. Products:
 - a. MKT Metal Manufacturing; Equipment Rails: www.mktduct.com/#sle.

2.2 ROOF HATCHES AND VENTS

- A. Roof Hatch Manufacturers:
 - 1. Bilco Company; Type TB (various types and special size): www.bilco.com/#sle.
- B. Roof Hatches: Factory-assembled aluminum frame and cover.
 - 1. Style: Provide flat metal covers unless otherwise indicated.
 - 2. Mounting: Provide frames and curbs suitable for mounting conditions as indicated on drawings.
 - 3. Thermally Broken Hatches: Provide insulation within frame and cover.
 - 4. Size: As indicated on drawings; single-leaf style unless otherwise indicated.
 - 5. For Ladder Access: Single leaf; 30 by 36 inches.
- C. Ladder Safety Post: Telescoping post mounted on ladder. Steel, powder coating.
 - 1. Basis of Design: Bilco; LadderUP Safety Post LU-1 for interior and LU-2 for exterior.
 - 2. Locations: Mount on all interior and exterior ladders.

- D. Safety Railing System: Roof hatch safety rail system mounted directly to curb without penetration of roofing system.
 - 1. Railing: Comply with 29 CFR 1910.23 for ladder safety, with a safety factor of two.
 - 2. Self-Closing Gate: Comply with 29 CFR 1910.29 for safe egress and fall protection through hatch opening.
 - 3. Posts and Rails: Galvanized steel tubing.
 - 4. Gate: Same material as railing; automatic closing with latch.
 - 5. Finish: Manufacturer's standard, factory applied finish.
 - 6. Gate Hinges and Post Guides: ASTM B221 (ASTM B221M), 6063 alloy, T5 temper aluminum.
 - 7. Mounting Brackets: Hot dipped galvanized steel, 1/4 inch thick, minimum.
 - 8. Fasteners: Stainless steel, Type 316.
 - 9. Products:
 - a. BILCO Company; Bil-Guard 2.0: www.bilco.com/#sle.
- E. Hardware: Steel, zinc coated and chromate sealed, unless otherwise indicated or required by manufacturer.
 - 1. Lifting Mechanisms: Compression or torsion spring operator with shock absorbers that automatically opens upon release of latch; capable of lifting covers despite 10 psf load.
 - 2. Hinges: Heavy duty pintle type.
 - 3. Hold open arm with vinyl-coated handle for manual release.
 - 4. Latch: Upon closing, engage latch automatically and reset manual release.
 - 5. Manual Release: Pull handle on interior.
 - 6. Locking: Padlock hasp on interior.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using methods recommended by manufacturer for achieving acceptable results for applicable substrate under project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions, in manner that maintains roofing system weather-tight integrity.

3.4 CLEANING

- A. Clean installed work to like-new condition.

3.5 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION 077200

SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Penetrations in fire-resistance-rated walls.
 - 2. Penetrations in horizontal assemblies.
 - 3. Penetrations in smoke barriers.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at [Project site] .

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each penetration firestopping system, for tests performed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

- A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install penetration firestopping system when ambient or substrate temperatures are outside limits permitted by penetration firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.
- B. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics:
 - 1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:
 - a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.
 - 1) UL in its "Fire Resistance Directory."
 - 2) Intertek Group in its "Directory of Listed Building Products."
 - 3) FM Global in its "Building Materials Approval Guide."

2.2 PENETRATION FIRESTOPPING SYSTEMS

- A. Penetration Firestopping Systems: Systems that resist spread of fire, 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.
 - 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. 3M Fire Protection Products.
 - b. A/D Fire Protection Systems Inc.
 - c. Hilti, Inc.
 - d. RectorSeal.
 - e. Specified Technologies, Inc.

f. Tremco, Inc.

- B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).
 - 1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).
 - 1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
 - 2. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
 - 3. W-Rating: Provide penetration firestopping systems showing no evidence of water leakage when tested according to UL 1479.
- D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479, based on testing at a positive pressure differential of 0.30-inch wg (74.7 Pa).
 - 1. L-Rating: Not exceeding 5.0 cfm/sq. ft. (0.025 cu. m/s per sq. m) of penetration opening at and no more than 50-cfm (0.024-cu. m/s) cumulative total for any 100 sq. ft. (9.3 sq. m) at both ambient and elevated temperatures.
- E. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E 84.
- F. VOC Content: Penetration firestopping sealants and sealant primers shall comply with the following limits for VOC content:
 - 1. Sealants: 250 g/L.
 - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 - 3. Sealant Primers for Porous Substrates: 775 g/L.
- G. Low-Emitting Materials: Penetration firestopping sealants and sealant primers shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- 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 system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.
 - 1. Permanent forming/damming/backing materials.
 - 2. Substrate primers.
 - 3. Collars.
 - 4. Steel sleeves.

2.3 FILL MATERIALS

- A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer sleeve lined with an intumescent strip, a flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- C. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced intumescent elastomeric sheet bonded to galvanized-steel sheet.
 - 1. Basis of Design: 3M; CS-195+ Composite Sheet.
- D. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- E. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.

2.4 MIXING

- A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Before installing penetration firestopping systems, clean out openings immediately 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 materials.

2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
 3. Remove laitance and form-release agents from concrete.
- B. 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.

3.3 INSTALLATION

- A. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.
- 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.
1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.
- C. Install fill materials by proven techniques to produce the following results:
1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
 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.

3.4 IDENTIFICATION

- A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches (76 mm) high and with minimum 0.375-inch (9.5-mm) strokes.
1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet (4.57 m) from end of wall and at intervals not exceeding 30 feet (9.14 m).
- B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing and inspecting agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.5 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E 2174.
- B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.
- C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 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 system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping systems are 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 material and install new materials to produce systems complying with specified requirements.

END OF SECTION 078413

SECTION 078443 - JOINT FIRESTOPPING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Joints in or between fire-resistance-rated constructions.
 - 2. Joints at exterior curtain-wall/floor intersections.
 - 3. Joints in smoke barriers.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site .

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Schedule: For each joint firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing agency.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each joint firestopping system, for tests performed by a qualified testing agency.

1.6 CLOSEOUT SUBMITTALS

- A. Installer Certificates: From Installer indicating that joint firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements."

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install joint firestopping systems when ambient or substrate temperatures are outside limits permitted by joint firestopping system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Install and cure joint firestopping systems per manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

1.9 COORDINATION

- A. Coordinate construction of joints to ensure that joint firestopping systems can be installed according to specified firestopping system design.
- B. Coordinate sizing of joints to accommodate joint firestopping systems.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics:
 - 1. Perform joint firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2. Test per testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:
 - a. Joint firestopping systems shall bear classification marking of a qualified testing agency.
 - 1) UL in its "Fire Resistance Directory."

2.2 JOINT FIRESTOPPING SYSTEMS

- A. Joint Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.
- B. Basis of Design: 3M Fire Protection Products.

- C. 3M Fire Barrier Sealant FD 150+: Single-part, water-based sealant. Sag-resistant, low-shrinkage, low VOC, UL 2079.
 - 1. Fire Resistance: For use in 1, 2, 3 or 4 hour fire-rated systems.
 - 2. Location: For use at top-of-wall, bottom-of-wall, wall-to-wall and floor-to-floor.
 - 3. Compression/Extension Recovery: +/- 19 percent of original joint width.
 - 4. Meets optional L rating requirements.
- D. 3M Fire Barrier Water Tight Sealant 1000 NS: Single-part, non-slump elastomeric silicone sealant. Sag-resistant, low VOC, UL 2079.
 - 1. Fire Resistance: For use in 1, 2, 3 or 4 hour fire rated systems.
 - 2. Meets UL Water Leakage Test, W Rating – Class 1 requirements.
 - 3. Location: For use at top-of-wall, bottom-of-wall, wall-to-wall, floor-to-floor, floor-to-wall and perimeter joints.
 - 4. Compression/Extension Recovery: +/- 15 percent of original joint width.
- E. 3M Fire Barrier Water Tight Sealant 1003 SL: Single-part, self-leveling elastomeric silicone sealant. Sag-resistant, low VOC, UL 2079.
 - 1. Fire Resistance: For use in 1, 2, 3 or 4 hour fire rated systems.
 - 2. Meets UL Water Leakage Test, W Rating – Class 1 requirements.
 - 3. Location: For use at top-of-wall, bottom-of-wall, floor-to-wall and floor-to-floor joints.
 - 4. Compression/Extension Recovery: +/- 15 percent of original joint width.
- F. 3M Fire Barrier Sealant 2000 NS: Single-part, non-slump elastomeric silicone sealant. Sag-resistant, low VOC, UL 2079.
 - 1. Fire Resistance: For use in 1, 2, 3 or 4 hour fire rated systems.
 - 2. Service Flexibility: Accommodate vibration from normal building movement.
 - 3. Location: For use at top-of-wall, bottom-of-wall, wall-to-wall, floor-to-wall, floor-to-floor and perimeter joints.
 - 4. Compression/Extension Recovery: +/- 31 percent of original joint width.
- G. 3M Fire Barrier Sealant 2000+: Silicone Sealant: Single-part, elastomeric silicone sealant. Sag-resistant, low VOC, UL 2079.
 - 1. Fire Resistance: For use in 1, 2, 3 or 4 hour fire rated systems.
 - 2. Compression/Extension Recovery: +/- 13 percent of original joint width.
 - 3. Location: For use at top-of-wall, bottom-of-wall, wall-to-wall, floor-to-wall and floor-to-floor joints.
- H. 3M FireDam Spray 200: Water-based, paintable, low VOC, freeze/thaw resistant spray applied fire resistive product. Applied with conventional airless spray equipment, UL 2079.
 - 1. Fire Resistance: For use in 1, 2, 3 or 4 hour fire rated systems.
 - 2. Compression/Extension Recovery: +/- 50 percent of joint width.
 - 3. Location: For use at head-of-wall, wall-to-wall, floor-to-floor, bottom-of-wall, floor-to-wall and perimeter joints.

- I. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- J. VOC Content: Fire-resistive joint system sealants shall comply with the following limits for VOC content:
 - 1. Architectural Sealants: 250 g/L.
 - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 - 3. Sealant Primers for Porous Substrates: 775 g/L.
- K. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Before installing fire-resistive joint systems, clean joints immediately to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:
 - 1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of elastomeric fill materials or compromise fire-resistive rating.
 - 2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with elastomeric fill materials. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Prime substrates where recommended in writing by joint firestopping system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION

- A. General: Install fire-resistive joint systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

- B. Install forming materials and other accessories of types required to support elastomeric fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing elastomeric fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.
- C. Install elastomeric fill materials for fire-resistive joint systems by proven techniques to produce the following results:
 - 1. Elastomeric fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
 - 2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.
 - 3. For elastomeric fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

- A. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of joint edge so labels are visible to anyone seeking to remove or joint firestopping system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
 - 1. The words "Warning - Joint Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Contractor's name, address, and phone number.
 - 3. Designation of applicable testing agency.
 - 4. Date of installation.
 - 5. Installer's name.

3.5 FIELD QUALITY CONTROL

- A. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E 2393.
- B. Where deficiencies are found or joint firestopping systems are damaged or removed due to testing, repair or replace joint firestopping systems so they comply with requirements.
- C. Proceed with enclosing joint firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

- A. Clean off excess elastomeric fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by joint firestopping system manufacturers and that do not damage materials in which joints occur.
 - 1. Provide final protection and maintain conditions during and after installation that ensure joint firestopping systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

END OF SECTION 078443

SECTION 079200 - JOINT SEALANTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Nonsag gunnable joint sealants.
- B. Self-leveling pourable joint sealants.
- C. Joint backings and accessories.

1.2 REFERENCE STANDARDS

- A. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2022.
- B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- C. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.
- D. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2022.
- E. SCAQMD 1168 - Adhesive and Sealant Applications; 1989, with Amendment (2017).

1.3 SUBMITTALS

- A. Product Data for Joint Sealants: Submit manufacturer's technical datasheets for each product to be used, and include the following:
 - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
 - 2. List of backing materials approved for use with the specific product.
 - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
 - 4. Substrates that product is not compatible with.
 - 5. Substrates that primer is required.
- B. Product Data for Accessories: Submit manufacturer's technical data sheet for each accessory product to be used, including physical characteristics, installation instructions, and recommended tools.
- C. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.
- D. Executed warranty.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.

1.5 WARRANTY

- A. Manufacturer Warranty: Provide 2-year manufacturer warranty for installed sealants and accessories that fail to achieve a watertight seal, exhibit loss of adhesion or cohesion, or do not cure. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Joint Sealants:
 - 1. Dow Silicones Corporation: www.dow.com/#sle.

2.2 JOINT SEALANT APPLICATIONS

- A. Scope:
 - 1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to:
 - a. Wall expansion and control joints.
 - b. Joints between door, window, and other frames and adjacent construction.
 - c. Joints between different exposed materials.
 - d. Openings below ledge angles in masonry.
 - e. Other joints are indicated below.
 - 2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items:
 - a. Joints between door, window, and other frames and adjacent construction.
 - b. In sound-rated wall and ceiling assemblies, gaps at electrical outlets, wiring devices, piping, and other openings; between wall/ceiling and other construction; and other flanking sound paths.
 - 1) Exception: Such gaps and openings in gypsum board and plaster finished stud walls and suspended ceilings.
 - 2) Exception: Through-penetrations in sound-rated assemblies that are also fire-rated.
 - c. Other joints are indicated below.
 - 3. Do not seal the following types of joints:
 - a. Intentional weep holes in masonry.

- b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
 - c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
 - d. Joints where installation of sealant is specified in another section.
 - e. Joints between suspended panel ceilings/grid and walls.
- B. Exterior Joints: Use nonsag nonstaining silicone sealant, unless otherwise indicated.
 - 1. Lap Joints in Sheet Metal Fabrications: Butyl rubber, noncuring.
 - 2. Lap Joints between Manufactured Metal Panels: Butyl rubber, noncuring.
 - 3. Control and Expansion Joints in Concrete Paving: Self-leveling silicone traffic-grade sealant.
- C. Interior Joints: Use nonsag silicone sealant, unless otherwise indicated.
 - 1. Floor Joints in Wet Areas: Nonsag silicone non-traffic-grade sealant suitable for continuous liquid immersion.
 - 2. Wall, Ceiling, and Floor Joints Where Tamper-Resistance is Required: Nonsag silicone sealant.
 - 3. Joints between Fixtures in Wet Areas and Floors, Walls, and Ceilings: Mildew-resistant silicone sealant; white.
 - a. See Section 093000 for sealing between tile and plumbing fixtures.
 - 4. In Sound-Rated Assemblies: Silicone sealant.
 - 5. Narrow Control Joints in Interior Concrete Slabs: Self-leveling silicone sealant.
 - 6. Other Floor Joints: Self-leveling silicone traffic-grade sealant.
- D. Interior Wet Areas: Bathrooms, restrooms, kitchens, food service areas, and food processing areas; fixtures in wet areas include plumbing fixtures, food service equipment, countertops, cabinets, and other similar items.
- E. Sound-Rated Assemblies: Walls and ceilings identified as STC-rated, sound-rated, or acoustical.
- F. Areas Where Tamper-Resistance is Required: As indicated on drawings.

2.3 JOINT SEALANTS - GENERAL

- A. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in SCAQMD 1168.
- B. Colors: As indicated on drawings.

2.4 NONSAG JOINT SEALANTS

- A. Hybrid Elastomeric Sealant: ASTM C920, Grade NS, Uses T2, NT, M, A, G, and O; single component; not expected to withstand continuous water immersion.
 - 1. Movement Capability: Plus and minus 50 percent, minimum.

2. Color: To be selected by Architect from manufacturer's standard range.
3. Service Temperature Range: Minus 75 to 300 degrees F.
4. Products:
 - a. Dow; DOWSIL Contractors Paintable Sealant - CPS: www.dow.com/#sle.
- B. Nonstaining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
 1. Movement Capability: Plus and minus 50 percent, minimum.
 2. Porous Stone: Nonstaining to light-colored natural stone when tested in accordance with ASTM C1248.
 3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
 4. Color: To be selected by Architect from manufacturer's standard range.
 5. Products:
 - a. Dow; DOWSIL 790 Silicone Building Sealant: www.dow.com/#sle.
- C. Silicone Sealant: ASTM C920, Grade NS, Use T; single-component, approved by manufacturer for traffic exposure when recessed below traffic surface; not expected to withstand continuous water immersion.
 1. Movement Capability: Plus 100 percent and minus 50 percent, minimum.
 2. Color: To be selected by Architect from manufacturer's standard range.
 3. Products:
 - a. Dow; DOWSIL NS Parking Structure Sealant: www.dow.com/#sle.
- D. Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
 1. Movement Capability: Plus and minus 25 percent, minimum.
 2. Color: Match adjacent finished surfaces.
 3. Products:
 - a. Dow; DOWSIL 999-A Building and Glazing Sealant: www.dow.com/#sle.

2.5 SELF-LEVELING JOINT SEALANTS

- A. Self-Leveling Silicone Sealant: ASTM C920, Grade P, Uses M and A; single- or multi-component, explicitly approved by manufacturer for traffic exposure when recessed below traffic surface; not expected to withstand continuous water immersion.
 1. Movement Capability: Plus 100 percent, minus 50 percent, minimum.
 2. Color: To be selected by Architect from manufacturer's standard range.
 3. Products:
 - a. Dow; DOWSIL 890-SL Silicone Joint Sealant: www.dow.com/#sle.

2.6 ACCESSORIES

- A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
- B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.
- C. Masking Tape: Self-adhesive, nonabsorbent, nonstaining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.
- D. Joint Cleaner: Noncorrosive and nonstaining; type recommended by sealant manufacturer; compatible with joint forming materials.
- E. Primers: Type recommended by sealant manufacturer to suit application; nonstaining.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.

3.2 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.
- E. Concrete Floor Joints That Will Be Exposed in Completed Work: Test joint filler in an inconspicuous area to verify that it does not stain or discolor slab.

3.3 INSTALLATION

- A. Install this work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Provide joint sealant installations complying with ASTM C1193.
- C. Install acoustical sealant application work in accordance with ASTM C919.

- D. Measure joint dimensions and size joint backers to achieve the following, unless otherwise indicated:
 - 1. Width/depth ratio of 2:1.
 - 2. Neck dimension no greater than 1/3 of the joint width.
 - 3. Surface bond area on each side not less than 75 percent of joint width.
- E. Install bond breaker backing tape where backer rod cannot be used.
- F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- G. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- H. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.
- I. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

END OF SECTION 079200

SECTION 079219 - ACOUSTICAL JOINT SEALANTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes acoustical joint sealants.

1.2 ACTION SUBMITTALS

- A. Product Data: For each acoustical joint sealant.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Acoustical-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.

1.3 INFORMATIONAL SUBMITTALS

- A. Sample Warranties: For special warranties.

1.4 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace acoustical 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.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Provide acoustical joint-sealant products that effectively reduce airborne sound transmission through perimeter joints and openings in building construction, as demonstrated by testing representative assemblies according to ASTM E90.
- B. VOC Content of Interior Sealants: Sealants and sealant primers shall comply with the following:

1. Acoustical sealants and sealant primers shall have a VOC content of 250 g/L or less.
- C. Low-Emitting Interior Sealants: Acoustical sealants and sealant primers shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.2 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex acoustical sealant complying with ASTM C834.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. GE Construction Sealants; Momentive Performance Materials Inc.; RCS20 Acoustical.
 - b. Hilti, Inc.; CP 506 Smoke and Acoustical Sealant.
 - c. Pecora Corporation; AIS-919.
 - d. Tremco Incorporated; Tremco Acoustical Sealant.
 - e. United States Gypsum Company; SHEETROCK Acoustical Sealant.
 2. Colors of Exposed Acoustical Joint Sealants: As selected by Architect from manufacturer's full range of colors.
- B. Acoustical Sealant for Concealed Joints: Manufacturer's standard nonsag, nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber acoustical sealant.

2.3 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by acoustical-joint-sealant manufacturer where required for adhesion of sealant to joint substrates.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive acoustical joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing acoustical joint sealants to comply with joint-sealant manufacturer's written instructions.
- B. Joint Priming: Prime joint substrates where recommended by acoustical-joint-sealant manufacturer. 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.

3.3 INSTALLATION OF ACOUSTICAL JOINT SEALANTS

- A. Comply with acoustical joint-sealant manufacturer's written installation instructions unless more stringent requirements apply.
- B. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical joint sealant. Install acoustical joint sealants at both faces of partitions, at perimeters, and through penetrations. Comply with ASTM C919, ASTM C1193, and manufacturer's written recommendations for closing off sound-flanking paths around or through assemblies, including sealing partitions to underside of floor slabs above acoustical ceilings.
- C. Acoustical Ceiling Areas: Apply acoustical joint sealant at perimeter edge moldings of acoustical ceiling areas in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.

3.4 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of acoustical joint sealants and of products in which joints occur.

3.5 PROTECTION

- A. Protect acoustical 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, remove, and repair damaged or deteriorated acoustical joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 079219

SECTION 079513 - EXPANSION JOINT COVER ASSEMBLIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Expansion joint cover assemblies for floor and wall surfaces.

1.2 REFERENCE STANDARDS

- A. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
- B. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.
- C. ASTM B308/B308M - Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles; 2020.
- D. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems; 2015 (Reapproved 2019).
- E. ITS (DIR) - Directory of Listed Products; Current Edition.
- F. UL (DIR) - Online Certifications Directory; Current Edition.
- G. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Current Edition, Including All Revisions.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Installation Templates: For frames and anchors to be embedded in concrete or masonry, furnish templates to relevant installers; include installation instructions and tolerances.

1.4 SUBMITTALS

- A. Product Data: Provide joint assembly profiles, profile dimensions, anchorage devices and available colors and finish.
- B. Shop Drawings: Indicate joint and splice locations, miters, layout of the work, affected adjacent construction and anchorage locations.
- C. Manufacturer's Installation Instructions: Indicate rough-in sizes and required tolerances for item placement.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Expansion Joint Cover Assemblies:
 - 1. Construction Specialties, Inc: www.c-sgroup.com/#sle.

2.2 EXPANSION JOINT COVER ASSEMBLY APPLICATIONS

- A. Interior Expansion Joints:
 - 1. Manufacturers:
 - a. Construction Specialties, Inc: www.c-sgroup.com/#sle.
 - 1) Type EJ-2: ASM- by width required; at walls and ceilings.
 - 2) Type EJ-4: GFS- by width required; at floors with existing floor finish.
- B. Exterior Expansion Joints:
 - 1. Manufacturers:
 - a. Construction Specialties, Inc: www.c-sgroup.com/#sle.
 - 1) Type EJ-1: VF-width required; at walls.
 - 2) Type EJ-6: SRJ-width required; at roof.

2.3 EXPANSION JOINT COVER ASSEMBLIES

- A. Expansion Joint Cover Assemblies - General: Factory-fabricated and assembled; designed to completely fill joint openings, sealed to prevent passage of air, dust, water, smoke; suitable for traffic expected.
 - 1. Joint Dimensions and Configurations: As indicated on drawings.
 - 2. Joint Cover Sizes: Selected to suit joint width and configuration, based on manufacturer's published recommendations and limitations.
 - 3. Joint Cover Styles: As indicated.
 - 4. Joint Movement Capability: If not indicated, provide minimum plus/minus 25 percent joint movement capability.
 - 5. Lengths: Provide covers in full lengths required; avoid splicing wherever possible.
 - 6. Anchors, Fasteners, and Fittings: Provided by cover manufacturer.
 - 7. Colors: To be selected by the Architect.
- B. Floor Joint Covers: Coordinate with indicated floor coverings.
 - 1. If floor covering is not indicated, obtain instructions from Architect before proceeding.
 - 2. If style is not indicated, provide extruded aluminum frame both sides, resilient seals, and minimize exposed metal.

- C. Resilient Seal Type Covers: Having flat exposed surface without crevices that could collect dirt; designed to withstand expected movement without extrusion of seal from joint assembly; for floors, provide style that is flush with top of floor covering; for exterior joints, weathertight.
- D. Sliding Cover Plate Type Covers: Provide plate with beveled edges and neat fit that does not collect dirt.
- E. Covers in Gypsum Board Assemblies: Provide style with anchoring wings that can be completely covered by joint compound.
- F. Covers in Fire Rated Assemblies: Provide cover assembly having fire rating equivalent to that of assembly into which it is installed.
 - 1. Acceptable Evaluation Agencies: UL (DIR) and ITS (DIR).

2.4 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper; or ASTM B308/B308M, 6061 alloy, T6 temper.
 - 1. Exposed Finish at Floors: Finish and color to be selected by the Architect.
 - 2. Exposed Finish at Walls and Ceilings: Finish and color to be selected by the Architect..
- B. Anchors and Fasteners: As recommended by cover manufacturer.
- C. Ferrous Metal Anchors: Galvanized where embedded in concrete or in contact with cementitious materials.
- D. Threaded Fasteners: Stainless steel.
- E. Backing Paint for Aluminum Components in Contact with Cementitious Materials: Asphaltic type.

2.5 ACCESSORIES

- A. Resilient Fire Barrier: For use with metal expansion joint covers and elastomeric seals without use of mechanical fasteners, with fire rating in accordance with surrounding construction performance capabilities.
 - 1. Application: in rated walls or floors. Refer to Life Safety drawings for rated locations.
 - 2. Fire Resistance Rating: as indicated on Life Safety Drawings, in accordance with ASTM E1966 and UL 2079.
 - 3. Manufacturers:
 - a. Construction Specialties; Basis of Design: Relfex. .

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that joint preparation and dimensions are acceptable and in accordance with manufacturer's requirements.
- B. Verify that frames and anchors installed by others are in correct locations and suitable for installation of remainder of assembly.

3.2 INSTALLATION

- A. Install components and accessories in accordance with manufacturer's instructions.
- B. Align work plumb and level, flush with adjacent surfaces.
- C. Rigidly anchor to substrate to prevent misalignment.

3.3 PROTECTION

- A. Do not permit traffic over unprotected floor joint surfaces.
- B. Provide strippable coating to protect finish surface.

END OF SECTION 079513

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Non-fire-rated hollow metal frames.
- B. Fire-rated hollow metal frames.

1.2 REFERENCE STANDARDS

- A. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames; 2020.
- B. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2017.
- C. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2020.
- D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- E. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2021a.
- F. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2018a.
- G. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2020.
- H. ASTM C476 - Standard Specification for Grout for Masonry; 2020.
- I. BHMA A156.115 - Hardware Preparation in Steel Doors and Steel Frames; 2016.
- J. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.
- K. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.
- L. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames; 2017.
- M. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames; 2014.

- N. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2022.

1.3 SUBMITTALS

- A. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.
- B. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.
- C. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Hollow Metal Frames:
 - 1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com/#sle.
 - 2. Curries, an Assa Abloy Group company: www.assaabloydss.com/#sle.
 - 3. Republic Doors, an Allegion brand: www.republicdoor.com/#sle.
 - 4. Steelcraft, an Allegion brand: www.allegion.com/#sle.
 - 5. De La Fontaine.

2.2 PERFORMANCE REQUIREMENTS

- A. Requirements for Hollow Metal Doors and Frames:
 - 1. Steel Sheet: Comply with one or more of the following requirements; galvanized steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
 - 2. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

3. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
 - a. Based on SDI Standards: Provide at least A40/ZF120 (galvannealed) when necessary, coating not required for typical interior door applications, and at least A60/ZF180 (galvannealed) for corrosive locations.
- B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.3 HOLLOW METAL FRAMES

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. Frame Finish: Factory primed and field finished.
- C. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
 1. Frame Metal Thickness: 16 gauge, 0.053 inch, minimum.
- D. Door Frames, Fire-Rated: Full profile/continuously welded type.
 1. Fire Rating: Same as door, labeled.
 2. Frame Metal Thickness: 16 gauge, 0.053 inch, minimum.
- E. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.
- F. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
- G. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inches high to fill opening without cutting masonry units.
- H. Frames Wider than 48 inches: Reinforce with steel channel fitted tightly into frame head, flush with top.

2.4 FINISHES

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

2.5 ACCESSORIES

- A. Grout for Frames: Mortar grout complying with ASTM C476 with maximum slump of 4 inches as measured in accordance with ASTM C143/C143M for hand troweling in place; plaster grout and thinner pumpable grout are prohibited.
- B. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.
- C. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.

3.2 PREPARATION

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.3 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Install fire rated units in accordance with NFPA 80.
- C. Coordinate frame anchor placement with wall construction.
- D. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
- E. Install door hardware as specified in Section 087100.
 - 1. Comply with recommended practice for hardware placement of doors and frames in accordance with ANSI/SDI A250.6 or NAAMM HMMA 861.
- F. Comply with glazing installation requirements of Section 088000.
- G. Coordinate installation of electrical connections to electrical hardware items.
- H. Touch up damaged factory finishes.

3.4 TOLERANCES

- A. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

END OF SECTION 081113

SECTION 081416 - FLUSH WOOD DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Flush wood doors; flush configuration; fire-rated and non-rated.

1.2 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Current Edition.
- B. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2025.
- C. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives; 2025.
- D. UL (DIR) - Online Certifications Directory; Current Edition.
- E. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- F. WDMA I.S. 1A - Interior Architectural Wood Flush Doors; 2021, with Errata (2022).

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTALS

- A. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.
- B. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing, fire-protection ratings for fire-rated doors and other details.
- C. Samples: Submit two samples of door veneer, 8 by 10 inches in size illustrating wood grain, stain color, and sheen.
- D. Certificate: Submit labels and certificates required by quality assurance and quality control programs.
- E. Manufacturer's qualification statement.
- F. Warranty, executed in Owner's name.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, with not less than three years of documented experience.
 - 1. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.
- B. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Package, deliver and store doors in accordance with specified quality standard.
- B. Accept doors on site in manufacturer's packaging, and inspect for damage.
- C. Protect doors with resilient packaging sealed with heat shrunk plastic; do not store in damp or wet areas or areas where sunlight might bleach veneer; seal top and bottom edges with tinted sealer if stored more than one week, and break seal on site to permit ventilation.
- D. Mark each door on bottom rail with opening number used on Shop Drawings.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during remainder of construction period.

1.8 WARRANTY

- A. Manufacturer Warranty: Provide manufacturer's warranty on interior doors for the life of the installation. Complete forms in Owner's name and register with manufacturer.
 - 1. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.
 - a. Warping (bow, cup, or twist) more than 1/4 inch (6.4 mm) in a 42-by-84-inch (1067-by-2134-mm) section.
 - b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch (0.25 mm in a 76.2-mm) span.
 - 2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Wood Veneer Faced Doors:
 - 1. Masonite Architectural; Aspiro Select Wood Veneer Doors:
www.architectural.masonite.com/#sle.
 - 2. VT Industries, Inc; Heritage Collection: www.vtindustries.com/#sle.
 - 3. Graham..
- B. Source Limitations: Obtain flush wood doors from single manufacturer.

2.2 DOORS

- A. Doors: See drawings for locations and additional requirements.
 - 1. Quality Standard: Custom Grade, Extra Heavy Duty performance, in accordance with WDMA I.S. 1A.
 - 2. [Adhesives](#): Do not use adhesives that contain urea formaldehyde.
 - 3. [Composite Wood Products](#): Products shall be made without urea formaldehyde.
 - 4. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.
- B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
 - 1. Provide solid core doors at each location.
 - 2. Fire Rated Doors: Tested to ratings indicated on drawings in accordance with UL 10C - Positive Pressure; Underwriters Laboratories Inc (UL) or Intertek/Warnock Hersey (WHI) labeled without any visible seals when door is closed.
 - a. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
 - b. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
 - c. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
 - d. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
 - 3. Smoke and Draft Control Doors: In addition to required fire rating, provide flush wood door assemblies in compliance with WDMA I.S. 1A requirements for "S" label; no additional gasketing or edge sealing allowed.
 - a. Listed and labeled for smoke and draft control, based on testing according to UL 1784.

2.3 DOOR AND PANEL CORES

- A. Non-Rated Solid Core and 20 Minute Rated Doors: Type structural composite lumber core (SCLC), plies and faces as indicated.
 - 1. Structural Composite Lumber: WDMA I.S.10.
 - a. Screw Withdrawal, Face: 700 lbf (3100 N).
 - b. Screw Withdrawal, Edge: 400 lbf (1780 N).
- B. Fire-Rated Doors: Mineral core type, with fire resistant composite core (FD), plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.
 - 1. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as needed to eliminate through-bolting hardware and as follows:
 - a. 5-inch (125-mm) top-rail blocking.
 - b. 5-inch (125-mm) bottom-rail blocking, in doors indicated to have protection plates.
 - c. 5-inch (125-mm) midrail blocking, in doors indicated to have armor plates.
 - 2. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.
 - a. Screw-Holding Capability: 550 lbf (2440 N) per WDMA T.M.-10.

2.4 DOOR FACINGS

- A. Veneer Facing for Transparent Finish: Maple, HPVA Grade A, plain sliced (flat cut), with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.
 - 1. Vertical Edges: Same species as face veneer.
 - 2. Pair and Set Match: Provide for doors hung in same opening.
 - 3. Construction: Five or seven plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering.
 - 4. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.

2.5 DOOR CONSTRUCTION

- A. Fabricate doors in accordance with door quality standard specified.
- B. Where supplementary protective edge trim is required, install trim after veneer facing has been applied full-width.
- C. Glazed Openings: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.

- D. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- E. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
- F. Provide edge clearances in accordance with the quality standard specified.

2.6 FINISHES - WOOD VENEER DOORS

- A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
 - 1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on bottom edges, edges of cutouts, and mortises.
- B. Finish work in accordance with WDMA I.S. 1A for grade specified and as follows:
 - 1. Transparent:
 - a. Grade: Premium.
 - b. System - TR-6, Catalyzed Polyurethane.
 - c. Stain: As selected by Architect.
 - d. Sheen: Satin.
 - e. Effect: Semifilled finish, produced by applying an additional finish coat to partially fill the wood pores.
- C. Seal door top edge with color sealer to match door facing.

2.7 ACCESSORIES

- A. Metal Louvers:
 - 1. Material and Finish: Roll formed steel; pre-painted finish to color as selected.
 - 2. Louver Blade: Inverted V blade, sight proof, light proof; fire rated to match door hours with fusible link design to UL (DIR) requirements.
- B. Glazed Openings:
 - 1. Fire-Protection-Rated Glass: Safety Certification, 16 CFR 1201, Category II.
 - 2. Tint: Clear.
- C. LIGHT FRAMES
 - 1. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads unless otherwise indicated.
 - a. Wood Species: Species compatible with door faces.
 - b. Profile: Manufacturer's standard shape.
 - c. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips approved for such use.

2. Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer's standard frame formed of 0.048-inch- (1.2-mm-) thick, cold-rolled steel sheet; factory primed for paint with baked-enamel- or powder-coated finish; and approved for use in doors of fire-protection rating indicated.
- D. Glazing: See Section 088000.
- E. Astragals and Edges for Double Doors: Pairs of doors astragals, and door edge sealing and protection devices.
 1. UL listed products in compliance with requirements of authorities having jurisdiction.
 2. Provide surface mounted astragal to cover or fill space for full door height between pair of doors or door and adjacent jamb.
 3. Material: Steel.
 4. Metal Finish: Gray powder coating.
- F. Astragals for Fire-Rated Double Doors: Steel, T shaped, overlapping and recessed at face edge, specifically for double doors.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and specified quality standard.
 1. Install fire-rated doors in accordance with NFPA 80 requirements.
 2. Install smoke and draft control doors in accordance with NFPA 105 requirements.
- B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
- C. Use machine tools to cut or drill for hardware.
- D. Coordinate installation of doors with installation of frames and hardware.
- E. Coordinate installation of glazing.

- F. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
 - 1. Clearances: Provide 1/8 inch (3.2 mm) at heads, jambs, and between pairs of doors. Provide 1/8 inch (3.2 mm) from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch (6.4 mm) from bottom of door to top of threshold unless otherwise indicated.
 - a. Comply with NFPA 80 for fire-rated doors.
 - b. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.
 - 2. Bevel fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock edge; trim stiles and rails only to extent permitted by labeling agency.
- G. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- H. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.
- I. Install door louvers plumb and level.

3.3 TOLERANCES

- A. Comply with specified quality standard for fit and clearance tolerances.
- B. Comply with specified quality standard for telegraphing, warp, and squareness.

3.4 ADJUSTING

- A. Adjust doors for smooth and balanced door movement.
- B. Adjust closers for full closure.
- C. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081416

SECTION 081613 - FIBERGLASS DOORS

PART 1 GENERAL

1.1 Section Includes

- A. Fiberglass doors.

1.2 Reference Standards

- A. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.
- B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2018.
- C. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 2022.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
- E. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).
- F. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).
- G. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2023).
- H. ASTM E2112 - Standard Practice for Installation of Exterior Windows, Doors and Skylights; 2019c.

1.3 Administrative Requirements

- A. Coordination: Obtain hardware templates from hardware manufacturer prior to starting fabrication.

1.4 Submittals

- A. Product Data: Provide manufacturer's standard details, installation instructions, hardware and anchor recommendations.
- B. Shop Drawings: Indicate layout and profiles; include assembly methods.
 - 1. Indicate product components, including hardware reinforcement locations and preparations, accessories, finish colors, patterns, and textures.
 - 2. Indicate wall conditions, door and frame elevations, sections, materials, gauges, finishes, location of door hardware by dimension, and details of openings; use same reference numbers indicated on drawings to identify details and openings.
- C. Selection Samples: Submit two complete sets of color chips, illustrating manufacturer's available finishes, colors, and textures.
- D. Maintenance Data: Include instructions for repair of minor scratches and damage.
- E. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer; include detailed terms of warranty.

1.5 Delivery, Storage, and Handling

- A. Mark doors with location of installation, door type, color, and weight.
- B. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- C. Store materials in original packaging, under cover, protected from exposure to harmful weather conditions and from direct contact with water.
 - 1. Store at temperature and humidity conditions recommended by manufacturer.
 - 2. Do not use non-vented plastic or canvas shelters.
 - 3. Immediately remove wet wrappers.
- D. Store in position recommended by manufacturer, elevated minimum 4 inches above grade, with minimum 1/4 inch space between doors.

1.6 Field Conditions

- A. Do not install doors until structure is enclosed.
- B. Maintain temperature and humidity at manufacturer's recommended levels during and after installation of doors.

1.7 Warranty

- A. Provide five (5) year manufacturer warranty covering materials and workmanship , including degradation or failure due to chemical contact.

PART 2 PRODUCTS

2.1 Manufacturers

- A. Fiberglass Composite Doors:
 - 1. Special-Lite, Inc; SL-17: www.special-lite.com/#sle.

2.2 Door and Frame Assemblies

- A. Door and Frame Assemblies: Factory-fabricated, prepared and machined for hardware.
 - 1. Operation: Manual.
 - 2. Physical Endurance: Swinging door cycle test to ANSI/SDI A250.4, Level A (1,000,000 cycles) minimum; tested with hardware and fasteners intended for use on project.
 - 3. Screw-Holding Capacity: Tested to 890 pounds, minimum.
 - 4. Surface Burning Characteristics: Flame spread index (FSI) of 0 to 25, Class A, and smoke developed index (SDI) of 450 or less, when tested in accordance with ASTM E84.
 - 5. Flammability: Self-extinguishing when tested in accordance with ASTM D635.
 - 6. Sizes: As indicated on drawings.
 - 7. Clearance Between Door and Frame: 1/8 inch, maximum.
 - 8. Clearance Between Bottom of Door and Finished Floor: 3/4 inch, maximum; not less than 1/4 inch clearance to threshold.

2.3 Components

- A. Doors: Fiberglass construction with reinforced core.
 - 1. Type: As indicated on drawings, including swinging doors.
 - 2. Thickness: 1-3/4 inch, nominal.
 - 3. Core Material: Manufacturer's standard core material for application indicated.
 - 4. Construction:
 - a. Pultruded as single monolithic fiberglass reinforced plastic (FRP) panel.
 - 5. Face Sheet Texture: Pebble grain.
 - 6. Door Panel Configuration: As indicated on drawings.
 - 7. Subframe and Reinforcements: Manufacturer's standard materials.
 - 8. Waterproof Integrity: Provide factory fabricated edges, cut-outs, and hardware preparations of fiberglass reinforced plastic (FRP); provide cut-outs with joints sealed independently of glazing, louver inserts, or trim.
 - 9. Hardware Preparations: Factory reinforce, machine, and prepare for door hardware including field installed items; provide solid blocking for each item; field cutting, drilling or tapping is not permitted; obtain manufacturer's hardware templates for preparation as necessary.
- B. Door Frames: Provide type in compliance with performance requirements specified for doors.
 - 1. Type: aluminum frame..

2. Profiles: As indicated on drawings.
3. Non-Fire-Rated:
 - a. Aluminum, 0.04 inch minimum wall thickness; natural anodized finish.
4. Corner Joints: Mitered with concealed corner blocks or angles of same material as frame; fiberglass and aluminum joined with screws; steel and stainless steel spot welded; sealed watertight with silicone sealant; field assemble knock-down type frames as required.
5. Hardware Cut-outs: Provide continuous backing or mortar guards of same material as frame, with watertight seal.
6. Frame Anchors: Stainless steel, Type 304; provide three anchors in each jamb for heights up to 84 inches with one additional anchor for each additional 24 inches in height.
7. Reinforcing: Provide manufacturer's standard reinforcing at hinge, strike, and closer locations.

2.4 Performance Requirements

- A. Provide door assemblies that have been designed and fabricated in compliance with specified performance requirements.
- B. Water Leakage: No uncontrolled leakage on interior face when tested in accordance with ASTM E331 at differential pressure of 7.5 psf.
- C. Air Leakage: Maximum of 0.1 cfm per square foot at 6.27 psf differential pressure, when tested in accordance with ASTM E283.
- D. Structural Performance: Withstand positive and negative wind loads equal to 1.5 times design wind loads specified by local code without damage or permanent set, when tested in accordance with ASTM E330/E330M, using 10 second duration of maximum load.
- E. Thermal Transmittance, Exterior Doors: AAMA 1503, U-value of 0.35, maximum, measured on exterior door in size required for this project.

2.5 Finishes

- A. Gel Coating: Ultraviolet (UV) stabilized polyester finish.
 1. Thickness: Minimum 15 mils, 0.015 inch wet thickness, plus/minus 3 mils, 0.003 inch.
 2. Color: As selected by Architect from manufacturer's standard line of colors.

2.6 Accessories

- A. Stops for Glazing: Fiberglass, unless otherwise indicated or required by fire rating; provided by door manufacturer to fit factory made openings, with color and texture to match door; fasteners shall maintain waterproof integrity.
 - 1. Exterior Doors: Provide non-removable stops on exterior side with continuous compression gasket weatherseal.
 - 2. Glazed Openings: Provide removable stops on interior side.
 - 3. Opening Sizes and Shapes: As indicated on drawings.
- B. Glazing: See Section 088000.

PART 3 EXECUTION

3.1 Examination

- A. Verify actual dimensions of openings by field measurements before door fabrication; show recorded measurements on shop drawings.
- B. Do not begin installation until substrates have been properly prepared.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 Preparation

- A. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- B. Clean and prepare substrate in accordance with manufacturer's directions.
- C. Protect adjacent work and finish surfaces from damage during installation.

3.3 Installation

- A. Install in accordance with manufacturer's instructions; do not penetrate frames with anchors.
- B. Install exterior doors in accordance with ASTM E2112.
- C. Install door hardware as specified in Section 087100.
- D. Set units plumb, level, and true-to-line, without warping or racking doors, and with specified clearances; anchor in place.
- E. Set thresholds in continuous bed of sealant.
- F. In masonry walls, install frames prior to laying masonry; anchor frames into masonry mortar joints; fill jambs with grout as walls are laid up.

- G. In stud walls, install frames prior to building walls; anchor frames to studs using concealed anchors.
- H. Separate aluminum and other metal surfaces from sources of corrosion of electrolytic action at points of contact with other materials.
- I. Repair or replace damaged installed products.

3.4 Adjusting

- A. Lubricate, test, and adjust doors to operate easily, free from warp, twist or distortion, and to fit watertight for entire perimeter.
- B. Adjust hardware for smooth and quiet operation.
- C. Adjust doors to fit snugly and close without sticking or binding.

3.5 Cleaning

- A. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance.

3.6 Protection

- A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION 081613

SECTION 084313 - ALUMINUM-FRAMED STOREFRONTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Aluminum-framed storefront, with vision glass and spandral .
- B. Infill panels (Spandral) of metal.
- C. Aluminum doors and frames.
- D. Weatherstripping.
- E. Door hardware.

1.2 REFERENCE STANDARDS

- A. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site; 2015.
- B. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.
- C. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- D. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
- E. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.
- F. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
- G. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.
- H. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.
- I. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).

- J. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2023).

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with installation of other components that comprise the exterior enclosure.
- B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.4 SUBMITTALS

- A. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, and internal drainage details.
- B. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and field welding required.
 - 1. Include design engineer's stamp or seal on shop drawings for attachments and anchors.
- C. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.
- D. Design Data: Provide framing member structural and physical characteristics, engineering calculations, and dimensional limitations.
- E. Designer's qualification statement.
- F. Specimen warranty.

1.5 QUALITY ASSURANCE

- A. Designer Qualifications: Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State in which the Project is located.
- B. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.
- C. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Handle products of this section in accordance with AAMA CW-10.

- B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.7 FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.8 WARRANTY

- A. Correct defective Work within a one year period after Date of Substantial Completion.
- B. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.
- C. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Aluminum-Framed Storefronts:
 - 1. Apogee Architectural Metals, EFCO .

2.2 BASIS OF DESIGN -- FRAMING FOR INSULATING GLAZING

- A. Center-Set Style, Thermally-Broken:
 - 1. Basis of Design: EFCO; XTherm Series 403X.
 - 2. Mullion Dimensions: 2" x 4-1/2".

2.3 BASIS OF DESIGN -- SWINGING DOORS

- A. Wide Stile, Insulating Glazing, Thermally-Broken:
 - 1. Basis of Design: EFCO; D518 Durastile.
 - 2. Thickness: 2 inches.

2.4 ALUMINUM-FRAMED STOREFRONT

- A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
 - 1. Finish:
 - a. Superior performing organic coatings

- b. Factory finish all surfaces that will be exposed in completed assemblies.
 - c. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.
- 2. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
- 3. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
- 4. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
- 5. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
- 6. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
- 7. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
- 8. Maintain continuous air barrier and/or vapor retarder seal throughout assembly, primarily in line with inside pane of glazing and inner sheet of infill panel, and heel bead of glazing compound.

B. Performance Requirements

- 1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
 - a. Design Wind Loads: Comply with requirements of ASCE 7.
 - b. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
- 2. Water Penetration Resistance on Manufactured Assembly: No uncontrolled water on interior face, when tested in accordance with ASTM E331 at pressure differential of 8 psf.
- 3. Air Leakage: 0.06 cfm/sq ft maximum leakage of storefront wall area when tested in accordance with ASTM E283/E283M at 1.57 psf pressure difference.
- 4. Overall U-value Including Glazing: 0.38 Btu/(hr sq ft deg F), maximum.

2.5 COMPONENTS

- A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
 - 1. Framing members for interior applications need not be thermally broken.

2. Glazing Stops: Flush.
- B. Glazing: See Section 088000.
- C. Infill Panels: Insulated, aluminum, with edges formed to fit glazing channel and sealed.
 1. Total Nominal Thickness: 1 inch.
 2. Face Sheet: .050 inch thick.
 3. Core: Polyisocyanurate (ISO) insulation core with R-value of 7.0.
 4. Reinforcement Layer: Manufacturer's standard reinforced thermoset plastic.
 5. Back Sheet: .050 inch thick.
 6. Finish: Same as storefront.
 7. Products:
 - a. Nudo Products, Inc; Endurex 500: www.nudo.com/#sle.

2.6 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).
- B. Sheet Aluminum: ASTM B209/B209M.
- C. Fasteners: Stainless steel.
- D. Concealed Flashings: Stainless steel, 26 gauge, 0.0187 inch minimum thickness.
- E. Sill Flashing Sealant: Elastomeric, silicone or polyurethane, compatible with flashing material.
- F. Sealant for Setting Thresholds: Non-curing butyl type.
- G. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

2.7 FINISHES

- A. Superior Performing Organic Coatings System: Polyvinylidene fluoride (PVDF) multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent PVDF resin, and at least 80 percent of aluminum extrusion and panels surfaces having minimum total dry film thickness (DFT) of 1.2 mils, 0.0012 inch.
 1. Manufacturers:
 - a. PPG; Duranar: www.ppgmetalcoatings.com/#sle.
 - b. Sherwin-Williams Company; Fluropon: www.coil.sherwin.com/#sle.
- B. Color: As selected by Architect from manufacturer's full range.
- C. Touch-Up Materials: As recommended by coating manufacturer for field application.

2.8 HARDWARE

- A. For each door, include weatherstripping, sill sweep strip, and threshold.
- B. Weatherstripping: Wool pile, continuous and replaceable; provide on all doors.
- C. Sill Sweep Strips: Resilient seal type, retracting, of neoprene; provide on all doors.
- D. Threshold: Thermally broken extruded aluminum, one piece per door opening, ribbed surface; provide on all doors.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify dimensions, tolerances, and method of attachment with other work.
- B. Verify that storefront wall openings and adjoining water-resistive and/or air barrier seal materials are ready to receive work of this section.

3.2 INSTALLATION

- A. Install wall system in accordance with manufacturer's instructions.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
- G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.
- H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- I. Set thresholds in bed of sealant and secure.
- J. Install hardware using templates provided.
 - 1. See Section 087100 for hardware installation requirements.

- K. Install glass and infill panels using glazing method required to achieve performance criteria; see Section 088000.
- L. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.3 TOLERANCES

- A. Maximum Variation from Plumb: 0.06 inch per 3 feet non-cumulative or 0.06 inch per 10 feet, whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.4 ADJUSTING

- A. Adjust operating hardware for smooth operation.

3.5 CLEANING

- A. Remove protective material from pre-finished aluminum surfaces.
- B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths, and take care to remove dirt from corners and to wipe surfaces clean.
- C. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with AAMA 609 & 610.

3.6 PROTECTION

- A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION 084313

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SECTION 084435 - FIRE-RATED FRAMED GLAZED ASSEMBLIES - SAFTI

PART 1 GENERAL

1.1 Section Includes

- A. Fire-protective-rated glazing.
- B. Fire-resistive-rated framing.
- C. Fire-resistive-rated, temperature-rise doors.
- D. Fire-resistive-rated glazing.

1.2 Reference Standards

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Current Edition.
- B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test; 2015 (Reaffirmed 2020).
- C. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2021.
- D. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.
- E. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2022.
- F. ITS (DIR) - Directory of Listed Products; Current Edition.
- G. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2022.
- H. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2022.
- I. UL (DIR) - Online Certifications Directory; Current Edition.
- J. UL 10B - Standard for Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- K. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- L. UL 263 - Standard for Fire Tests of Building Construction and Materials; Current Edition, Including All Revisions.

1.3 Administrative Requirements

- A. Coordination: Coordinate with installation of other components comprising exterior enclosure.
- B. Preinstallation Meeting: Convene preinstallation meeting one week before starting work of this section; require attendance by each affected installer.

1.4 Submittals

- A. Product Data: Provide manufacturer's published product data on framing, glazing, anchorage, fasteners, doors, and hardware. Show compliance with fire performance and other criteria.
- B. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and field welding required.
- C. Design Data: Submit framing member structural and physical characteristics and engineering calculations, and identify dimensional limitations.
- D. Executed warranty.

1.5 Quality Assurance

- A. Designer Qualifications: Perform design under direct supervision of professional structural engineer experienced in design of this type of work and licensed in the State in which the Project is located.
- B. Manufacturer Qualifications: Provide glass products listed and manufactured under follow-up program of inspections conducted by ITS (DIR) or UL (DIR).

1.6 Delivery, Storage, and Handling

- A. Protect finished surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to substrate when exposed to sunlight or weather.

1.7 Field Conditions

- A. Do not install sealants when ambient temperature is less than 40 degrees F, and maintain above minimum temperature during and for 48 hours after installation.

1.8 Warranty

- A. Manufacturer Warranty: Provide 5-year manufacturer warranty from date of shipping against product defects. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.1 Manufacturers

- A. SAFTI FIRST, a division of O'Keeffe's Inc: www.safti.com/#sle.
- B. Furnish framing, glazing, and doors from single manufacturer and obtained from a single supplier.
- C. Provide glazed assembly manufacturer's recommended door hardware by approved hardware manufacturers.

2.2 Fire-Rated Assemblies

- A. Type FRRA-1 - Fire-Resistance-Rated Assembly: Comprised of glazing and sidelight framing.
 - 1. Application: At openings indicated on drawings.
 - 2. Rating: As indicated on drawings.
 - 3. Framing: GPX Architectural Series Fire Resistive Framing.
 - 4. Glazing: 60-minute fire-resistive tempered units; SuperLite II-XL 60.
- B. Type FRRD-1 - Fire-Resistance-Rated, Temperature Rise Door:
 - 1. Application: At openings indicated on drawings.
 - 2. Rating: As indicated on drawings.
 - 3. Framing: GPX Architectural Series Fire Resistive Framing.
 - 4. Doors: GPX Builders Series Temperature Rise Doors.
 - 5. Vision Light Glazing: 60-minute fire-resistive tempered units; SuperLite II-XL 60.
 - 6. Door Hardware: Provide assembly manufacturer's recommended hardware to suit application.

2.3 Performance Requirements

- A. Provide factory-fabricated, factory-finished framing members with glazing and related anchorage and attachment devices.
- B. Fire Performance Certification: Listed by UL (DIR) or ITS (DIR).
- C. Fire-Resistive Wall Assemblies: Provide hourly fire ratings as indicated in contract documents, tested as assembly including glazing complying with ASTM E119 or UL 263 and requirements of authorities having jurisdiction.
- D. Fire-Resistive, Temperature Rise Doors: Provide hourly fire ratings as indicated in contract documents; tested as assembly including glazing and framing complying with NFPA 252, UL 10B, and UL 10C and requirements of authorities having jurisdiction. Not more than 250 degrees F temperature rise on unexposed face.

- E. Impact Resistance of Glazing in Hazardous Locations: Comply with ANSI Z97.1 - Class A and 16 CFR 1201 - Category II impact test requirements.

2.4 Components

- A. Framing Members: Formed steel structural members with aluminum cladding and noncombustible, thermally resistive material as required for fire rating.
 - 1. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced as required for imposed loads.
 - 2. Glazing Stops: Flush.
 - 3. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.

2.5 Materials

- A. Aluminum Sheet: ASTM B209/B209M.
- B. Internal Framing: ASTM A501/A501M, with galvanized cladding retainers.
- C. Sealants within Fire-Rated Assembly: As required by fire rating and manufacturer's assembly.

2.6 Finishes

- A. Finishing: Apply factory finish to surfaces that will be exposed in completed assemblies.
 - 1. Touch up surfaces cut during fabrication so no natural metal surfaces are visible in completed assemblies, including joint edges.
- B. Apply factory finish to surfaces that will be exposed in completed assemblies.
- C. Aluminum Finish: Clear anodized.

PART 3 EXECUTION

3.1 Examination

- A. Verify dimensions, tolerances, and attachment method with other work.
- B. Verify wall openings and adjoining water-resistive barrier materials are ready to receive work of this section.
- C. Verify anchorage devices are correctly installed and located.

3.2 Installation

- A. Install wall system in accordance with limitations of fire rating and with manufacturer's instructions.
- B. Install framed glazing assemblies in accordance with NFPA 80 and requirements of local authorities having jurisdiction.
- C. Attach to structure to accommodate construction tolerances and other irregularities.
- D. Provide alignment attachments and shims to permanently fasten system to building structure.
- E. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- F. Provide thermal isolation where components penetrate or disrupt building insulation.
- G. Install door hardware using templates provided.
- H. Touch up minor damage to factory-applied finish; replace components that cannot be repaired to as-new condition.

3.3 Tolerances

- A. Maximum Variation from Plumb: 1/16 inch per 3 feet noncumulative or 1/2 inch per 100 feet, whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting In-Plane: 1/32 inch.

3.4 Adjusting

- A. Adjust doors for smooth operation.

3.5 Cleaning

- A. Remove protective material from prefinished surfaces.
- B. Wash down surfaces with solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

3.6 Protection

- A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION 084435

SECTION 085113 - ALUMINUM WINDOWS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Extruded aluminum windows with operating sash.
- B. Factory glazing.
- C. Operating hardware.
- D. Insect screens.

1.2 REFERENCE STANDARDS

- A. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for Windows, Doors, and Skylights; 2017.
- B. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site; 2015.
- C. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum; 2025.
- D. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- E. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
- F. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.
- G. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).
- H. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.
- I. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2023).

- J. ASTM E1332 - Standard Classification for Rating Outdoor-Indoor Sound Attenuation; 2022.
- K. ASTM F588 - Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact; 2017.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.

1.4 SUBMITTALS

- A. Product Data: Include component dimensions, information on glass and glazing, internal drainage details, and descriptions of hardware and accessories.
- B. Shop Drawings: Indicate opening dimensions, elevations of different types, framed opening tolerances, anchorage locations, and installation requirements.
- C. Grade Substantiation: Prior to submitting shop drawings or starting fabrication, submit one of the following showing compliance with specified grade:
 - 1. Evidence of AAMA Certification.
- D. Test Reports: Prior to submitting shop drawings or starting fabrication, submit test report(s) by independent testing agency showing compliance with performance requirements in excess of those prescribed by specified grade.
- E. Manufacturer's qualification statement.
- F. Installer's qualification statement.
- G. Specimen warranty.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of AAMA CW-10.
- B. Protect finished surfaces with wrapping paper or strippable coating during installation. Do not use adhesive papers or sprayed coatings that bond to substrate when exposed to sunlight or weather.

1.7 FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F.
- B. Maintain this minimum temperature during and 24 hours after installation of sealants.

1.8 WARRANTY

- A. Correct defective work within a one year period after Date of Substantial Completion.
- B. Manufacturer Warranty: Provide 10-year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units. Complete forms in Owner's name and register with manufacturer.
- C. Manufacturer Warranty: Provide 10-year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: EFCO.

2.2 BASIS OF DESIGN - AW PERFORMANCE CLASS WINDOWS

- A. Grade: AAMA/WDMA/CSA 101/I.S.2/A440 having Performance Class of AW, and Performance Grade at least as high as specified design pressure.
- B. Hung Windows, Vertically Sliding; with Matching Fixed Units:
 - 1. Basis of Design: EFCO; HX32 Single Hung.

2.3 ALUMINUM WINDOWS

- A. Aluminum Windows: Extruded aluminum frame and sash, factory fabricated, factory finished, with operating hardware, related flashings, and anchorage and attachment devices.
 - 1. Frame Depth: 3-1/4 inch.
 - 2. Operable Units: Double weatherstripped.
 - 3. Provide factory-glazed units.
 - 4. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced as required for operating hardware and imposed loads.

5. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
 6. Movement: Accommodate movement between window and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.
 7. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
 8. Thermal Movement: Design to accommodate thermal movement caused by 180 degrees F surface temperature without buckling stress on glass, joint seal failure, damaging loads on structural elements, damaging loads on fasteners, reduction in performance or other detrimental effects.
- B. Single-Hung Type:
1. Construction: Thermally broken.
 2. Provide screens.
 3. Glazing: Refer to Section 088000 for insulated tinted glass.
 4. Exterior Finish: Class I color anodized.
 5. Interior Finish: Class I color anodized.

2.4 PERFORMANCE REQUIREMENTS

- A. Grade: AAMA/WDMA/CSA 101/I.S.2/A440 requirements for specific window type:
1. Performance Class (PC): AW.
- B. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
- C. Water Leakage: No uncontrolled leakage on interior face when tested in accordance with ASTM E331 at differential pressure of 10 psf.
- D. Air Leakage: 0.30 cfm/sq ft maximum leakage per unit area of outside window frame dimension when tested at 1.57 psf pressure difference in accordance with ASTM E283/E283M.
- E. Overall Thermal Transmittance (U-value)
1. Fixed: 0.28, maximum, including glazing, measured on window sizes required for this project.
 2. Operable: 0.54, maximum, including glazing, measured on window sizes required for this project.
- F. Forced Entry Resistance: Tested to comply with ASTM F588 requirements for performance level of Grade 10 for specific window style required.
- G. Acoustic Performance: Minimum outdoor-indoor transmission class (OITC) rating of 35, when tested in accordance with ASTM E90 and ASTM E1332.

- H. **Rescue Windows:** Submitted manufacturers product shall comply with New York State Education Department (SED) S106-4 and the following:
1. Clear Opening: Minimum clear opening area for unit 6 sq.ft. Provide horizontally and vertically 24 inches minimum dimensions for the clear opening.
 2. Labels: Provide window labels on inside and outside faces.
 - a. Bright yellow background with black letters.
 - b. Size: Minimum 3 by 5 inches.
 - c. Text: "RESCUE WINDOW" readable from each side of the unit.
 3. Provide labels at rescue window units of all student occupied spaces.
 4. Rescue window latching: Maximum height of window latch is 54 inches above finished floor, typical all locations

2.5 COMPONENTS

- A. Frames: 4 3-1/4 inch deep profile, flush glass stops of snap-on type.
- B. Glazing: See Section 088000.
- C. Sills: .040 inch thick, extruded aluminum; sloped for positive wash; fit under sash leg to 1/2 inch beyond wall face; one piece full width of opening; jamb angles to terminate sill end.
- D. Insect Screens: Extruded aluminum frame with mitered and reinforced corners; screen mesh taut and secure to frame; secured to window with adjustable hardware allowing screen removal without use of tools.
1. Hardware: Spring loaded steel pins; four per screen unit.
 2. Screen Mesh: Vinyl-coated fiberglass, window manufacturer's standard mesh.
 3. Frame Finish: Same as frame and sash.
 4. **Rescue Window** Locations: Provide sliding screens. All other screens to be fixed.
- E. Operable Sash Weatherstripping: Wool pile; permanently resilient, profiled to achieve effective weather seal.
- F. Fasteners: Stainless steel.
- G. Sealant for Setting Sills and Sill Flashing: Non-curing butyl type.
1. See Section 079200 for additional requirements.

2.6 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.

2.7 HARDWARE

- A. Sash lock: Lever handle with cam lock.

- B. Pulls: Manufacturer's standard type.
- C. Bottom Rollers: Stainless steel, adjustable.
- D. Limit Stops: Resilient rubber.

2.8 FINISHES

- A. Superior Performing Organic Coatings System: Polyvinylidene fluoride (PVDF) multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent PVDF resin, and at least 80 percent of aluminum extrusion and panels surfaces having minimum total dry film thickness (DFT) of 1.2 mils, 0.0012 inch.
 - 1. Manufacturers:
 - a. PPG; Duranar: www.ppgmetalcoatings.com/#sle.
 - b. Sherwin-Williams Company; Fluropon: www.coil.sherwin.com/#sle.
- B. Finish Color: As selected by Architect from manufacturer's standard range.
- C. Apply one coat of bituminous coating to concealed aluminum surfaces in contact with dissimilar materials.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that wall openings and adjoining water-resistive barrier materials are ready to receive aluminum windows; see Section 072500.

3.2 PRIME WINDOW INSTALLATION

- A. Install windows in accordance with manufacturer's instructions.
- B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.
- C. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.
- D. Install sill and sill end angles.
- E. Set sill members and sill flashing in continuous bead of sealant.
- F. Provide thermal isolation where components penetrate or disrupt building insulation. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

- G. Install operating hardware not pre-installed by manufacturer.
- H. Install glass and infill panels in accordance with requirements; see Section 088000.

3.3 TOLERANCES

- A. Maximum Variation from Level or Plumb: 1/16 inches every 3 ft non-cumulative or 1/8 inches per 10 ft, whichever is less.

3.4 ADJUSTING

- A. Adjust hardware for smooth operation and secure weathertight closure.

3.5 CLEANING

- A. Remove protective material from factory finished aluminum surfaces.
- B. Wash surfaces by method recommended and acceptable to window manufacturer; rinse and wipe surfaces clean.
- C. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with AAMA 609 & 610.
- D. Remove excess glazing sealant by moderate use of mineral spirits or other solvent acceptable to sealant and window manufacturer.

END OF SECTION 085113

SECTION 086200 - UNIT SKYLIGHTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Skylights with integral frame.
- B. Integral insulated curb.

1.2 REFERENCE STANDARDS

- A. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- B. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
- C. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.
- D. ASTM E2112 - Standard Practice for Installation of Exterior Windows, Doors and Skylights; 2019c.
- E. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.3 SUBMITTALS

- A. Product Data: Include structural, thermal, and daylighting performance values.
- B. Shop Drawings: Indicate configurations, dimensions, locations, fastening methods, and installation details.
- C. Manufacturer's Installation Instructions: Indicate special procedures.
- D. Specimen warranty.

1.4 WARRANTY

- A. Manufacturer Warranty: Provide five-year manufacturer warranty including coverage for leakage due to defective skylight materials or construction. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Unit Skylights:
 - 1. American Skylights a Division of the Andi Group; Thermally Broken & Insulated Self Flashing (Model TSF): www.americanskylights.com/#sle.

2.2 SKYLIGHTS

- A. Skylights: Factory-assembled glazing in aluminum frame, free of visual distortion, and weathertight.
 - 1. Shape: square and rectangular.
 - 2. Glazing: Double.
 - 3. Operation: None; fixed.
 - 4. Nominal Size: custom size..

2.3 PERFORMANCE REQUIREMENTS

- A. Provide unit skylights that comply with the following:
 - 1. Allow for expansion and contraction within system components caused by a cycling surface temperature range of 170 degrees F without causing detrimental effects to system or components.
 - 2. Energy Code Compliance: Comply with ICC (IBC), ASHRAE Std 90.1 I-P, or the authorities having jurisdiction as required for unit skylights.

2.4 COMPONENTS

- A. Double Glazing: Polycarbonate plastic; factory sealed.
 - 1. Outer Glazing: Clear transparent.
 - 2. Inner Glazing: Clear transparent.
- B. Frames: ASTM B221 ASTM B221M Extruded aluminum thermally broken, reinforced and welded corner joints, integral curb frame mounting flange and counterflashing to receive roofing flashing system, with integral condensation collection gutter, glazing retainer; clear anodized finish.

2.5 ACCESSORIES

- A. Anchorage Devices: Type recommended by manufacturer, exposed to view.
- B. Counterflashings: Same metal type and finish as skylight frame.
- C. Skylight Protection System: OSHA-compliant; nonpenetrating fall protection.

- D. Protective Back Coating: Zinc molybdate alkyd.
- E. Sealant: Elastomeric, silicone or polyurethane, compatible with material being sealed .

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that openings and substrate conditions are ready to receive work of this section.

3.2 PREPARATION

- A. Apply protective back coating on aluminum surfaces of skylight units that will be in contact with cementitious materials or dissimilar metals.

3.3 INSTALLATION

- A. Install unit skylights in accordance with manufacturer's instructions and ASTM E2112.

3.4 CLEANING

- A. Remove protective material from prefinished aluminum surfaces.
- B. Wash down exposed surfaces; wipe surfaces clean.
- C. Remove excess sealant.

END OF SECTION 086200

SECTION 087100 – DOOR HARDWARE

Part 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes but not limited to the following:

- 1. Mechanical and/or electrical hardware.
- 2. Cylinder for hardware specified in other sections.

- B. Related Requirements

- 1. Division 1 Section "Sustainable Design Requirements".
- 2. Division 01 Section "Closeout Procedures".
- 3. Division 06 Section "Rough Carpentry".
- 4. Division 06 Section "Finish Carpentry".
- 5. Division 08 Section "Hollow Metal Doors and Frames".
- 6. Division 08 Section "Flush Wood Doors".
- 7. Division 08 Section "Fiberglass Doors".
- 8. Division 08 Section "Aluminum-Framed Entrances and Storefronts".
- 9. Division 28 Section "Access Control".

- C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

- 1. ANSI 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. NYS SED – Manual of Planning Standards (MPS).
- 8. State Building Codes, Local Amendments.

1.3 COORDINATION

- A. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- B. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
- C. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.
- D. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.

1.4 COORDINATION AND MEETINGS

- A. Location: Conduct conferences on project site or other location as directed by the Architect/Owner.
- B. Preinstallation Conference
 - 1. Purpose of the Preinstallation conference is to:
 - a. Coordinate between trades, so all understand their responsibilities.
 - b. To instruct the installing contractors' personnel on the proper installation and adjustment of their respective products.
 - 1. The hardware supplier is responsible for bringing the installation instructions to the meeting.
 - c. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
 - d. Review sequence of operation narratives for each unique access-controlled opening.
 - e. Review the requirements for local and state building codes and how they apply to doors, frames, and hardware.
 - 1. Gap requirements around the doors to follow NFPA 80.
 - 2. Opening forces to follow DOJ's "2010 ADA Standards for accessible design".
 - f. Review any special applications.
 - 2. Conference participants shall include but not limited to:
 - a. General Contractor.
 - b. Installer for doors, frames, and hardware.
 - c. Supplier Representative.
 - d. Owner and/or Owners Representative.
 - e. Electrical Contractor (if applicable).

- f. System Integrator (if applicable).
- g. Construction Manager (if applicable).
- h. Architect and/or Architects Consultant.

C. Keying Conference:

1. Incorporate conference decisions into keying schedule after reviewing door hardware keying system including, but not limited to, the following:
 - a. Flow of traffic and degree of security required.
 - b. Preliminary key system schematic diagram.
 - c. Requirements for key control system.
 1. This is to include the number of keys per keyset.
 2. Number of Master level keys.
 3. Use of keyed construction cores.
 - d. Requirements for access control.
 - e. Address for delivery of keys.
2. Keying Conference participants shall include but not limited to:
 - a. Supplier Representative.
 - b. Owner and/or Owners Representative.
 - c. Architect and/or Architects Consultant.

- D. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

1.5 SUBMITTALS

- A. Submittal Sequence to follow in this order and each are to be submitted under separate cover:
1. Information Submittal.
 2. Door Hardware Schedule.
 3. Hardware Product Data.
 4. Samples.
 5. Riser Diagrams.
 6. Keying Schedule (Only after the keying meeting has taken place).
 7. Wiring Diagrams (Only after final approval of the hardware has been received).
 8. Closeout Submittals.
 9. Submit door hardware schedule concurrent with submissions of Product Data, Samples, Riser Diagrams.
- B. Information Submittals:

1. Qualification Data: Submit qualification data for the Installer and Supplier as defined under Quality Assurance of the Section.
 2. Product Certifications:
 - a. Certify that door hardware for use on each type and size of labeled fire-rated doors complies with listed fire-rated door assemblies.
 3. Product Test Reports: For compliance with accessibility requirements, for tests performed by manufacturer and witnessed by a qualified testing agency.
- 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: Use same scheduling sequence and use same door numbers as in the Contract Documents.
 2. Content: Include the following information:
 - a. Index of openings showing hardware set assignments.
 - b. Identification number, location, hand, fire rating, size, degree of opening, and material of each door and frame.
 - c. Locations of each door hardware set, cross-referenced to floor plans, and to door and frame schedule.
 - d. Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
 - e. Description of electrified door hardware sequences of operation and interfaces with other building control systems.
 - f. Fastenings and other installation information.
 - g. Explanation of abbreviations, symbols, and designations contained in door hardware schedule.
 - h. Mounting locations for door hardware.
 - i. Complete list of related door devices specified or supplied in other Sections for each door and frame.
- D. Riser Diagrams: Required for each opening that has electronic hardware and to incorporate the following:
1. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
 2. Index of openings showing hardware set assignments.
 3. Identification number, location, hand, fire rating, size, degree of opening, and material of each door and frame.
 4. Locations of each door hardware set, cross-referenced to floor plans, and to door and frame schedule.

E. Door Hardware Product Data: Prepared by or under the supervision of supplier.

1. Provide an index of products used grouped by manufacturer.
2. Each product shall be highlighted or marked accordingly.
 - a. Do not include pages or products that are not applicable to the project. If they appear on the same page as a product being used, they shall be crossed out.

F. Samples:

1. Provide a finish sample for each exposed product in each finish specified, in manufacturer's standard size.
2. Tag Samples with full product description to coordinate samples with the door hardware schedule.

G. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:

1. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
2. Complete (point-to-point) access control system block wiring diagrams.
3. Wiring instructions for each electronic component scheduled herein.

H. Keying Schedule: Only after a keying meeting with the owner has taken place, prepare a keying schedule detailing final instruction. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions.

1. The owner must approve the submitted keying schedule prior to the ordering of permanent cylinders/cores.

I. Closeout Submittals:

1. After final approval is received from the architect, submit a Record Copy of the Door and Hardware Schedule with all the content as previously required.
 - a. Submittal must be stamped "RECORD COPY."
 - b. The Record Copy will be given to the installer for the installation of the hardware.
2. Warranty Submittal: Warranty information to include the following information:
 - a. Original factory order number.
 - b. Date order was placed.
 - c. Date of installation (approximately if unknown).

3. Operating and Maintenance Manuals:

- a. Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.
- 4. Wiring Diagrams:
 - a. Provide "as-built" wiring diagrams with all the information as required previously.
 - b. Show any modifications that were made in the field.
- J. Submittals that do not comply with all the requirements above will be rejected and will have to be resubmitted. Any project delays caused by incorrect/incomplete submittals will be the responsibility of the General Contractor and Hardware Supplier.

1.6 QUALITY ASSURANCE

A. Installer Qualifications:

- 1. 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.

B. Door Hardware Supplier Qualifications:

- 1. 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.
- 2. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity.
- 3. 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.

1.7 DELIVERY AND STORAGE

A. All hardware for field installation shall be delivered to the project site.

- 1. Any hardware that is required to be factory installed shall be delivered to the factory at the cost of the supplier of the doors or frames requiring the factory installation.

B. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site.

1. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
 2. The storage area must maintain low humidity and a temperature between 60 to 90 degrees Fahrenheit.
- C. 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.
- D. 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".

1.8 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 (10) years for mechanical mortise locks.
 2. Ten (10) years for mechanical cylindrical locks.
 3. Five (5) years for mechanical exit hardware.
 4. Thirty (30) years for mechanical, manual overhead door closers.
 5. Two (2) years for electromechanical door hardware.

1.9 MAINTENANCE

- 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

2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of door hardware from single manufacturer.
 - 1. Provide electrified door hardware from same manufacturer as mechanical door hardware unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Door Assemblies: Where fire-rated doors are indicated, provide door hardware complying with NFPA 80 that is listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
- B. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that complies with requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
- C. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
- E. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the DOJ's "2010 ADA Standards for Accessible Design".
 - 1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
 - 2. Comply with the following maximum opening-force requirements:
 - a. Interior, Hinged Doors: 5 lbf applied perpendicular to door.
 - b. Sliding or Folding Doors: 5 lbf applied parallel to door at latch.
 - c. Provide thresholds not more than 1/2 inch high.
 - d. Adjust door closer sweep periods so that, from an open position of 90 degrees, the door will take at least 5 seconds to move to a position of 12 degrees from the latch.

- e. Adjust spring hinges so that, from an open position of 70 degrees, the door will take at least 1.5 seconds to move to the closed position.

2.3 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. For products furnished, but not installed, under this Section, Coordinating, purchasing, delivering, and scheduling remain requirements of this Section.
- C. Equals: Requests for equals 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. Approval of requests is at the discretion of the architect, owner, and their designated consultants.
- D. Substitutions: Are not allowed unless the specified product(s) are no longer available.

2.4 HINGES

- A. Hinges are to meet or exceed ANSI/BHMA A156.1 requirements.
- B. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.
- C. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
 - 1. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
 - 2. Sizes from 3'1" to 4'0": 5" heavy weight.
- D. Hinge Type: Provide the type listed in the hardware sets.
- E. Hinge Options:
 - 1. Non-removable Pins: 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.
- F. Manufacturers:
 - 1. Hager Companies (HA).
 - 2. McKinney Products (MK).

3. Stanley Hardware (ST).

2.5 CONTINUOUS HINGES

A. General Requirements:

1. Continuous Hinges are to meet or exceed ANSI/BHMA A156.26 Grade 1 Requirements.
2. Fabricated to full height of door and to template screw locations; with components finished after milling and drilling are complete.
3. Hinges are to be non-handed.
4. Factories to prepare for electrical cut-outs.
5. Hinge Type: Provide the type listed in the hardware sets.
6. Coordinate with door manufacturers for the exact type required, as it varies between door manufacturers and application.
7. Fasteners: All of the fasteners are to be fabricated from corrosion resistant materials.
 - a. Provide either 12-24 x 3/4" self-drilling, thread-forming or 12-24 x 1/2" thread-forming screws that are made of 410 stainless steel with an undercut head.

B. Continuous, Gear-Type Hinges:

1. Manufactured out of 6063-T6 extruded-aluminum, pin-less, geared hinge leaves joined by a continuous extruded-aluminum channel cap; with concealed, self-lubricating bearings.
2. Manufacturers:
 - a. Architectural Builders Hardware (AH).
 - b. Markar (MK).
 - c. Select (SE).

C. Continuous, Pin-and-Barrel Type:

1. Provide hinge leaves with a minimum 14-gauge Type 304 stainless steel hinge leaves.
2. Both the top and bottom of pins are to be permanently welded.
3. Pins are to be manufactured out of stainless steel with a minimum diameter of 3/16" (.1875").
4. Manufacturers:
 - a. Architectural Builders Hardware (AH).
 - b. Hager Companies (HA).
 - c. Markar (MK).
 - d. Select (SE).

2.6 MANUAL FLUSH AND SURFACE BOLTS

- A. Bolts are to meet or exceed ANSI/BHMA A156.3 and A156.16, Grade 1 requirements.
- B. Furnish Dustproof Strikes for all bottom bolts.
- C. Provide related accessories or mounting brackets as required for appropriate installation and operation.
- D. Manufacturers:
 - 1. Architectural Builders Hardware (AH).
 - 2. Rockwood Manufacturing (RO).
 - 3. Trimco (TC).

2.7 OPERATING TRIM

- A. Door Push Plates and Pulls: are to meet or exceed ANSI/BHMA A156.6 requirements.
- B. Coordinate and provide proper width and height as required where conflicting hardware dictates.
- C. Provide a minimum clearance of 2 ½" from face of door.
- D. Provide Heavy Duty Concealed Fasteners where possible. Coordinate type required with door material.
- E. Manufacturers:
 - 1. Architectural Builders Hardware (AH).
 - 2. Rockwood Manufacturing (RO).
 - 3. Trimco (TC).

2.8 CYLINDERS AND KEYING

- A. Cylinders: Original manufacturer cylinders complying with the following:
 - 1. Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.
 - 2. Meet or exceed ANSI/BHMA A156.5 Grade 1 requirements.
 - 3. Mortise Type: Threaded cylinders with rings and cams to suit hardware application.
 - 4. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
 - a. 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. Stamped collars are not allowed.
 - 5. Face finished to match lockset.

6. Core Type: Interchangeable.
7. Keyway: Standard.
8. Keying: Factory Keyed, per approved Keying Schedule.
9. Key Quantity:
 - a. Change keys per cylinder/core: Two (2).
 - b. Master keys per level: Five (5).
 - c. Control Keys (where required): Five (5).
 - d. Key Blanks: One Hundred (100).

B. Construction Cores:

1. Construction Cores: Provide keyed construction cores that are replaceable by permanent cores.
 - a. Provide 10 construction master keys.
 - b. Provide 2 Construction Core Removal Keys.

C. Key Registration List:

1. Provide transcript list in writing or electronic file (proper format) as directed by the Owner.
2. Furnish a list of opening numbers with locking devices, showing cylinder types and quantities required when cylinders or cores are to be owner furnished.

D. Manufacturers:

1. Best (BE).
2. Corbin Russwin (RU).
3. Kaba Ilco (KA).
4. Medeco (MC).
5. Sargent (SA).
6. Schlage (SC).
7. Yale (YA).

2.9 MECHANICAL LOCK AND LATCHING DEVICE

A. Mortise Locksets:

1. Locks shall meet or exceed ANSI/BHMA A156.13, Series 1000, Operational Grade 1, and Security.
2. Locksets are to be manufactured with a corrosion resistant steel case and be field-reversible for handing without disassembly of the lock body.
3. Lock trim and function as shown in hardware sets.
4. Manufacturers:

- a. Best (BE) 45H Series.
- b. Sargent Manufacturing (SA) 8200 Series.
- c. Schlage (SC) L9000 Series.

B. Cylindrical Locks:

1. Locks shall meet or exceed ANSI/BHMA A156.2 Series 4000 Operation Grade 1 requirements.
2. Locks are to be non-handed and fully field reversible.
3. Lock Throw:
 - a. 1/2" throw at single openings.
 - b. 3/4" throw at rated paired openings.
4. Basket:
 - a. 2-3/4" unless noted otherwise.
5. Lock trim and function as shown in hardware sets.
6. Latchbolt:
 - a. Provide deadlocking latchbolt for all locks with a keyed function.
7. Manufacturers:
 - a. Best (BE) 9K Series.
 - b. Sargent Manufacturing (SA) 10X Line.
 - c. Schlage (SC) ND Series.

C. WIRELESS ACCESS CONTROL LOCKS

1. Wireless Access Control Cylindrical Locks: Wireless technology ANSI/BHMA A156.2 Grade 1 cylindrical lockset with integrated card reader and request-to-exit signaling in one complete unit. Separate DPS connects directly to lock electronics for door position (open/closed status) monitoring. Motor driven locking/unlocking control of the lever handle trim with 1/2" deadlocking stainless steel latch. Lock is U.L listed and labeled for use on up to 3 hour fire rated openings.
2. Wireless access control cylindrical locks interface using local wireless connection between the lock unit and a communication hub located directly above the door. Communication hub connected via RS-485 to a new or existing online electronic access control system platform.
3. Fully-encrypted AES 128 wireless communication between lock and communication hub (IEEE 802.15.4, 2.4 GHz) with no proprietary programming device requirements. Locks will continue functional operation independent of wireless connection slowdown or failure.
4. Integrated card reader supports 125kHz proximity credentials; 13.56 MHz contactless credentials: HID® iCLASS (full authentication, all formats), Mifare Classic (Sector and UID), DESFire; and CSN (Card Serial Number) reads for other common 13.56 MHz cards, including ISO 14443 A/B and ISO 15693.
5. User Interfaces: Keypad/Proximity, Proximity Only, Keypad/iCLASS, and iCLASS only, locks with a minimum of 2,000 user codes and the ability to audit the last 10,000 transactions.

6. Power Source: 6 AA alkaline batteries power supply with LED indication of locked, programming mode and low capacity warning status conditions.
 - a. The batteries are to be provided
7. Outside lever rigid except when in "office" mode or valid user code is entered. Emergency override access capability with optional mechanical key cylinder retraction of lock latch bolt without necessary electronic activation.
8. Privacy functionality is required at toilet room and mothers rooms.
9. Complete installation to include manufacturer's Installation Tool and USB Radio Dongle for initial lock set-up and configuration.
10. Provide Panel interface modules at a quantity of a 1 to 4 ration to the locks. 1 panel for every 4 locks. The exact location will be determined.
11. Provide secure application area of HID iCLASS®, iCLASS SE®, Seos® smart credentials.
 - a. Quantity of 200.
12. Electronic on-line access control system platform, including, Access control panels, communication cabling and software, by others.
13. Manufacturers:
 - a. Schlage Electronics (SC) (Basis of design).
 - b. Sargent (SA)
 - c. Corbin Russwin (RU).

2.10 LOCK AND LATCH STRIKES

A. Standards:

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.

B. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame.

C. 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.
 - a. Provide at paired openings with metal edges and astragals.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Dustproof Strikes: Provide for all bottom flush bolts or latches, exit devices, and where thermal pins are required from the door to the floor at fire rated openings.

2.11 ELECTRIC STRIKES

A. Electric strikes shall meet or exceed ANSI/BHMA A156.31, Grade 1 requirements.

1. Shall be for use on non-rated or fire rated openings.
2. Strikes shall be tested to a minimum endurance of 1 million operating cycles.
3. Provide strikes with 12 or 24 VDC capability, fail-secure unless otherwise specified.
4. Where specified provide latchbolt and latchbolt strike monitoring indicating both the position of the latchbolt and locked condition of the strike.
5. Manufacturers:
 6. HES (HS).
 7. Trine (TR).
 8. Von Duprin (VD).

2.12 EXIT DEVICES

- A. Exit Devices shall meet or exceed ANSI/BHMA A156.3, Grade 1 requirements.
- B. On fire rated doors, provide Exit Devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware".
- C. Exit Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar.
 1. Provide solid filler plate(s) where gap behind the Exit Device exists.
 2. When used on full glass door applications provide a filler plate that fills in the gap between the Exit Device and the Glass.
- D. Provide exit latches with deadlocking feature.
- E. Where function of the Exit Device requires a cylinder, provide a cylinder per the requirements of the Keying System.
- F. Function and Trim design as listed in the Hardware Sets.
- G. Provide mounting brackets or spacers as required for proper installation and operation.
- H. Where Vertical Rod Exit Devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated.
 1. Provide dust proof strikes where thermal pins are required to project into the floor.
- I. Provide Through Bolts for All Exit Devices installed on wood doors.
- J. Do not cut perimeter gasket to mount the Exit Device Strikes. Adjust template accordingly.

- K. Coordinate the mounting centerline of the Exit Devices with the Door Elevations.
 - 1. Exit Devices shall not be mounted over vision kits, unless approved by the Architect.
- L. Manufacturers:
 - 1. Detex (DE) Advantex Series.
 - 2. Sargent (SA) PED80 Series.
 - 3. Von Duprin (VD) 98 Series.

2.13 SURFACE CLOSERS

- A. Surface Closers shall meet or exceed ANSI/BHMA A156.4, Grade 1 requirements.
- B. Surface Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
- C. 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.
- D. Provide Surface Closers complying the Americans with Disabilities Act, ANSI ICC/A117.1.
- E. Extended cycle test: Surface Closers to have been cycle tested to 10 million cycles.
- F. Provide metal closer covers.
- G. Closers shall not be installed on exterior or corridor side of doors.
 - 1. Where a conflict exists, bring it to the attention of the Architect prior to installation.
- H. Provide accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation and operation.
- I. Coordinate with Overhead Holder/Stop installation, provide special templates as required to avoid hardware conflicts.
- J. When installing Mullions in Aluminum or Fiberglass Framing, install using Rivnuts and Stainless-Steel machine screws.
- K. Provide Through Bolts for Surface Closers installed on wood doors.
- L. Manufacturers:
 - 1. LCN (LC) 4010/4110Series.

2. Norton (NO) 9500 Series.
3. Sargent (SA) 281 Series.

2.14 ELECTROMAGNETIC HOLDERS

- A. Holders shall meet or exceed ANSI/BHMA A156.15, Grade 1 requirements.
- B. Minimum holding force of 30 lbs.
- C. Tri-voltage, field selectable 12VDC/24VDC/120VAC.
- D. Provide armatures that are through bolted on all Wood Door applications.
- E. Provide armature extensions as required to achieve the degree of opening required.
- F. Coordinate with fire detectors and interface with fire-alarm system for labeled fire-rated door assemblies.
- G. Manufacturers:
 1. Architectural Builders Hardware (AH).
 2. Rixson (RF).
 3. Security Door Controls (SD).

2.15 ELECTRIFIED HOLDERS

- A. Holders shall meet or exceed ANSI/BHMA A156.15, Grade 1 requirements.
- B. Voltage 24VAC/DC or 120VAC as required.
- C. Provide units that are through bolted on all Wood Door applications.
- D. Coordinate with fire detectors and interface with fire-alarm system for labeled fire-rated door assemblies.
- E. Manufacturers:
 1. LCN (LC).
 2. Rixson (RF).

2.16 OVERHEAD STOPS AND HOLDERS

- A. Stops and Holders shall meet or exceed ANSI/BHMA A156.8, Grade 1 requirements.

- B. Provide units that are through bolted on all Wood Door applications.
- C. Coordinate with door closer installation, special templating may be required.
- D. Where stops and holders are specified, coordinate with door manufacturer to insure proper application, installation, and operation.
- E. Function as show in Hardware Sets.
- F. Manufacturers:
 - 1. Architectural Builders Hardware (AH).
 - 2. Glynn Johnson (GJ).
 - 3. Rixson (RF).

2.17 ARCHITECTURAL TRIM

- A. Protective Plates (kick, armor, or mop):
 - 1. Shall meet ANSI/BHMA A156.6 requirements.
 - 2. Protective plates, fabricated from the following:
 - a. Stainless Steel: 300 grade, 050-inch thick.
 - 3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80.
 - 4. Kick and Armor Plates are to be installed on the push side of the door, unless stated otherwise.
 - 5. Mop Plates are to be installed on the pull side of the door.
 - 6. Size: Fabricate protection plates not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
 - 7. Provide Plates with countersunk screw holes.
 - 8. Provide Plates are to be beveled on all 4 edges.
 - 9. Height: 10", unless noted otherwise.
 - 10. Manufacturers:

- a. Burns Manufacturing (BU).
- b. Rockwood Products (RO).
- c. Trimco (TC).

B. Metal Edges and Astragals:

1. Provide Metal Edges and Astragals on both leaf's of doors that have flush bolts.
2. Fabricated from the following:
 - a. Steel: 050-inch thick.
3. Size: Height to match door Height.
4. Finish: Standard Color as selected by Architect.
5. Prepare Metal Edges and Astragals for hardware as required.
6. Provide Metal Edges and Astragals to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
7. Manufacturers:
 - a. Architectural Builders Hardware (AH).
 - b. National Guard (NG).
 - c. Rockwood Products (RO).

2.18 DOOR STOPS AND HOLDERS

- A. Door Stops and Holders shall comply with ANSI/BHMA A156.16, Grade 1 requirements.
- B. Provide wall bumpers, either convex or concave types as required.
- C. Provide Door stops with anchorage required based upon wall or floor application.
- D. Do not mount floor stops where they will impede traffic.
- E. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
- F. Manufacturers:
 1. Burns Manufacturing (BU).
 2. Rockwood Products (RO).
 3. Trimco (TC).

2.19 THRESHOLDS

- A. Thresholds shall comply with ANSI/BHMA A156.21 requirements.
- B. Thresholds shall be fabricated to full width of opening.
- C. Provide non-slip surface.
- D. Provide Stainless Steel Fasteners, type as detailed or required for specific floor conditions.
- E. Manufacturers:
 - 1. National Guard (NG).
 - 2. Pemko (PE).
 - 3. Reese (RE).

2.20 GASKETING

- A. Door Gasketing shall comply with ANSI/BHMA A156.22 requirements.
- B. Provide with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.
- C. Perimeter gasketing should not be cut around door hardware. Gaskets must maintain a continuous seal at the top and vertical edges. Adjust hardware templates accordingly.
- D. 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.
- E. 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.
- F. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.
- G. Maximum Air Leakage: When tested according to ASTM E 283 with tested pressure differential of 0.3-inch wg (75 Pa), as follows:
 - 1. Smoke-Rated Gasketing: 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) of door opening.
 - 2. Gasketing on Single Doors: 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) of door opening.
 - 3. Gasketing on Double Doors: 0.50 cfm per foot (0.000774 cu. m/s per m) of door opening.

H. Manufacturers:

1. National Guard (NG).
2. Pemko (PE).
3. Reese (RE).

2.21 ELECTRONIC ACCESSORIES

A. Door Position Switches:

1. Door position magnetic reed contact switches specifically designed for use in commercial door applications.
2. On recessed models the contact and magnetic housing snap-lock into a 1" diameter hole.
3. Surface mounted models include wide gap distance design complete with armored flex cabling.
4. Manufacturers:
 - a. Alarm Controls (AK).
 - b. Security Door Controls (SD).
 - c. Securitron (SU).

2.22 FABRICATION

- A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rating labels and as otherwise approved by Architect.
1. Manufacturer's identification is permitted on rim of lock cylinders only.
- B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.
1. The use of Aluminum or Brass/Bronze based screws is not acceptable.
- C. Fasteners: Provided by door hardware manufacturer, to comply with published installation instructions, templates and as test for fire rated applications.
1. The use of other fasteners will be rejected.

2. Provide Phillips flat-head screws with finished heads to match surface of door hardware unless otherwise indicated.
3. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners.
4. Where hardware is being attached to Aluminum or FRP doors and frames Rivnuts (Rivet Nuts) and machine screws must be used.
5. Exit Devices, Surface Door Closers, Pulls, and Overhead Stops that are installed on wood doors shall be installed using through-bolts.
6. Gasket Fasteners: Provide Stainless Steel fasteners.
7. Threshold Fasteners:
 - a. Concrete floors: Provide 1/4-20 Stainless Steel Machine Screws and Expansion Shields.
 - b. Wood floors: Provide #10 Stainless Steel Wood Screws.
8. Continuous Hinge Fasteners:
 - a. All of the fasteners are to be fabricated from corrosion resistant materials.
 - b. Provide either 12-24 x 3/4" self-drilling, thread-forming or 12-24 x 1/2" thread-forming screws that are made of 410 stainless-steel with an undercut head.
9. Butt Hinge Fasteners:
 - a. Provide screws out of steel or stainless Steel to match hinge base material.
 - b. Provide Wood Screws for wood door and frame applications.
 - c. Provide Machine Screws for metal door and frame applications.

2.23 FINISHES

- A. Provide finishes complying with ANSI/BHMA A156.18 as indicated in door hardware schedule.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other

components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

Part 3 – EXECUTION

3.1 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance of the Work.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware.
- C. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

- A. Steel Doors and Frames: For surface-applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

- A. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.
- B. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
- C. 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. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors".
 - 3. Comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities".

- D. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- E. Self-closing doors must close and latch completely from the fully opened position.
- F. Lock Cylinders:
 - 1. Install keyed construction cores to secure building and areas during construction period.
 - 2. Replace construction cores with permanent cores as directed by Owner.
- G. Thresholds: Set thresholds in full bed of sealant, and caulk around all edges, complying with requirements specified in Section 079200 "Joint Sealants."
- H. Gaps: Gaps around the head and vertical edges of the doors shall meet the following requirements:
 - 1. Wood Doors: 1/8" top, vertical edge, and in between paired doors.
 - 2. Hollow Metal Doors: 1/8" +/- 1/16" top, vertical edge, and in between paired doors.
 - 3. Where shimming is required to adjust the gaps the shim material must be steel. Cardboard, paper, and other materials are not acceptable.
 - 4. Bottom of door (Undercut) shall not exceed 1" on non-rated openings and 3/4" on rated openings.
- I. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
 - 1. Do not notch or cut perimeter gasketing to install other surface-applied hardware.
- J. Pressure Sensitive Gasketing:
 - 1. Do not install until the frame and door have been finished painted/stained.
 - 2. Surface must be cleaned with alcohol wipes and dry before Gasketing is applied. Follow manufacturer's instructions.
- K. Door Bottoms: Apply to bottom of door, forming seal with floor or threshold when door is closed.
- L. Door Closers: Adjust closers to follow opening forces listed under this section's Performance Requirements.

1. Degree of opening: Template the closer to allow for the maximum degree of opening the conditions will allow.
 2. Back Check valve shall be adjusted so it engages 10 degrees prior to the door reaching full swing.
 3. The Latch Speed valve shall be adjusted so the door latches properly without slamming.
 4. When through-bolts are used on wood doors, do not overtighten, and crush the door. If this happens the door is to be replaced.
 5. Where closers or arms are installed on Aluminum or FRP doors and/or frames, install using Rivnuts (Rivet Nuts).
- M. Wall Bumpers or Stops: Note that blocking in drywall partitions where wall stops, or other wall mounted hardware is located is required.
- N. 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.**
- 1. Lock Strikes: Where retrofitting into existing frames, field verify the frame condition prior to ordering strikes. Field modifications to accept new strike or custom Strikes may be required.**
 - 2. Existing holes: Where holes are left from old hardware in the door and/or frame they shall repaired in compliance with NFPA80 Section 5.5.7. Finished as required by Architect.**
 - 3. Power Supplies: Location of power supplies to be coordinated with the Electrical Contractor, Fire Alarm Supplier and access control supplier.**

3.4 FIELD QUALITY CONTROL

- A. Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating, and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.

- B. 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.
 - 1. Submit documentation of incomplete items in PDF electronic format.
- C. Fire Door Assembly Inspection: Reference Division 01 Sections "Closeout Procedures" for stipulations requiring an initial fire door assembly inspection, including documentation reporting, upon completion of door hardware installation according to NFPA 80 Standard for Fire Doors and Other Opening Protectives, paragraph 5.2.4, requirements.

3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

3.6 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.7 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

3.8 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.9 DOOR HARDWARE SCHEDULE

- A. The hardware sets represent the design intent and direction of the owner and architect. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process.
- B. 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.

C. HARDWARE SETS:

Set: 1.0

3 Hinge	Match Existing Size and Weight	US26D	ST
1 Wireless Lock	AD-400-CY-70-Si-RHO-B	626	SC
1 Core	1C	626	BE
1 Overhead Stop	9000A	US32D	AH
1 Closer, Regular Arm	R9500 M SN-134	689	NO
1 Kick Plate	KP50	US32D	BU
1 Gasketing	5040C		NG

Set: 2.0

3 Hinge	FBB168 4-1/2" x 4-1/2"	US26D	ST
1 Wireless Lock	AD-400-CY-70-Si-RHO-B	626	SC
1 Core	1C	626	BE
1 Overhead Stop	9000A	US32D	AH
1 Closer, Regular Arm	R9500 M SN-134	689	NO
1 Kick Plate	KP50	US32D	BU
1 Gasketing	5040C		NG

Set: 3.0

3 Hinge	Match Existing Size and Weight	US26D	ST
1 Wireless Lock	AD-400-CY-70-Si-RHO-B	626	SC
1 Core	1C	626	BE
1 Closer, Regular Arm	R9500 M SN-134	689	NO
1 Kick Plate	KP50	US32D	BU
1 Wall Stop, Convex	570	US32D	BU
1 Gasketing	5040C		NG

Set: 4.0

3 Hinge	FBB168 4-1/2" x 4-1/2"	US26D	ST
1 Wireless Lock	AD-400-CY-70-Si-RHO-B	626	SC
1 Core	1C	626	BE
1 Closer, Regular Arm	R9500 M SN-134	689	NO
1 Kick Plate	KP50	US32D	BU
1 Wall Stop, Convex	570	US32D	BU
1 Gasketing	5040C		NG

Set: 5.0

3 Hinge	FBB168 4-1/2" x 4-1/2"	US26D	ST
1 Wireless Lock	AD-400-CY-70-Si-RHO-B	626	SC
1 Core	1C	626	BE
1 Closer, Parallel Arm	PR9500 M SN-134	689	NO
1 Kick Plate	KP50	US32D	BU
1 Wall Stop, Convex	570	US32D	BU
1 Gasketing	5040C		NG

Set: 6.0

3 Hinge	Match Existing Size and Weight	US26D	ST
1 Wireless Lock	AD-400-CY-70-Si-RHO-B	626	SC
1 Core	1C	626	BE
1 Surface, Spring Stop	UNI9500 M SN-134	689	NO
1 Kick Plate	KP50	US32D	BU
1 Gasketing	5040C		NG

Set: 7.0

3 Hinge	Match Existing Size and Weight	US26D	ST
1 Entrance Lock	9K37AB 15D	626	BE
1 Core	1C	626	BE
1 Overhead Stop	9000A	US32D	AH
3 Silencer	500		BU

Set: 8.0

3 Hinge	Match Existing Size and Weight	US26D	ST
1 Entrance Lock	9K37AB 15D	626	BE
1 Core	1C	626	BE
1 Wall Stop, Concave	575	US32D	BU
3 Silencer	500		BU

Set: 9.0

3 Hinge	FBB168 4-1/2" x 4-1/2"	US26D	ST
1 Entrance Lock	9K37AB 15D	626	BE
1 Wall Stop, Concave	575	US32D	BU
3 Silencer	500		BU

Set: 10.0

3 Hinge	FBB168 4-1/2" x 4-1/2"	US26D	ST
1 Entrance Lock	9K37AB 15D	626	BE
1 Overhead Stop	9000A	US32D	AH
3 Silencer	500		BU

Set: 11.0

1 Continuous Hinge	A505 083 AS	US32D	AH
1 Intruder Lock	9K37IN 15D	626	BE
1 Closer, Regular Arm	R9500 M SN-134	689	NO
1 Wall Stop, Convex	570	US32D	BU
1 Edge Guard	542SS 7'0" Cut Out-Lock Face		NG
1 Gasketing	5040C		NG

Notes: Provide hinge fillers as required

Set: 12.0

3 Hinge	Match Existing Size and Weight	US26D	ST
DOOR HARDWARE			087100-29

1	Dormitory Lock w/Indicator	45H7TD 15H VIB	626	BE
1	Overhead Stop	9000A	US32D	AH
1	Closer, Regular Arm	R9500 M SN-134	689	NO
1	Gasketing	5040C		NG

Set: 13.0

3	Hinge	FBB168 4-1/2" x 4-1/2"	US26D	ST
1	Dormitory Lock w/Indicator	45H7TD 15H VIB	626	BE
1	Overhead Stop	9000A	US32D	AH
1	Gasketing	5040C		NG

Set: 14.0

3	Hinge	FBB168 4-1/2" x 4-1/2"	US26D	ST
1	Dormitory Lock w/Indicator	45H7TD 15H VIB	626	BE
1	Wall Stop, Convex	570	US32D	BU
1	Gasketing	5040C		NG

Set: 15.0

3	Hinge	Match Existing Size and Weight	US26D	ST
1	Dormitory Lock w/Indicator	45H7TD 15H VIB	626	BE
1	Closer, Regular Arm	R9500 M SN-134	689	NO
1	Kick Plate	KP50	US32D	BU
1	Wall Stop, Convex	570	US32D	BU
1	Gasketing	5040C		NG

Set: 16.0

3	Hinge	FBB168 4-1/2" x 4-1/2"	US26D	ST
1	Dormitory Lock w/Indicator	45H7TD 15H VIB	626	BE
1	Closer, Regular Arm	R9500 M SN-134	689	NO
1	Wall Stop, Convex	570	US32D	BU
1	Gasketing	5040C		NG

Set: 17.0

3 Hinge	FBB168 4-1/2" x 4-1/2"	US26D	ST
1 Storeroom Lock	9K37D 15D	626	BE
1 Closer, Parallel Arm	PR9500 M SN-134	689	NO
1 Kick Plate	KP50	US32D	BU
1 Wall Stop, Convex	570	US32D	BU
3 Silencer	500		BU

Set: 18.0

3 Hinge	FBB168 4-1/2" x 4-1/2"	US26D	ST
1 Storeroom Lock	9K37D 15D	626	BE
1 Closer, Regular Arm	R9500 M SN-134	689	NO
1 Kick Plate	KP50	US32D	BU
1 Wall Stop, Convex	570	US32D	BU
3 Silencer	500		BU

Set: 19.0

3 Hinge	FBB168 4-1/2" x 4-1/2"	US26D	ST
1 Storeroom Lock	9K37D 15D	626	BE
1 Closer, Regular Arm	R9500 M SN-134	689	NO
1 Kick Plate	KP50	US32D	BU
1 Wall Stop, Convex	570	US32D	BU
1 Gasketing	5040C		NG

Set: 20.0

3 Hinge	FBB168 4-1/2" x 4-1/2"	US26D	ST
1 Storeroom Lock	9K37D 15D	626	BE
1 Surface, Spring Stop	UNI9500 M SN-134	689	NO
1 Kick Plate	KP50	US32D	BU
3 Silencer	500		BU

Set: 21.0

3 Hinge	Match Existing Size and Weight	US26D	ST

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1 Storeroom Lock	9K37D 15D	626	BE
1 Closer, Parallel Arm	PR9500 M SN-134	689	NO
1 Kick Plate	KP50	US32D	BU
1 Wall Stop, Convex	570	US32D	BU
3 Silencer	500		BU

Set: 22.0

3 Hinge	Match Existing Size and Weight	US26D	ST
1 Storeroom Lock	9K37D 15D	626	BE
1 Closer, Regular Arm	R9500 M SN-134	689	NO
1 Kick Plate	KP50	US32D	BU
1 Wall Stop, Convex	570	US32D	BU
3 Silencer	500		BU

Set: 23.0

3 Hinge	FBB168 4-1/2" x 4-1/2"	US26D	ST
1 Storeroom Lock	9K37D 15D	626	BE
1 Overhead Stop	9000A	US32D	AH
1 Closer, Regular Arm	R9500 M SN-134	689	NO
1 Kick Plate	KP50	US32D	BU
3 Silencer	500		BU

Set: 24.0

3 Hinge	FBB168 4-1/2" x 4-1/2"	US26D	ST
1 Communicating Lock	9K37S 15D	626	BE
1 Surface, Spring Stop	UNI9500 M SN-134	689	NO
1 Kick Plate	KP50	US32D	BU
1 Gasketing	5040C		NG

Set: 25.0

3 Hinge	FBB168 4-1/2" x 4-1/2"	US26D	ST
1 Communicating Lock	9K37S 15D	626	BE
1 Kick Plate	KP50	US32D	BU

3	Silencer	500		BU

Set: 26.0

3	Hinge	FBB168 4-1/2" x 4-1/2"	US26D	ST
1	Classroom Lock	9K37R 15D	626	BE
1	Overhead Stop	9000A	US32D	AH
1	Kick Plate	KP50	US32D	BU
3	Silencer	500		BU

Set: 27.0

3	Hinge	Match Existing Size and Weight	US26D	ST
1	Classroom Lock	9K37R 15D	626	BE
1	Overhead Stop	9000A	US32D	AH
1	Kick Plate	KP50	US32D	BU
1	Gasketing	5040C		NG

Set: 28.0

3	Hinge	Match Existing Size and Weight	US26D	ST
1	Classroom Lock	9K37R 15D	626	BE
1	Kick Plate	KP50	US32D	BU
1	Wall Stop, Convex	570	US32D	BU
1	Gasketing	5040C		NG

Set: 29.0

3	Hinge	FBB168 4-1/2" x 4-1/2"	US26D	ST
1	Classroom Lock	9K37R 15D	626	BE
1	Overhead Stop	9000A	US32D	AH
1	Closer, Regular Arm	R9500 M SN-134	689	NO
1	Kick Plate	KP50	US32D	BU
1	Gasketing	5040C		NG

Set: 30.0

3 Hinge	Match Existing Size and Weight	US26D	ST
1 Classroom Lock	9K37R 15D	626	BE
1 Overhead Stop	9000A	US32D	AH
1 Closer, Regular Arm	R9500 M SN-134	689	NO
1 Kick Plate	KP50	US32D	BU
1 Gasketing	5040C		NG

Set: 31.0

3 Hinge	Match Existing Size and Weight	US26D	ST
1 Classroom Lock	9K37R 15D	626	BE
1 Closer, Regular Arm	R9500 M SN-134	689	NO
1 Kick Plate	KP50	US32D	BU
1 Wall Stop, Convex	570	US32D	BU
1 Gasketing	5040C		NG

Set: 32.0

3 Hinge	FBB168 4-1/2" x 4-1/2"	US26D	ST
1 Classroom Lock	9K37R 15D	626	BE
1 Closer, Regular Arm	R9500 M SN-134	689	NO
1 Kick Plate	KP50	US32D	BU
1 Wall Stop, Convex	570	US32D	BU
1 Gasketing	5040C		NG

Set: 33.0

3 Hinge	FBB168 4-1/2" x 4-1/2"	US26D	ST
1 Passage Latch	9K30N 15D	626	BE
1 Wall Stop, Convex	570	US32D	BU
3 Silencer	500		BU

Set: 34.0

1 Continuous Hinge	A160HD 083	C	AH
1 Storeroom Lock	9K37D 15D	626	BE
1 Surface, Spring Stop	UNI9500 M	689	NO

1	Perimeter Gasket	By Frame Manufacturer		OT
1	Drip Strip	16A		NG
1	Door Bottom	C627A		NG
1	Threshold	8425 1/4-20 SSMS/EA SIA		NG
1	Position Switch	Under Section 281300		SU
1	Latch Protector	621	US2C	BU

Set: 35.0

1	Continuous Hinge	A160HD 083	C	AH
1	Storeroom Lock	9K37D 15D	626	BE
1	Electric Strike	4100 LBSM	US32D	TR
1	Surface, Spring Stop	UNI9500 M	689	NO
1	Perimeter Gasket	By Frame Manufacturer		OT
1	Drip Strip	16A		NG
1	Door Bottom	C627A		NG
1	Threshold	8425 1/4-20 SSMS/EA SIA		NG
1	Position Switch	Under Section 281300		SU
1	Card Reader	Under Section 281300		OT
1	Latch Protector	621	US2C	BU

Notes: The access control panel is to power the electric strike.

Theory of operation:

Door to be closed and locked at all times

entry allowed through access control system or mechanical key override.

When valid credentials are presented the electric strike shall release for 5 seconds allowing entry. After 5 seconds the electric strike will return to the secure state.

Free egress at all times.

Fail secure

Set: 36.0

6	Hinge	FBB168 4-1/2" x 4-1/2"	US26D	ST
1	Flush Bolt	1857P	US32D	AH
1	Dust Proof Strike	1870	US32D	AH
1	Storeroom Lock	9K37D 15D 3/4	626	BE
1	Overhead Stop	9000A	US32D	AH

1 Closer, Regular Arm	R9500 M SN-134	689	NO
2 Kick Plate	KP50	US32D	BU
1 Wall Stop, Convex	570	US32D	BU
1 Astragal	563 Cut Out-Lock Face Cut Out-Strike Cut Out-Flush Bolt	BPR	NG
1 Gasketing	5040C		NG
1 Astragal Gasket	5060C		NG

Set: 37.0

2 Continuous Hinge	A160HD 083	C	AH
1 Dust Proof Strike	1870	US32D	AH
1 Flush Bolt	1855P	US32D	AH
1 Communicating Lock	9K37S 15D 3/4	626	BE
1 Overhead Stop	9000A 90541	US32D	AH
1 Closer, Regular Arm	R9500 M SN-134	689	NO
1 Wall Stop, Convex	570	US32D	BU
1 Perimeter Gasket	By Frame Manufacturer		OT
2 Door Bottom	17		NG
1 Drip Strip	16A		NG
1 Threshold	8433S 1/4-20 SSMS/EA		NG

Notes: Overlapping astragal by door manufacturer

Set: 38.0

2 Continuous Hinge	A160HD 083	C	AH
1 Dust Proof Strike	1870	US32D	AH
1 Flush Bolt	1855P	US32D	AH
1 Storeroom Lock	9K37D 15D 3/4	626	BE
1 Overhead Stop	9000A	US32D	AH
1 Closer, Spring Stop/Hold-open	UNI9500H M	689	NO
1 Perimeter Gasket	By Frame Manufacturer		OT
1 Drip Strip	16A		NG
2 Door Bottom	C627A		NG
1 Threshold	8425 1/4-20 SSMS/EA SIA		NG
2 Position Switch	Under Section 281300		SU

Notes: Overlapping astragal by door manufacturer

Set: 39.0

1 Continuous Hinge	A505 083 AS	US32D	AH
1 Continuous Hinge, Electric	A505 083 AS EZ12-AA	US32D	AH
1 SVR Exit, Electric Trim	12 NB-PE8774-24v WEL	US32D	SA
1 SVR Exit, Storeroom	12 70 NB-PE8706 WEL	US32D	SA
1 Core	1C	626	BE
2 Closer, Parallel Arm	PR9500 M SN-134	689	NO
2 Kick Plate	KP50	US32D	BU
2 Wall Stop, Convex	570	US32D	BU
1 Astragal	9605A(SET)		NG
2 Gasketing	5040C		NG
1 Wire Harness	EZAA-12		AH
1 Wire Harness	EZAA-300-1		AH
2 Position Switch	Under Section 281300		SU
1 Card Reader	Under Section 281300		OT

Notes: Provide hinge fillers as required

The access control panel is to power the electric trim.

Theory of operation:

Door to be closed and locked at all times.

Entry allowed through the access control system.

Upon valid credentials the exit trim shall unlock for 5 seconds, return to the locked state.

Remote access is allowed through access control system

Free egress at all times

upon power failure the door shall remain secure, fail secure.

Set: 40.0

1 Continuous Hinge	A505 083 AS	US32D	AH
1 Continuous Hinge, Electric	A505 083 AS EZ12-AA	US32D	AH
1 SVR Exit, Electric Trim	12 NB-PE8774-24v WEL	US32D	SA
1 SVR Exit, Storeroom	12 70 NB-PE8706 WEL	US32D	SA

1 Core	1C	626	BE
1 Closer, Parallel Arm	PR9500 M SN-134	689	NO
1 Surface, Spring Stop	UNI9500 M	689	NO
2 Kick Plate	KP50	US32D	BU
1 Wall Stop, Convex	570	US32D	BU
1 Astragal	9605A(SET)		NG
1 Gasketing	5040C		NG
1 Wire Harness	EZAA-12		AH
1 Wire Harness	EZAA-300-1		AH
2 Position Switch	Under Section 281300		SU
1 Card Reader	Under Section 281300		OT

Notes: Provide hinge fillers as required

The access control panel is to power the electric trim.

Theory of operation:

Door to be closed and locked at all times.

Entry allowed through the access control system.

Upon valid credentials the exit trim shall unlock for 5 seconds, return to the locked state.

Remote access is allowed through access control system

Free egress at all times

upon power failure the door shall remain secure, fail secure.

Set: 41.0

1 Continuous Hinge	A505 083 AS	US32D	AH
1 Continuous Hinge, Electric	A505 083 AS EZ12-AA	US32D	AH
1 SVR Exit, Electric Trim	12 NB-PE8774-24v WEL	US32D	SA
1 SVR Exit, Storeroom	12 70 NB-PE8706 WEL	US32D	SA
1 Core	1C	626	BE
2 Surface, Spring Stop	UNI9500 M	689	NO
2 Kick Plate	KP50	US32D	BU
1 Astragal	9605A(SET)		NG
1 Gasketing	5040C		NG
1 Wire Harness	EZAA-12		AH
1 Wire Harness	EZAA-300-1		AH
2 Position Switch	Under Section 281300		SU

1 Card Reader Under Section 281300 OT

Notes: Provide hinge fillers as required

The access control panel is to power the electric trim.

Theory of operation:

Door to be closed and locked at all times.

Entry allowed through the access control system.

Upon valid credentials the exit trim shall unlock for 5 seconds, return to the locked state.

Remote access is allowed through access control system

Free egress at all times

upon power failure the door shall remain secure, fail secure.

Set: 42.0

2 Continuous Hinge	A505 083 AS	US32D	AH
1 SVR Exit, Storeroom	12 70 NB-PE8706 WEL	US32D	SA
1 SVR Exit, Exit Only	12 NB-PE8710 EO	US32D	SA
1 Core	1C	626	BE
2 Surface, Spring Stop	UNI9500 M SN-134	689	NO
2 Kick Plate	KP50	US32D	BU
1 Astragal	9605A(SET)		NG
2 Gasketing	5040C		NG

Notes: Provide hinge fillers as required

Set: 43.0

1 Continuous Hinge	A240HD 083	C	AH
1 Rim Exit, Storeroom	12 70 PE8804 WEL	US32D	SA
1 Core	1C	626	BE
1 Surface, Spring Stop	UNI9500 M SN-134	689	NO
1 Kick Plate	KP50	US32D	BU
1 Gasketing	5040C		NG

Notes: Provide hinge fillers as required.

Set: 44.0

1	Continuous Hinge	A240HD 083	C	AH
1	Rim Exit, Intruder	12 49 70 PE8816 WEL	US32D	SA
2	Core	1C	626	BE
1	Closer, Parallel Arm	PR9500 M SN-134	689	NO
1	Kick Plate	KP50	US32D	BU
1	Wall Stop, Convex	570	US32D	BU
1	Gasketing	5040C		NG

Set: 45.0

1	Electric Strike	4800F LB	US32D	TR

Notes: provide electrical quick disconnect in the mullion at door V8A

Set: 46.0

1	Continuous Hinge	A505 083 AS	US32D	AH
1	Continuous Hinge, Electric	A505 083 AS EZ12-AA	US32D	AH
1	SVR Exit, Electric Trim	12 NB-PE8774-24v WEL	US32D	SA
1	SVR Exit, Storeroom	12 70 NB-PE8706 WEL	US32D	SA
1	Core	1C	626	BE
2	Closer, Parallel Arm	PR9500 M SN-134	689	NO
2	Kick Plate	KP50	US32D	BU
2	Wall Stop, Convex	570	US32D	BU
1	Astragal	9605A(SET)		NG
1	Gasketing	5040C		NG
1	Wire Harness	EZAA-12		AH
1	Wire Harness	EZAA-300-1		AH
2	Position Switch	Under Section 281300		SU
1	Card Reader	Under Section 281300		OT

Notes: The access control panel is to power the electric trim.

Theory of operation:

Door to be closed and locked at all times.

Entry allowed through the access control system.
Upon valid credentials the exit trim shall unlock for 5 seconds, return to the locked state.
Remote access is allowed through access control system
Free egress at all times
upon power failure the door shall remain secure, fail secure.

Set: 47.0

1	Continuous Hinge	A160HD 083	C	AH
1	Rim Exit, Storeroom	LD 70 PE8804 WEL	US32D	SA
1	Core	1C	626	BE
1	Electric Strike	4800F LB	US32D	TR
1	Surface, Spring Stop	UNI9500 M	689	NO
1	Perimeter Gasket	By Frame Manufacturer		OT
1	Drip Strip	16A		NG
1	Door Bottom	C627A		NG
1	Threshold	8425 1/4-20 SSMS/EA SIA		NG
1	Position Switch	Under Section 281300		SU
1	Card Reader	Under Section 281300		OT

Notes: The access control panel is to power the electric strike.

Theory of operation:

Door to be closed and locked at all times

entry allowed through access control system or mechanical key override.

When valid credentials are presented the electric strike shall release for 5 seconds allowing entry. After 5 seconds the electric strike will return to the secure state.

Free egress at all times.

Fail secure

Set: 48.0

3	Hinge	Match Existing Size and Weight	US26D	ST
1	Intruder Lock	9K37IN 15D	626	BE
1	Closer, Regular Arm	R9500 M SN-134	689	NO
1	Kick Plate	KP50	US32D	BU
1	Wall Stop, Convex	570	US32D	BU
1	Gasketing	5040C		NG

Set: 49.0

3 Hinge	Match Existing Size and Weight	US26D	ST
1 Intruder Lock	9K37IN 15D	626	BE
1 Closer, Regular Arm	R9500 M SN-134	689	NO
1 Kick Plate	KP50	US32D	BU
1 Magnetic Holder	Reuse Existing		OT
1 Gasketing	5040C		NG

Set: 50.0

1 Continuous Hinge	A160HD 083	C	AH
1 Dormitory Lock w/Indicator	45H7TD 15H VIB	626	BE
1 Electric Strike	4100DBDL LB	US32D	TR
1 Closer, Regular Arm	R9500 M SN-134	689	NO
1 Wall Stop, Convex	570	US32D	BU
1 Perimeter Gasket	By Frame Manufacturer		OT
1 Door Bottom	17		NG
1 Drip Strip	16A		NG
1 Threshold	8433S 1/4-20 SSMS/EA		NG
1 Position Switch	Under Section 281300		SU
1 Card Reader	Under Section 281300		OT

Notes: The access control panel is to power the electric strike.

Theory of operation:

Door to be closed and locked at all times

Electric strike can be programmed unlocked. When unlocked the door will push open unless the deadbolt is throw.

When locked entry allowed through access control system or mechanical key override.

When valid credentials are presented the electric strike shall release for 5 seconds allowing entry. After 5 seconds the electric strike will return to the secure state.

Free egress at all times.

Fail secure

Set: 51.0

6 Hinge	FBB168 4-1/2" x 4-1/2"	US26D	ST
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1	Dust Proof Strike	1870	US32D	AH
1	Flush Bolt	1855P	US32D	AH
1	Storeroom Lock	9K37D 15D 3/4	626	BE
1	Closer, Parallel Arm	PR9500 M SN-134	689	NO
2	Kick Plate	KP50	US32D	BU
2	Wall Stop, Convex	570	US32D	BU
1	Astragal	553 Cut Out-Lock Face Cut Out-Strike Cut Out-Flush Bolt	BPR	NG
2	Silencer	500		BU

Set: 52.0

2	Continuous Hinge	A505 083 AS	US32D	AH
2	SVR Exit, Exit Only	12 NB-PE8710 EO	US32D	SA
2	Closer, Parallel Arm	PR9500 M SN-134	689	NO
2	Electromagnetic Holder	2300 20400	US32D	AH
1	Astragal	9605A(SET)		NG
1	Gasketing	5040C		NG

Set: 53.0

2	Continuous Hinge	A505 083 AS	US32D	AH
1	SVR Exit, Storeroom	12 70 NB-PE8706 WEL	US32D	SA
1	SVR Exit, Exit Only	12 NB-PE8710 EO	US32D	SA
1	Core	1C	626	BE
2	Closer, Parallel Arm	PR9500 M SN-134	689	NO
2	Kick Plate	KP50	US32D	BU
2	Electromagnetic Holder	2100	US32D	AH
1	Astragal	9605A(SET)		NG
1	Gasketing	5040C		NG

Set: 54.0

1	Continuous Hinge	A505 083 AS	US32D	AH
1	Continuous Hinge, Electric	A505 083 AS EZ12-AA	US32D	AH
1	SVR Exit, Electric Trim	12 NB-PE8774-24v WEL	US32D	SA
1	SVR Exit, Storeroom	12 70 NB-PE8706 WEL	US32D	SA

1 Core	1C	626	BE
2 Closer, Parallel Arm	PR9500 M SN-134	689	NO
2 Kick Plate	KP50	US32D	BU
2 Electromagnetic Holder	2100	US32D	AH
1 Astragal	9605A(SET)		NG
1 Gasketing	5040C		NG
1 Wire Harness	EZAA-12		AH
1 Wire Harness	EZAA-300-1		AH
2 Position Switch	Under Section 281300		SU
1 Card Reader	Under Section 281300		OT

Notes: The access control panel is to power the electric trim.

Theory of operation:

Door to be closed and locked at all times.

Entry allowed through the access control system.

Upon valid credentials the exit trim shall unlock for 5 seconds, return to the locked state.

Remote access is allowed through access control system

Free egress at all times

upon power failure the door shall remain secure, fail secure.

Set: 55.0

2 Continuous Hinge	A160HD 083	C	AH
1 SVR Exit, Storeroom	12 70 NB-PE8706 WEL	US32D	SA
1 SVR Exit, Exit Only	12 NB-PE8710 EO	US32D	SA
1 Core	1C	626	BE
2 Closer, Regular Arm	R9500 M SN-134	689	NO
1 Astragal	9605A(SET)		NG
1 Perimeter Gasket	By Frame Manufacturer		OT
1 Drip Strip	16A		NG
2 Door Bottom	C627A		NG
1 Threshold	8425 1/4-20 SSMS/EA SIA		NG
2 Position Switch	Under Section 281300		SU

Set: 56.0

3 Hydraulic Spring Hinge	AX-L-2-1-S-45	630	PB

1	Storeroom Lock	9K37D 15D	626	BE
1	Wall Stop, Convex	570	US32D	BU
3	Silencer	500		BU

Set: 57.0

2	Continuous Hinge	A505 083 AS	US32D	AH
1	Rim Exit, Exit Only	12 PE8810 EO	US32D	SA
1	Rim Exit Device, Classroom	12 70 PE8813 WEL	US32D	SA
2	Core	1C	626	BE
2	Closer, Parallel Arm	PR9500 M SN-134	689	NO
2	Kick Plate	KP50	US32D	BU
2	Magnetic Holder	Reuse Existing		OT
2	Gasketing	5040C		NG

Notes: PROVIDE HINGE FILLERS AS REQUIRED

Set: 58.0

1	Continuous Hinge	A240HD 083	C	AH
1	Rim Exit Device, Classroom	12 70 PE8813 WEL	US32D	SA
1	Core	1C	626	BE
1	Surface, Spring Stop	UNI9500 M SN-134	689	NO
1	Kick Plate	KP50	US32D	BU
1	Gasketing	5040C		NG

Notes: Provide hinge and strike fillers as required.

Set: 59.0

1	Continuous Hinge	A240HD 083	C	AH
1	Rim Exit Device, Classroom	12 70 PE8813 WEL	US32D	SA
1	Core	1C	626	BE
1	Closer, Parallel Arm	PR9500 M SN-134	689	NO
1	Kick Plate	KP50	US32D	BU
1	Wall Stop, Convex	570	US32D	BU
1	Gasketing	5040C		NG

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Set: 60.0

2 Continuous Hinge	A160HD 083	C	AH
2 Push Bar & Pull	422 x 39C	US32D	BU
2 Closer, Parallel Arm	PR9500 M SN-134	689	NO
2 Wall Stop, Convex	570	US32D	BU
1 Perimeter Gasket	By Frame Manufacturer		OT

Set: 61.0

2 Continuous Hinge	A160HD 083	C	AH
1 Rim Exit, Exit Only	LD PE8810 EO	US32D	SA
1 Rim Exit, Storeroom	LD 70 PE8804 WEL	US32D	SA
1 Core	1C	626	BE
1 Electric Strike	4800F LB	US32D	TR
2 Closer, Parallel Arm	PR9500 M	689	NO
2 Wall Stop, Convex	570	US32D	BU
2 Perimeter Gasket	By Frame Manufacturer		OT
1 Drip Strip	16A		NG
2 Door Bottom	C627A		NG
2 Threshold	8425 1/4-20 SSMS/EA SIA		NG
2 Position Switch	Under Section 281300		SU
1 Card Reader	Under Section 281300		OT

Notes: The access control panel is to power the electric strike.

Theory of operation:

Door to be closed and locked at all times

entry allowed through access control system or mechanical key override.

When valid credentials are presented the electric strike shall release for 5 seconds allowing entry. After 5 seconds the electric strike will return to the secure state.

Free egress at all times.

Fail secure

Set: 62.0

1 Continuous Hinge	A160HD 083	C	AH

1	Rim Exit, Storeroom	LD 70 PE8804 WEL	US32D	SA
1	Core	1C	626	BE
1	Closer, Regular Arm	R9500 M SN-134	689	NO
1	Perimeter Gasket	By Frame Manufacturer		OT
1	Door Bottom	17		NG
1	Drip Strip	16A		NG
1	Threshold	8433S 1/4-20 SSMS/EA		NG
1	Position Switch	Under Section 281300		SU

Set: 63.0

2	Continuous Hinge	A160HD 083	C	AH
1	Rim Exit, Exit Only	LD PE8810 EO	US32D	SA
1	Rim Exit, Storeroom	LD 70 PE8804 WEL	US32D	SA
1	Core	1C	626	BE
1	Electric Strike	4800F LB	US32D	TR
2	Overhead Stop	1000SA	US32D	AH
2	Closer, Parallel Arm	PR9500 M	689	NO
2	Perimeter Gasket	By Frame Manufacturer		OT
1	Drip Strip	16A		NG
2	Door Bottom	C627A		NG
2	Threshold	8425 1/4-20 SSMS/EA SIA		NG
2	Position Switch	Under Section 281300		SU
1	Card Reader	Under Section 281300		OT

Notes: The access control panel is to power the electric strike.

Theory of operation:

Door to be closed and locked at all times

entry allowed through access control system or mechanical key override.

When valid credentials are presented the electric strike shall release for 5 seconds allowing entry. After 5 seconds the electric strike will return to the secure state.

Free egress at all times.

Fail secure

Set: 64.0

3	Hinge	FBB168 4-1/2" x 4-1/2"	US26D	ST

1	Intruder Lock	9K37IN 15D	626	BE
1	Closer, Regular Arm	R9500 M SN-134	689	NO
1	Kick Plate	KP50	US32D	BU
1	Wall Stop, Convex	570	US32D	BU
1	Gasketing	5040C		NG

END OF SECTION

SECTION 088000 - GLAZING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Insulating glass units.
- B. Glazing units.
- C. Decorative Window films. (WC-#)
- D. Laminated glass interlayers.
- E. Glazing compounds.
- F. Note: All Glass is tempered.

1.2 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Current Edition.
- B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test; 2015 (Reaffirmed 2020).
- C. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2019).
- D. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.
- E. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2019.
- F. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.
- G. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass; 2021a.
- H. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2016.
- I. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2019.
- J. GANA (SM) - GANA Sealant Manual; 2008.
- K. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2020.

- L. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2020.
- M. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems; 2020.

1.3 SUBMITTALS

- A. Product Data on Insulating Glass Unit and Glazing Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
- B. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.
- C. Samples: Submit two samples 12 by 12 inch in size of glass units and window film.
- D. Certificate: Certify that products of this section meet or exceed specified requirements.
- E. Manufacturer's qualification statement.
- F. Installer's qualification statement.
- G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for tinted glass coated glass insulating glass glazing sealants and glazing gaskets.
 - 1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.
- H. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- I. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- J. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience and who is approved by coated-glass manufacturer.

- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience and certified under the National Glass Association's Certified Glass Installer Program..
- C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.
- D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
- E. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.
- F. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.
- G. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 1. GANA Publications: GANA's "Laminated Glazing Reference Manual" and GANA's "Glazing Manual."
 - 2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- H. **Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201.**
- I. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

1.5 PRECONSTRUCTION TESTING

- A. Preconstruction Adhesion and Compatibility Testing: Test each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.
- B. Testing will not be required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
- C. Use ASTM C 1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.

1.6 FIELD CONDITIONS

- A. Do not install glazing when ambient temperature is less than 40 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.7 WARRANTY

- A. Insulating Glass Units: Provide a ten (10) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.
- B. Laminated Glass: Provide a ten (10) year manufacturer warranty to include coverage for delamination, including providing products to replace failed units.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. **Provide glazing that meets the minimum requirements of the NYS building code §2406.1 Human impact loads. Individual glazed areas, including glass mirrors, in hazardous locations as defined in §2406.2 shall pass the test requirements of CPSC 16 CFR 1201, listed in Chapter 35. Glazing shall comply with the CPSC 16 CFR, Part 1201 criteria for Category I or Category II as indicated in Table 2406.1.**
 - 1. **All glass units over 9 square feet in size shall be Category II safety glass.**
- B. All interior glazing to comply with NFPA 80 and/or ASTM E119 – coordinate with glazing size and types.
- C. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
 - 1. Design Pressure: As indicated on drawings.
 - 2. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
 - 3. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
 - 4. Glass thicknesses listed are minimum.
- D. Weather-Resistive Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure water-resistive barrier, vapor retarder, and/or air barrier.

- E. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
 - 1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
 - 2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
 - 3. Solar Optical Properties: Comply with NFRC 300 test method.
- F. Delegated Design: Design glass, including comprehensive engineering analysis according to ASTM E 1300 by a qualified **NYS licensed professional engineer**, using the following design criteria. Design to be signed and sealed and certified to be in compliance with the building code of NYS and as specified.
 - 1. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201 Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.
 - a. Wind Design Data: As indicated on Drawings.
 - b. Basic Wind Speed: 90 mph (40 m/s).
 - 2. Design Snow Loads: As indicated on Drawings.
 - 3. Vertical Glazing: For glass surfaces sloped 15 degrees or less from vertical, design glass to resist design wind pressure based on glass type factors for short-duration load.
 - 4. Thickness of Patterned Glass: Base design of patterned glass on thickness at thinnest part of the glass.
 - 5. Probability of Breakage for Sloped Glazing: For glass surfaces sloped more than 15 degrees from vertical, design glass for a probability of breakage not greater than 0.001.
 - 6. 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 1 inch (25 mm), whichever is less.
 - 7. Differential Shading: Design glass to resist thermal stresses induced by differential shading withing individual glass lites.
 - 8. Thermal Movements: Allow for thermal movements

2.2 GLASS MATERIALS

- A. Float Glass: Provide float glass based glazing unless otherwise indicated.
 - 1. Kind **FT** - Fully Tempered Type: Complies with ASTM C1048; Type I (transparent flat glass); Quality-Q3; of class 1, Condition A.
 - a. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.

- 1) Heat Treated Flat Glass to be by horizontal (roller hearth) process with inherent rollerwave distortion parallel to the bottom edge of the glass as installed.
- 2) Maximum peak to valley rollerwave 0.003" (0.08mm) in the central area and 0.008" (0.20mm) within 10.5" (267mm) of the leading and trailing edge.
- 3) Maximum bow and warp 1/32" per lineal foot (0.79mm).
- 4) **All tempered architectural safety glass shall conform with ANSI Z97.1 and CPSC 16 CFR 1201.**
 - b. Labeled glass: Permanently label glass per ASTM standard for tempered glass (sand blasted or etched graphic)
 - c. Thickness: Clear, 1/4 inch. Drawing Designation Glass **Type G6**.
2. Fully Tempered Safety Glass: Complies with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.
- B. Laminated Glass, **Tempered**: Float glass laminated in accordance with ASTM C1172.
 1. Laminated Safety Glass: Complies with ANSI Z97.1 - Class B or 16 CFR 1201 - Category I impact test requirements.
 2. Polyvinyl Butyral (PVB) Interlayer: 0.030 inch thick, minimum.

2.3 INSULATING GLASS UNITS

- A. Manufacturers:
 1. Guardian Glass, LLC: www.guardianglass.com/#sle.
- B. Fabricator: Certified by glass manufacturer for type of glass, coating, and treatment involved and capable of providing specified warranty.
- C. Insulating Glass Units: Types as indicated.
 1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
 2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
 3. Warm-Edge Spacers: Low-conductivity thermoplastic with dessicant warm-edge technology design.
 - a. Spacer Width: As required for specified insulating glass unit.
 - b. Spacer Height: Manufacturer's standard.
 4. Spacer Color: Black.
 5. Edge Seal:
 - a. Dual-Sealed System: Provide polyisobutylene sealant as primary seal applied between spacer and glass panes, and silicone, polysulfide, or polyurethane sealant as secondary seal applied around perimeter.

- b. Color: Black.
- 6. Purge interpane space with dry air, hermetically sealed.
- D. Clear Insulating Glass Units: Vision glass, double glazed. Drawing Designation Glass **Type G3**.
 - 1. Applications: Inner Vestibule doors.
 - 2. Space between lites filled with air.
 - 3. Outboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
 - a. Tint: Clear.
 - 4. Metal edge spacer.
 - 5. Inboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
 - a. Tint: Clear.
 - 6. Total Thickness: 1 inch.
 - 7. **Provide safety glazing labeling.**
- E. Clear Laminated Insulating Glass Units: Vision glass, double glazed. Drawing Designation Glass **Type G4**.
 - 1. Space between lites filled with air.
 - 2. Outboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
 - a. Tint: Clear.
 - 3. Metal edge spacer.
 - 4. Inboard Lite: Fully tempered, Laminated float glass, 1/4 inch thick, minimum.
 - a. Tint: Clear.
 - 5. Total Thickness: 1 inch.
 - 6. **Provide safety glazing labeling.**
- F. Tinted Laminated Insulating Glass Units: Vision glass, double glazed, Laminated. Drawing Designation Glass **Type G1**.
 - 1. Basis of Design - Guardian Glass, LLC: www.guardianglass.com/#sle.
 - 2. Applications: Exterior glazing unless otherwise indicated.
 - 3. Outboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
 - a. Tint: Crystal Gray.
 - b. Coating: Low-E (passive type), SunGuard eXtraSelective SNX 62/27 on #2 surface of laminated unit.
 - 4. Warm-edge spacer.
 - 5. Inboard Lite: Laminated tempered float glass, 1/4 inch thick, minimum.
 - a. Tint: Clear.
 - 6. Total Thickness: 1 inch.
 - 7. Thermal Transmittance (U-Value), Summer - Center of Glass: 0.209, nominal.
 - 8. Visible Light Transmittance (VLT): 31 percent, nominal.
 - 9. Shading Coefficient: 0.19, nominal.
 - 10. Solar Heat Gain Coefficient (SHGC): 0.17, nominal.
 - 11. Visible Light Reflectance, Outside: 6 percent, nominal.

12. Glazing Method: Dry glazing method, gasket glazing.
13. **Provide safety glazing labeling.**

G. Tinted Insulating Glass Units: Vision glass, double glazed. Drawing Designation Glass
Type G2.

1. Basis of Design - Guardian Glass, LLC: www.guardianglass.com/#sle.
2. Applications: Exterior glazing unless otherwise indicated.
3. Space between lites filled with air.
4. Outboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
 - a. Tint: Crystal Gray.
 - b. Coating: Low-E (passive type), SunGuard eXtraSelective SNX 62/27 on #2 surface.
5. Warm-edge spacer.
6. Inboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
 - a. Tint: Clear.
7. Total Thickness: 1 inch.
8. Thermal Transmittance (U-Value), Summer - Center of Glass: 0.209, nominal.
9. Visible Light Transmittance (VLT): 31 percent, nominal.
10. Shading Coefficient: 0.19, nominal.
11. Solar Heat Gain Coefficient (SHGC): 0.17, nominal.
12. Visible Light Reflectance, Outside: 6 percent, nominal.
13. Glazing Method: Dry glazing method, gasket glazing.
14. **Provide safety glazing labeling.**

2.4 PLASTIC FILMS/DECORATIVE WINDOW FILM

- A. WC-# - Decorative Plastic Film: Polyester type.
1. Application: Locations as indicated on drawings.
 2. Manufacturers:
 - a. Level; Lindsey Linear - Frosted.

2.5 GLAZING GASKETS

- A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:
1. Neoprene complying with ASTM C 864.
 2. EPDM complying with ASTM C 864.
 3. Silicone complying with ASTM C 1115.
 4. Thermoplastic polyolefin rubber complying with ASTM C 1115.
- B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned neoprene, silicone or thermoplastic polyolefin rubber gaskets complying with ASTM C 509, 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.
- C. Lock-Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into frames with molded corner units and zipper lock-strips, complying with ASTM C 542, black.

2.6 GLAZING SEALANTS

- A. General:
 1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 3. Sealants used inside the weatherproofing system, shall have a VOC content of not more than 250 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 4. Sealants used inside the weatherproofing system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
 5. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, use NT.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dow Corning Corporation; 790.
 - b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
 - c. May National Associates, Inc.; Bondaflex Sil 290.
 - d. Pecora Corporation; 890.
 - e. Sika Corporation, Construction Products Division; SikaSil-C990.
 - f. Tremco Incorporated; Spectrem 1.

2.7 ACCESSORIES

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch by width of glazing rabbet space minus 1/16 inch by height to suit glazing method and pane weight and area.
- D. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3 inch long by one half the height of the glazing stop by thickness to suit application, self adhesive on one face.
- E. Glazing Splines: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; color black.

PART 3 EXECUTION

3.1 VERIFICATION OF CONDITIONS

- A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.
- B. Verify that the minimum required face and edge clearances are being provided.
- C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.
- D. Verify that sealing between joints of glass framing members has been completed effectively.
- E. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.3 INSTALLATION, GENERAL

- A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.
- B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.
- C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.
- D. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.
- E. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.
- F. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, and not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, etc.

3.4 INSTALLATION - DRY GLAZING METHOD (TAPE AND GASKET SPLINE GLAZING)

- A. Application - Exterior Glazed: Set glazing infills from the exterior of the building.
- B. Cut glazing tape to length; install on glazing pane. Seal corners by butting tape and sealing junctions with butyl sealant.
- C. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
- D. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.
- E. Install removable stops without displacing glazing spline. Exert pressure for full continuous contact.
- F. Carefully trim protruding tape with knife.

3.5 INSTALLATION - PRESSURE GLAZED SYSTEMS

- A. Application - Exterior Glazed: Set glazing infills from exterior side of building.
- B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
- C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
- D. Install pressure plates without displacing glazing gasket; exert pressure for full continuous contact.

- E. Install cover plate.

3.6 INSTALLATION - PLASTIC FILM

- A. Install plastic film with adhesive, applied in accordance with film manufacturer's instructions.
- B. Place without air bubbles, creases or visible distortion.
- C. Install film tight to perimeter of glass and carefully trim film with razor sharp knife. Provide 1/16 inch to 1/8 inch gap at perimeter of glazed panel unless otherwise required. Do not score the glass.

3.7 CLEANING

- A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
- B. Remove nonpermanent labels immediately after glazing installation is complete.
- C. Clean glass and adjacent surfaces after sealants are fully cured.
- D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.8 PROTECTION

- A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.
- B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION 088000

SECTION 088723 - SAFETY AND SECURITY FILMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Glazing film applied to new glazing assemblies.
- B. Glazing assemblies to receive film are indicated on drawings.

1.2 REFERENCE STANDARDS

- A. ASTM C1184 - Standard Specification for Structural Silicone Sealants; 2018, with Editorial Revision.
- B. ASTM D882 - Standard Test Method for Tensile Properties of Thin Plastic Sheeting; 2018.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Record of product certification for safety requirements.
 - 2. Preparation instructions and recommendations.
 - 3. Storage and handling requirements and recommendations.
 - 4. Installation methods.
- B. Shop Drawings: Detailing installation of film, anchoring accessories, and sealant.
- C. Samples: For each film product to be used, minimum size 4 inches by 6 inches, representing actual product, color, and patterns.
- D. Test Reports: Detailed reports of full-scale chamber tests to specified criteria, using assemblies identical to those required for this project.
- E. Specimen Warranty.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Certified by glazing film manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of authorities having jurisdiction.

1.6 FIELD 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 absolute limits.

1.7 WARRANTY

- A. Provide 10 year manufacturer's replacement warranty to cover film against peeling, cracking, discoloration, and deterioration.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design Film: Armoured One, LLC; Shooter Attack Security Film.

2.2 SAFETY AND SECURITY GLAZING FILM

2.3 MATERIALS

- A. Glazing Film: 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. Thickness: 23 mil.
 - 2. Color: Clear.
 - 3. Tensile Strength: 30,000 psi minimum when tested in accordance with ASTM D882.
 - 4. Breaking Strength: 450 lbs per inch width when tested in accordance with ASTM D882.
 - 5. Surface Burning Characteristics: Flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84 (Class A).
 - 6. Abrasion Resistance: Film must have a surface coating that is resistant to abrasion such that, less than 5 percent increase of transmitted light haze will result in accordance with ASTM D 1044 using 50 cycles, 500 grams weight, and the CS10F Calbrase Wheel.

7. Uniformity: No noticeable pin holes, streaks, thin spots, scratches, banding or other optical defects.
8. Variation in Total Transmission across the Width: Less than 2 percent over the average at any portion along the length.
9. Identification: Labeled as to Manufacturer as listed in this Section.
10. Impact Resistance for Safety Glazing: Tested on 1/4 inch (6.4 mm) annealed glass.
 - a. Safety Rating (CPSC 16 CFR, Part 1201): Category II (400 ft.-lbs).
- B. Accessory Materials: As recommended or required by film manufacturer.
- C. Supplementary Anchors: As required by performance criteria and acceptable to Architect.
- D. Structural Silicone Sealant: Self-priming, elastomeric adhesive complying with ASTM C1184.
- E. Glass Cleaner: As recommended by glazing film manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Field -Applied Film: Verify that existing conditions are adequate for proper application and performance of film.
- B. Examine glass and frames. Verify that existing conditions are adequate for proper application and performance of film.
- C. Verify glass is not cracked, chipped, broken, or damaged.
- D. Verify that frames are securely anchored and free of defects.
- E. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- F. Upon the customer's request, 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.

3.2 PREPARATION

- A. Clean glass of dust, dirt, paint, oil, grease, mildew, mold, and other contaminants that would inhibit adhesion.

- B. Immediately prior to applying film, thoroughly wash glass with neutral cleaning solution.
- C. Protect adjacent surfaces.
- D. Do not begin installation until substrates have been properly prepared.

3.3 INSTALLATION

- A. Do not apply glazing film when surface temperature is less than 40 degrees F or if precipitation is imminent.
- B. Install in accordance with manufacturer's instructions, without air bubbles, wrinkles, streaks, bands, thin spots, pinholes, or gaps, as required to achieve specified performance.
- C. Accurately cut film with straight edges to required sizes allowing 1/16 inch to 1/8 inch gap at perimeter of glazed panel unless otherwise required by anchorage method.
- D. Seams: Seam film only as required to accommodate material sizes; form seams vertically without overlaps and gaps; do not install with horizontal seams.
- E. Supplemental Anchors: Install in accordance with manufacturer's instructions and shop drawings.
- F. Clean glass and anchoring accessories following installation. Remove excess sealants and other glazing materials from adjacent finished surfaces.
- G. Remove labels and protective covers.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION 088723

SECTION 088813 - FIRE-RATED GLAZING

PART 1 GENERAL

1.1 Section Includes

- A. Fire-rated glazing units.

1.2 Reference Standards

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Current Edition.
- B. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2019).
- C. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.
- D. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2022.
- E. GANA (SM) - GANA Sealant Manual; 2008.
- F. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. ITS (DIR) - Directory of Listed Products; Current Edition.
- H. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2022.
- I. UL (DIR) - Online Certifications Directory; Current Edition.
- J. UL 10B - Standard for Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- K. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- L. UL 263 - Standard for Fire Tests of Building Construction and Materials; Current Edition, Including All Revisions.

1.3 Administrative Requirements

- A. Preinstallation Meeting: Convene preinstallation meeting one week before starting work of this section; require attendance by affected installers.

1.4 Submittals

- A. Product Data on Glazing Units: Identify structural, physical, and environmental characteristics, fire-rated application and size limitations, and special handling and installation requirements.
- B. Product Data on Glazing Compounds and Accessories: Identify chemical, functional, and environmental characteristics, application and size limitations, and available colors.
- C. Samples: one samples 12 by 12 inch in size showing coloration and design.
- D. Certificate: Certify that products of this section meet or exceed specified requirements.
- E. Executed warranty.

1.5 Quality Assurance

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.
 - 1. Produce glass products listed and manufactured under follow-up program of inspections conducted by ITS (DIR) or UL (DIR).

1.6 Field Conditions

- A. Ambient Conditions: Do not install glazing when ambient temperature is less than 40 degrees F.
- B. Maintain minimum ambient temperature before, during, and 24 hours after installation of glazing compounds.

1.7 Warranty

- A. Manufacturer Warranty for Insulating Fire-Protective Glazing Units: Manufacturer's limited 5-year warranty from date of shipping.
- B. Manufacturer Warranty for Fire-Resistive Units: Manufacturer's limited 5-year warranty from date of shipping.

PART 2 PRODUCTS

2.1 Manufacturers

- A. Fire-Resistance-Rated Glass:
 - 1. SAFTI FIRST, a division of O'Keeffe's Inc: www.safti.com/#sle.
- B. Fire-Protection-Rated Glass:
 - 1. SAFTI FIRST, a division of O'Keeffe's Inc: www.safti.com/#sle.

2.2 Fire-Rated Glazing Units

- A. Provide products listed by ITS (DIR) or UL (DIR) and approved by authorities having jurisdiction.
- B. Safety Glazing Certification: 16 CFR 1201 Category II.
- C. Markings for Fire-Resistance-Rated Glazing Assemblies: Provide permanent markings on fire-resistance-rated glazing in compliance with ICC (IBC), local building code, and authorities having jurisdiction.
 - 1. "W" - meets wall assembly criteria of ASTM E119 or UL 263 fire test standards.
 - 2. "D" - meets fire door assembly criteria of NFPA 252, UL 10B, or UL 10C fire test standards.
 - 3. "H" - meets fire door assembly hose stream test of NFPA 252, UL 10B, or UL 10C fire test standards.
 - 4. "T" - meets temperature rise of not more than 450 degrees F above ambient at end of 30 minutes fire exposure in accordance with NFPA 252, UL 10B, or UL 10C fire test standards.
- D. Fire-Resistance-Rated Glazing: Glazing that blocks radiant heat and contains flames and smoke, as required to achieve indicated fire rating period exceeding 45 minutes when tested in accordance with ASTM E119, with hose stream, where applicable.
 - 1. Applications: for rated wall assembly systems, and locations indicated.
 - 2. Glazing Method: As required for fire rating.
 - 3. Glass Type: 20- to 45-minute fire-resistive units, tempered.
 - a. Product: SAFTIFIRST, a division of O'Keeffe's Inc; SuperLite II-XL 45:
www.safti.com/#sle.
 - 4. Glass Type: 60-minute fire-resistive units, tempered.
 - a. Product: SAFTIFIRST, a division of O'Keeffe's Inc; SuperLite II-XL 60:
www.safti.com/#sle.
- E. Fire-Protection-Rated Glazing: Glazing that contains flame and smoke but does not block radiant heat, as required to achieve indicated fire-rating period.
 - 1. Glass Type: 45/60/90-minute fire-protective glass, with hose stream for vision lights in doors.
 - a. Product: SAFTIFIRST, a division of O'Keeffe's Inc; SuperLite X-45/60/90:
www.safti.com/#sle.

2.3 Accessories

- A. Glazing Accessories: As recommended by glazing manufacturer and conforming to listed assemblies.
- B. Setting Blocks: Calcium silicate.

- C. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Continuous by one half the height of glazing stop by thickness to suit application, self-adhesive on one face.
- D. Glazing Tape: Flexible tape made from spun calcium-magnesium-silica fibers in binder; designed to remain stable at temperatures up to 2,012 degrees F.
 - 1. Thickness: As recommended by framing manufacturer for glazing application.
- E. Glazing Gaskets: Flexible intumescent seals.
 - 1. Material: Co-extruded intercalated graphite combined with thermoplastic lip.

PART 3 EXECUTION

3.1 Examination

- A. Verify openings for glazing meet manufacturer's tolerances.
- B. Verify minimum required face and edge clearances are provided.
- C. Verify surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.
- D. Verify sealing between joints of glass framing members is complete.
- E. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

3.2 Preparation

- A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings not tightly bonded to substrates.
- B. Seal porous glazing channels or recesses with substrate-compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant where required for sealant adhesion.

3.3 INSTALLATION

- A. Install glazing in strict compliance with requirements of tested assemblies and written instructions of glass and framing manufacturers.
 - 1. Installation Method: Dry glazing - tape and tape.
- B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.

- C. Do not exceed edge pressures around perimeter of glass lights as stipulated by glass manufacturer.
- D. Set glass lights of system with uniform pattern, draw, bow, and similar characteristics.
- E. Set coated glass lights in correct orientation so coatings face exterior or interior in accordance with requirements of tested assembly.
- F. Prevent glass from contact with contaminating substances that may result from construction operations including, but not limited to, weld spatter, fire safing, plastering, and mortar droppings.

3.4 Cleaning

- A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
- B. Remove nonpermanent labels immediately after glazing installation is complete.
- C. Clean glass and adjacent surfaces after sealants are fully cured.
- D. Clean glass on both exposed surfaces not more than four days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.5 Protection

- A. After installation, mark pane with 'X' by using removable plastic tape or paste; do not mark heat-absorbing or reflective glass units.
- B. Remove and replace glass damaged during construction period prior to Date of Substantial Completion.

END OF SECTION 088813

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SECTION 092116 - GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Metal stud wall framing.
- B. Metal channel ceiling framing.
- C. Resilient sound isolation clips.
- D. Acoustic insulation.
- E. Tile backing board.
- F. Gypsum wallboard.
- G. Joint treatment and accessories.

1.2 REFERENCE STANDARDS

- A. AISI S100 - North American Specification for the Design of Cold-Formed Steel Structural Members; 2016, with Supplement (2020).
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- C. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2017 (Reapproved 2022).
- D. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2024.
- E. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2024.
- F. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2020.
- G. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2025.
- H. 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.

- I. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 2019.
- J. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel; 2024.
- K. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.
- L. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels; 2024.
- M. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.
- N. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).
- O. ASTM E413 - Classification for Rating Sound Insulation; 2022.
- P. GA-216 - Application and Finishing of Gypsum Panel Products; 2024.
- Q. GA-600 - Fire Resistance and Sound Control Design Manual; 2024.
- R. UL (FRD) - Fire Resistance Directory; Current Edition.
- S. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Current Edition, Including All Revisions.

1.3 SUBMITTALS

- A. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.
- B. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum 3 years of experience.

PART 2 PRODUCTS

2.1 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
 - 1. See PART 3 for finishing requirements.

- B. Interior Partitions, Indicated as Acoustic: Provide completed assemblies with the following characteristics:
 - 1. Acoustic Attenuation: STC as indicated calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
- C. Fire-Resistance-Rated Assemblies: Provide completed assemblies complying with applicable code. UL rated, hour rating as indicated.
 - 1. Gypsum Association File Numbers: Comply with requirements of GA-600 for the particular assembly.
 - 2. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL (FRD).

2.2 METAL FRAMING MATERIALS

- A. Manufacturers - Metal Framing, Connectors, and Accessories:
 - 1. ClarkDietrich: www.clarkdietrich.com/#sle.
 - 2. MarinoWARE: www.marinoware.com/#sle.
 - 3. Minimum Base-Metal Thickness: As required for performance requirements and minimum 20 ga. [0.33 mil].
- B. Non-structural Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/120 at 5 psf.
 - 1. Studs: C-shaped with knurled or embossed faces.
 - a. Minimum 20 gauge studs, typical.
 - 2. Runners: U shaped, sized to match studs.
 - 3. Ceiling Channels: C-shaped.
 - 4. Furring Members: Hat-shaped sections, minimum depth of 7/8 inch.
 - 5. Furring Members: U-shaped sections, minimum depth of 3/4 inch.
 - 6. Furring Members: Zee-shaped sections, minimum depth of 1 inch.
 - 7. Resilient Furring Channels: Single or double leg configuration; 1/2 inch channel depth.
 - 8. Resilient Sound Isolation Clips: Steel resilient clips with molded rubber isolators, attaches to framing; improves noise isolation performance of wall and floor-ceiling assemblies.
 - a. Products:
 - 1) ClarkDietrich; Sound Clip (CDSC): www.clarkdietrich.com/#sle.
 - 2) Keene Building Products; Cylent Assurance Clip: www.keenebuilding.com/#sle.
 - 3) PAC International, Inc; RSIC-1: www.pac-intl.com/#sle.
- C. Shaft Wall Studs and Accessories: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754.
 - 1. Products:

- a. Same manufacturer as other framing materials.
- D. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection and prevent rotation of studs while maintaining structural performance of partition.
 - 1. Structural Performance: Maintain lateral load resistance and vertical movement capacity required by applicable code, when evaluated in accordance with AISI S100.
 - 2. Material: ASTM A653/A653M steel sheet, SS Grade 50/340, with G60/Z180 hot-dipped galvanized coating.
 - 3. Provide components UL-listed for use in UL-listed fire-resistance-rated head of partition joint systems indicated on drawings.
 - 4. Provide mechanical anchorage devices as described above that accommodate deflection while maintaining the fire-resistance rating of the wall assembly.
 - a. Products:
 - 1) ClarkDietrich; BlazeFrame RipTrak: www.clarkdietrich.com/#sle.
 - 2) FireTrak Corporation; Posi Klip: www.fire-trak.com/#sle.
- E. Deflection and Firestop Track: Intumescent strip factory-applied to track flanges expands when exposed to heat or flames to provide a perimeter joint seal.
 - 1. Products:
 - a. ClarkDietrich; BlazeFrame Firestop Deflection Track: www.clarkdietrich.com/#sle.
- F. Preformed Top Track Firestop Seal:
 - 1. Provide components UL-listed for use in UL-listed fire-resistance-rated head of partition joint systems indicated on drawings.
 - 2. Products:
 - a. Hilti, Inc; Top Track Seal CFS TTS: www.us.hilti.com/#sle.
 - b. Specified Technologies Inc; SpeedFlex TTG Track Top Gasket: www.stfirestop.com/#sle.
- G. Non-structural Framing Accessories:
 - 1. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
 - 2. Framing Connectors: ASTM A653/A653M G90 galvanized steel clips; secures cold rolled channel to wall studs for lateral bracing.
- H. Grid Suspension Systems: Steel grid system of main tees and support bars connected to structure using hanging wire.
 - 1. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.
 - 2. Hanger Attachments to Concrete:

- a. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E 488 by an independent testing agency.
 - 1) Type: Postinstalled, chemical anchor or Postinstalled, expansion anchor.
- b. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by an independent testing agency.
3. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch (4.12 mm) in diameter.
4. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.053 inch (1.34 mm) and minimum 1/2-inch- (13-mm-) wide flanges.
 - a. Depth: 1-1/2 inches (38 mm).
5. Products:
 - a. USG Corporation; Drywall Suspension System: www.usg.com/#sle.
 - b. [Chicago Metallic Corporation](#); Drywall Grid System.
 - c. [United States Gypsum Company](#); Drywall Suspension System.

2.3 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:
 1. CertainTeed Corporation: www.certainteed.com/#sle.
 2. Georgia-Pacific Gypsum: www.gpgypsum.com/#sle.
 3. Gold Bond Building Products, LLC provided by National Gypsum Company: www.goldbondbuilding.com/#sle.
 4. USG Corporation: www.usg.com/#sle.
- B. Gypsum) Wallboard: as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
 1. Application: Use for vertical surfaces, unless otherwise indicated.
 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - a. **Mold resistant board is required at all locations.**
 3. Use Type X board, UL or WH listed.
 4. Thickness: unless otherwise indicated or detailed.
 - a. Vertical Surfaces: 5/8 inch.
 5. **Gypsum Board (GWB), Type 'X' GWB** : Mold Resistant Type X Paper Faced Products:
 - a. CertainTeed Corporation; M2Tech 5/8" Type X Moisture & Mold Resistant Drywall: www.certainteed.com/#sle.

- b. Georgia-Pacific Gypsum; ToughRock Fireguard X Mold-Guard: www.gpgypsum.com/#sle.
 - c. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond XP Gypsum Board: www.goldbondbuilding.com/#sle.
 - d. USG Corporation; Sheetrock Brand Mold Tough Firecode SCX Panels 5/8 in. (15.9 mm): www.usg.com/#sle.
- C. Abuse Resistant Wallboard:
 - 1. Surface Abrasion: Level 2, minimum, when tested in accordance with ASTM C1629/C1629M.
 - 2. Indentation: Level 1, minimum, when tested in accordance with ASTM C1629/C1629M.
 - 3. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - 4. Type: Fire-resistance-rated Type X, UL or WH listed.
 - 5. Thickness: 5/8 inch.
 - 6. Edges: Tapered.
 - 7. Paper-Faced Products:
 - a. CertainTeed Corporation; Extreme Abuse Resistant Drywall with M2Tech: www.certainteed.com/#sle.
 - b. Georgia-Pacific Gypsum; ToughRock Fireguard X Mold Guard Abuse-Resistant: www.gpgypsum.com/#sle.
 - c. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond XP Hi-Abuse Gypsum Board: www.goldbondbuilding.com/#sle.
 - d. USG Corporation; Sheetrock Brand Mold Tough AR Firecode X 5/8 in. (15.9 mm): www.usg.com/#sle.
- D. Impact Resistant Wallboard:
 - 1. Application: High-traffic areas indicated.
 - 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - 3. Type: Fire-resistance-rated Type X, UL or WH listed.
 - 4. Thickness: 5/8 inch.
 - 5. Edges: Tapered.
 - 6. Paper-Faced Products:
 - a. CertainTeed Corporation; Extreme Impact Resistant Drywall with M2Tech: www.certainteed.com/#sle.
 - b. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond XP Hi-Impact Gypsum Board: www.goldbondbuilding.com/#sle.
 - c. USG Corporation; Sheetrock Brand Mold Tough VHI Firecode X Panels 5/8 in. (15.9 mm): www.usg.com/#sle.
- E. Backing Board For Wet Areas: One of the following products:
 - 1. Application: Surfaces behind tile in wet areas including tub and shower surrounds and shower ceilings.
 - 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.

3. Glass Mat Faced Board: Coated glass mat water-resistant gypsum backing panel as defined in ASTM C1178/C1178M.
 - a. Fire-Resistance-Rated Type: Type X core, thickness 5/8 inch.
 - b. Locations: Wet walls in Toilet Rooms, Wall behind Custodian Sinks, all locations receiving tile, ceiling area in wet areas-showers and locations indicated.
 - c. Products:
 - 1) CertainTeed Corporation; 5/8" GlasRoc Tile Backer Type X:
www.certainteed.com/#sle.
 - 2) Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond eXP Fire-Shield Tile Backer:
www.goldbondbuilding.com/#sle.
 - 3) USG Corporation; Durock Brand Glass-Mat Tile Backerboard:
www.usg.com/#sle.
- F. Backing Board For Non-Wet Areas: Water-resistant gypsum backing board as defined in ASTM C1396/C1396M; sizes to minimum joints in place; ends square cut.
 1. Application: Vertical surfaces behind thinset tile, except in wet areas.
 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 3. At Assemblies Indicated with Fire-Resistance Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
 4. Type X Thickness: 5/8 inch.
 5. Edges: Tapered.
 6. Products:
 - a. Georgia-Pacific Gypsum; ToughRock Mold-Guard Gypsum Board:
www.gpgypsum.com/#sle.
 - b. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond XP Fire-Shield Gypsum Board:
www.goldbondbuilding.com/#sle.
- G. Ceiling Board: Special sag resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
 1. Application: Ceilings, unless otherwise indicated.
 2. Thickness: 1/2 inch.
 3. Edges: Tapered.
 4. Products:
 - a. CertainTeed Corporation; Interior Ceiling Drywall:
www.certainteed.com/#sle.
 - b. Georgia-Pacific Gypsum; ToughRock Span 24 Ceiling Board:
www.gpgypsum.com/#sle.

- c. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond High Strength LITE Gypsum Board: www.goldbondbuilding.com/#sle.
 - d. USG Corporation; Sheetrock Brand UltraLight Panels 1/2 in. (12.7 mm): www.usg.com/#sle.
- H. Shaftwall and Coreboard: Type X; 1 inch thick by 24 inches wide, beveled long edges, ends square cut.
 - 1. Paper-Faced Type: Gypsum shaftliner board or gypsum coreboard as defined ASTM C1396/C1396M; water-resistant faces.
 - 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - 3. Paper-Faced Products:
 - a. Georgia-Pacific Gypsum; ToughRock Shaftliner: www.gpgypsum.com/#sle.
 - b. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond Shaftliner XP: www.goldbondbuilding.com/#sle.
 - c. USG Corporation; Sheetrock Brand Gypsum Liner Panels 1 in. (25.4 mm) SLX: www.usg.com/#sle.

2.4 GYPSUM BOARD ACCESSORIES

- A. Acoustic Insulation: ASTM C665; Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
 - 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
- B. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.
 - 1. Products:
 - a. Franklin International, Inc; Titebond GREENchoice Professional Acoustical Smoke and Sound Sealant: www.titebond.com/#sle.
 - b. Liquid Nails, a brand of PPG Architectural Coatings: www.liquidnails.com/#sle.
 - c. Specified Technologies Inc; Smoke N Sound Acoustical Sealant: www.stifirestop.com/#sle.
- C. Finishing Accessories: ASTM C1047, extruded aluminum alloy (6063 T5) or galvanized steel sheet ASTM A924/A924M G90, unless noted otherwise.
 - 1. Types: As detailed or required for finished appearance.
 - 2. Special Shapes: In addition to conventional corner bead and control joints, provide U-bead at exposed panel edges.
- D. Beads, Joint Accessories, and Other Trim: ASTM C1047, galvanized steel or rolled zinc, unless noted otherwise.
 - 1. Corner Beads: Low profile, for 90 degree outside corners.

- a. Products:
 - 1) CertainTeed Corporation; No-Coat Drywall Corner: www.certainteed.com/#sle.
 - 2) ClarkDietrich; Strait-Flex Big-Stick: www.clarkdietrich.com/#sle.
- 2. L-Trim Moulding: Sized to fit 1 1/2 inch thick.
 - a. Products: Reglet no. DRML-150.
- 3. Expansion Joints:
 - a. Fire-Resistance Rated: 1 hour when joint system tested in accordance with UL 2079.
 - b. Type: V-shaped PVC with tear away fins.
 - c. Products:
 - 1) Phillips Manufacturing Co; 093 Expansion Control Joint: www.phillipsmfg.com/#sle.
 - 2) Trim-Tex, Inc; Fire Rated 093V Expansion Bead: www.trim-tex.com/#sle.
- E. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
 - 1. Joint Tape:
 - a. Interior Gypsum Board: Tape compatible with XP system.
 - b. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
 - c. Tile Backing Panels: As recommended by panel manufacturer.
 - 2. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 - a. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas.
 - b. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges.
 - c. Fill Coat: For second coat.
 - d. Finish Coat: For third coat.
 - e. Skim Coat: For final coat of Level 5 finish.
 - 3. Joint Compound for Tile Backing Panels:
 - 4. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer and compatible with XP system.
 - 5. Joint Compound: Drying type, vinyl-based, ready-mixed.
- F. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion-resistant.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

3.2 SHAFT WALL INSTALLATION

- A. Shaft Wall Framing: Install in accordance with manufacturer's installation instructions.
 - 1. Fasten runners to structure with short leg to finished side, using appropriate power-driven fasteners at not more than 24 inches on center.
 - 2. Install studs at spacing required to meet performance requirements.
- B. Shaft Wall Liner: Cut panels to accurate dimensions and install sequentially between special friction studs.
 - 1. On walls over sixteen feet high, screw-attach studs to runners top and bottom.
 - 2. Seal perimeter of shaft wall and penetrations with acoustical sealant.

3.3 FRAMING INSTALLATION

- A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.
- B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
 - 1. Level ceiling system to a tolerance of 1/1200.
 - 2. Laterally brace entire suspension system.
- C. Studs: Space studs as scheduled.
 - 1. Extend partition framing to structure in all locations.
 - 2. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.
- D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.
- E. Standard Wall Furring: Install at concrete and masonry walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches on center.
 - 1. Orientation: Vertical.
 - 2. Spacing: As indicated.
- F. Blocking: Install wood blocking for support of:
 - 1. Framed openings.
 - 2. Wall-mounted cabinets.
 - 3. Plumbing fixtures.
 - 4. Toilet partitions.
 - 5. Toilet accessories.

6. Wall-mounted door hardware.
7. Stair handrails

3.4 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Acoustic Sealant: Install in accordance with manufacturer's instructions.
 1. Place one bead continuously on substrate before installation of perimeter framing members.
 2. Place continuous bead at perimeter of each layer of gypsum board.
 3. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes, except where firestopping is provided.

3.5 BOARD INSTALLATION

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Single-Layer Nonrated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
 1. Exception: Tapered edges to receive joint treatment at right angles to framing.
- C. Double-Layer, Nonrated: Use gypsum board for first layer, placed parallel to framing or furring members, with ends and edges occurring over firm bearing. Place second layer perpendicular to framing or furring members. Offset joints of second layer from joints of first layer.
- D. Fire-Resistance-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- E. Installation on Metal Framing: Use screws for attachment of gypsum board.

3.6 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as follows:
 1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

3.7 JOINT TREATMENT

- A. Paper Faced Gypsum Board: Use paper joint tape, embed with drying type joint compound and finish with drying type joint compound.
- B. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
 - 1. Level 5: Only on walls indicated and walls scheduled.
 - 2. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
 - 3. Level 2: On backing board to receive tile finish.
 - 4. Level 1: Wall areas above finished ceilings, whether or not accessible in the completed construction, concealed areas, and where indicated..
- C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
 - 1. Feather coats of joint compound so that camber is maximum 1/32 inch.
 - 2. Taping, filling, and sanding are not required at surfaces behind fixed cabinetry.
 - 3. Taping, filling, and sanding are not required at base layer of double-layer applications.

3.8 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.

3.9 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION 092116

SECTION 093013 - CERAMIC TILING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Wall tile.
 - 2. Stone thresholds.
 - 3. Metal edge strips.
 - 4. **Note: There is custom color grout for Corridor Tile Walls. Refer to Material Legend.**

1.3 DEFINITIONS

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.
- B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in its "Specifications for Installation of Ceramic Tile."
- C. Face Size: Actual tile size, excluding spacer lugs.
- D. Module Size: Actual tile size plus joint width indicated.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
- C. Samples for Initial Selection: For tile, grout, and accessories involving color selection.
- D. Samples for Verification:
 - 1. Full-size units of each type and composition of tile and for each color and finish required. For ceramic mosaic tile in color blend patterns, provide full sheets of each color blend.
 - 2. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required. Make samples at least 12 inches (300 mm) square, but not fewer than four tiles. Use grout of type and in color or colors approved for completed Work.
 - 3. Full-size units of each type of trim and accessory for each color and finish required.
 - 4. Metal edge strips in 6-inch (150-mm) lengths.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For each type of product.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
 - 2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Installer is a Five-Star member of the National Tile Contractors Association or a Trowel of Excellence member of the Tile Contractors' Association of America.
 - 2. Installer's supervisor for Project holds the International Masonry Institute's Foreman Certification.
 - 3. Installer employs only Ceramic Tile Education Foundation Certified Installers or installers recognized by the U.S. Department of Labor as Journeyman Tile Layers for Project.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Tile: Obtain tile of each type and color or finish from single source or producer.
 - 1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from single manufacturer and each aggregate from single source or producer.
 - 1. Obtain setting and grouting materials, except for unmodified Portland cement and aggregate, from single manufacturer.

2.2 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
 - 1. Provide tile complying with Standard grade requirements.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

- C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

2.3 TILE PRODUCTS

- A. Refer to Material Legend for manufacturers, models, tile install conditions, sizes, colors.

2.4 THRESHOLDS

- A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.
 - 1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch (1.5 mm) above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch (12.7 mm) or less above adjacent floor surface.
- B. Marble Thresholds: ASTM C503/C503M, with a minimum abrasion resistance of 10 according to ASTM C1353 or ASTM C241/C241M and with honed finish.
 - 1. Description: Uniform, fine- to medium-grained white stone with gray veining.

2.5 SETTING MATERIALS

- A. Basis of Design Products: Laticrete; Refer to Schedule in Part 4.
- B. Existing Surface Primer: Provide a primer over existing painted substrates or over existing tiled substrates.
 - 1. Basis of Design: Laticrete Prime-N-Bond.

2.6 GROUT MATERIALS

- A. Basis of Design Products: Laticrete; Refer to Schedule in Part 4.
- B. **Custom Color Grout for tile at Corridor Walls. Refer to Material Legend for Pantone color match for grout.**

2.7 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Vapor-Retarder Membrane: Polyethylene sheeting, ASTM D4397, 4.0 mils (0.1 mm) thick.

- C. Metal Edge Strips: Angle or L-shaped, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; stainless steel, ASTM A276/A276M or ASTM A666, 300 Series exposed-edge material.
 - 1. Products: Subject to compliance with requirements, provide the following:
 - a. Schluter Systems L.P; Jolly or similar, final selection by Architect.
 - 1) Material: Brushed Stainless unless otherwise indicated, size as required for tile application.
- D. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
- E. Floor Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout.

2.8 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 - 2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
 - 3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Where indicated, prepare substrates to receive waterproof membrane by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot (1:50) toward drains.
- C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 INSTALLATION OF CERAMIC TILE

- A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- E. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.
- F. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
- G. Joint Widths: Joint sizes to be provided by the Architect, the following is suggested but not final.
 - 1. Porcelain Tile: 1/8 inch.

- H. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
 - 1. Where joints occur in concrete substrates or walls, locate joints in tile surfaces directly above them.
- I. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.
 - 1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in modified dry-set mortar (thinset).
- J. Metal Edge Strips: Install at all outside corners, at all transition locations.

3.4 INSTALLATION OF TILE OVER EXISTING SUBSTRATES

- A. When tile is indicated to be installed over existing painted CMU or over existing ceramic wall tile, install a primer. The existing paint / ceramic wall tile must be well adhered and inspected and approved by Architect prior to primer installation.

3.5 ADJUSTING AND CLEANING

- A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.
- B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove grout residue from tile as soon as possible.
 - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

3.6 PROTECTION

- A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- B. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

PART 4 SCHEDULE OF PRODUCTS

Location	Waterproofing	Uncoupling Membrane	Mortar	Grout
Walls, 6x6 tile	n/a	n/a	254 Platinum Plus	Permacolor
Walls, 12x24	n/a	n/a	LHT	Permacolor Select with Select Color Kit
Walls, 6x6 wet walls	n/a	n/a	254 Platinum Plus	Permacolor

END OF SECTION 093013

SECTION 095100 - ACOUSTICAL CEILINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Suspended metal grid ceiling system.
- B. Acoustical units.

1.2 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- B. ASTM C635/C635M - Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2022.
- C. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2019 (Reapproved 2025).
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
- E. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2024a.
- F. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2023.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- B. Do not install acoustical units until after interior wet work is dry.

1.4 SUBMITTALS

- A. Shop Drawings: Indicate grid layout and related dimensioning.
- B. Product Data: Provide data on suspension system components and acoustical units.
- C. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Acoustical Units: Quantity equal to 5 percent of total installed.

1.5 QUALITY ASSURANCE

- A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.6 FIELD CONDITIONS

- A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acoustic Tiles/Panels:
 - 1. Armstrong World Industries, Inc: www.armstrongceilings.com/#sle.
- B. Suspension Systems:
 - 1. Same as for acoustical units.

2.2 Performance Requirements

- A. Fire-Resistance Rating: Class A in accordance with test procedures in ASTM E84.
 - 1. Flame spread index of 25 or less and smoke developed index of 50 or less (UL labeled)

2.3 ACOUSTICAL UNITS

- A. Acoustical Units - General: ASTM E1264, Class A.
- B. Acoustical Panels ACT-1: Painted mineral fiber, with the following characteristics:
 - 1. Classification: ASTM E1264 Type III.
 - a. Form: 2, water felted.
 - b. Pattern: C E.
 - 2. Size: 24 by 24 inches.
 - 3. Thickness: 3/4 inch.

4. Panel Edge: Square.
 5. Suspension System: Exposed grid.
 6. Products:
 - a. Armstrong World Industries, Inc; School Zone Fine Fissured:
www.armstrongceilings.com/#sle.
- C. Acoustical Panels ACT-2: with the following characteristics:
1. Application(s): Toilet Rooms, Kitchen Areas, and as indicated.
 2. Classification: ASTM E1264 Type XX.
 - a. Pattern: "G" - smooth.
 3. Size: 24 by 24 inches.
 4. Thickness: 3/4 inch
 5. Panel Edge: Square.
 6. Color: White.
 7. Suspension System: Exposed grid.
 8. Products:
 - a. Armstrong; Ceramaguard.

2.4 SUSPENSION SYSTEM(S)

- A. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with perimeter moldings, hold down clips, stabilizer bars, clips, and splices as required.
1. Materials:
 - a. Steel Grid: ASTM A653/A653M, G30 coating, unless otherwise indicated.
- B. Exposed Suspension System: Hot-dipped galvanized steel grid with steel cap.
1. Structural Classification: Intermediate-duty, when tested in accordance with ASTM C635/C635M.
 2. Profile: Tee; 15/16 inch face width.
 3. Finish: Baked enamel.
 4. Color: White.
 5. Products:
 - a. Armstrong; Prelude XL.

2.5 ACCESSORIES

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application and ceiling system flatness requirement specified.
- B. Hanger Wire: 12 gauge, 0.08 inch galvanized steel wire.
- C. Hold-Down Clips: Manufacturer's standard clips to suit application.
- D. Perimeter Moldings: Same metal and finish as grid.

1. Size: As required for installation conditions and specified Seismic Design Category.
 2. Angle Molding: L-shaped, for mounting at same elevation as face of grid.
 3. Acoustical Sealant For Perimeter Moldings: Non-hardening, non-skinning, for use in conjunction with suspended ceiling system.
- E. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that layout of hangers will not interfere with other work.

3.2 Preparation

- A. Install after major above-ceiling work is complete.
- B. Coordinate the location of hangers with other work.
- C. Provide hanger clips during steel deck erection. Provide additional hangers and inserts as required.

3.3 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions and as supplemented in this section.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- C. Lay out system to a balanced grid design with edge units no less than 50 percent of acoustical unit size.
- D. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
 1. Install in bed of acoustical sealant.
 2. Use longest practical lengths.
 3. Overlap and rivet corners.
- E. Suspension System, Non-Seismic: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

- F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- H. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
- I. Do not eccentrically load system or induce rotation of runners.

3.4 INSTALLATION - ACOUSTICAL UNITS

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Fit border trim neatly against abutting surfaces.
- D. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- E. Cutting Acoustical Units:
 - 1. Make field cut edges of same profile as factory edges.
 - 2. Double cut and field paint exposed reveal edges.
- F. Where round obstructions occur, provide preformed closures to match perimeter molding.
- G. Install hold-down clips on panels within 20 ft of an exterior door.

3.5 TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.6 CLEANING

- A. Clean surfaces.
- B. Replace damaged or abraded components.

END OF SECTION 095100

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SECTION 096466 - WOOD ATHLETIC FLOORING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Wood flooring refinishing including painted game lines, striping as indicated.

1.2 REFERENCE STANDARDS

- A. MFMA (SPEC) - Guide Specifications for Maple Flooring Systems; current edition.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meetings: Convene a preinstallation meeting one week before starting work of this section; require attendance by affected installers; review preparation and installation procedures and coordination and scheduling necessary for related work.

1.4 SUBMITTALS

- A. Product Data: Provide data for floor finish materials.
- B. Shop Drawings: Provide game lines, other floor paint as indicated on drawings.
- C. Manufacturer's Instructions: Indicate standard and special installation procedures.
- D. Maintenance Data: Include maintenance procedures and recommended maintenance materials.
- E. Installer's qualification statement.

1.5 QUALITY ASSURANCE

- A. Perform work of this section in accordance with MFMA (SPEC).
- B. Installer Qualifications: Company specializing in installing products specified in this section.
 - 1. Minimum three years of documented experience.
 - 2. MFMA accredited and approved by flooring manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials and store off the floor in a well-ventilated, weather-tight space.

1.7 FIELD CONDITIONS

- A. Maintain room temperature between 55 degrees F and 75 degrees F and relative humidity between 35 to 50 percent for a period of seven days prior to delivery of materials to installation space, during installation, and after installation.

PART 2 PRODUCTS

2.1 Finishes

- A. Floor Finishes: Types recommended by flooring manufacturer and complying with MFMA specifications.
 - 1. Sealer: Water based urethane; Bona US, SuperSport DTS.
 - 2. Finish Coats: Water based urethane; high gloss; Bona US SuperSport ONE.
 - 3. Game Marking/Decorative Paint: Compatible with sealer and finish coats; colors as indicated on drawings.

2.2 ACCESSORIES

- A. Ventilating Base: Molded rubber, 6 inch high with a 1 inch toe, pre-molded outside corners; black color.
 - 1. Location: Replace vented base with new vented base for Gymnasium.
- B. Adhesives: Types recommended by flooring manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting this work.

3.2 PREPARATION

- A. Vacuum clean substrate.

3.3 INSTALLATION

- A. Install base at floor perimeter to cover expansion space in accordance with manufacturer's instructions. Miter inside corners.
- B. Refinishing:
 - 1. Mask off adjacent surfaces before beginning sanding.
 - 2. Using course grit sandpaper, remove old finish and level existing imperfections.
 - 3. Transition to finer grits till surface is smooth.

4. Sand flooring to smooth even finish with no evidence of sander marks. Remove dust by vacuum.
5. Apply finishes in accordance with floor finish manufacturer's and MFMA instructions.
6. Apply one sealer coat and three finish coats.
7. Apply first coat, allow to dry, then buff lightly with recommended pad to remove irregularities. Vacuum clean and wipe with damp, lint-free cloth before applying succeeding coats.
8. Apply game lines/markers in accordance with layout indicated on drawings.
9. Apply last coat of finish.

3.4 CLEANING

- A. Clean floor surfaces in accordance with floor finish manufacturer's instructions.

3.5 PROTECTION

- A. Prohibit traffic on finished floor for 72 hours after installation.
- B. Place protective coverings over finished floors; do not remove coverings until Date of Substantial Completion.

END OF SECTION 096466

SECTION 096500 - RESILIENT FLOORING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Resilient sheet flooring.
- B. Resilient tile flooring.
- C. Resilient base.
- D. Resilient stair accessories.
- E. Installation accessories.

1.2 REFERENCE STANDARDS

- A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2025.
- B. ASTM F1344 - Standard Specification for Rubber Floor Tile; 2021a.
- C. ASTM F1859 - Standard Specification for Rubber Sheet Floor Covering Without Backing; 2021a.
- D. ASTM F1861 - Standard Specification for Resilient Wall Base; 2021 (Reapproved 2025).
- E. ASTM F2169 - Standard Specification for Resilient Stair Treads; 2015 (Reapproved 2020).
- F. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2023.

1.3 SUBMITTALS

- A. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- B. Shop Drawings: Indicate floor patterns.
- C. Verification Samples: Full-size units of each color and pattern of floor tile required.
- D. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.

- E. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of subfloor is acceptable.
- F. Manufacturer's Qualification Statement.
- G. Installer's Qualification Statement.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Flooring Material: 10 square feet of each type and color.
 - 2. Extra Wall Base: 20 linear feet of each type and color.
 - 3. Extra Stair Materials: Quantity equivalent to 5 percent of each type and color.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing specified flooring with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in installing specified flooring with minimum three years documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.
- B. Store all materials off of the floor in an acclimatized, weather-tight space.
- C. Maintain temperature in storage area between 55 degrees F and 90 degrees F.
- D. Do not double stack pallets.

1.6 FIELD CONDITIONS

- A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

PART 2 PRODUCTS

2.1 SHEET FLOORING

- A. Vinyl Sheet Flooring - Type VSF-#:
 - 1. Manufacturers:
 - a. Patcraft; Holistic 1422V.

2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
 3. Total Thickness: 0,079 inch minimum.
 4. Sheet Width: 78.94 inch minimum.
 5. Seams: Heat welded.
 6. Color: As indicated on drawings.
- B. Rubber Sheet Flooring - Type RSF-1: 100 percent rubber composition, color and pattern through total thickness.
1. Manufacturers:
 - a. Mannington Commercial: www.manningtoncommercial.com#sle.
 - b. Roppe Corporation: www.roppe.com/#sle.
 - c. ENCORE; ECONIGHTS.
 - d. Substitutions: See Section 016000 - Product Requirements.
 2. Minimum Requirements: Comply with ASTM F1859, Type 1, without backing.
 3. Thickness: 0.125 inch minimum.
 4. Sheet Width: 48 inch minimum.
 5. Seams: Heat welded.
 6. Surface Texture: Smooth.
 7. Pattern: As indicated on drawings.
 8. Color: See materials legend
- C. Welding Rod: Solid bead in material compatible with flooring, produced by flooring manufacturer for heat welding seams, and in color matching field color.

2.2 TILE FLOORING

- A. Rubber Tile: Homogeneous, color and pattern throughout thickness.
1. Manufacturers:
 - a. Nora by Interface; Noraplan Sentica 3.0 mm..
 2. Minimum Requirements: Comply with ASTM F1344, of Class corresponding to type specified.
 3. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
 4. Size: 24 by 24 inch nominal.
 5. Total Thickness: 0.012 inch.
 6. Texture: Smooth.
 7. Color: As indicated on drawings.

2.3 STAIR COVERING

- A. Stair Treads: Rubber; full width and depth of stair tread in one piece; including integral riser, tapered thickness.
1. Manufacturers:

- a. Johnsonite, a Tarkett Company: www.johnsonite.com/#sle.
2. Minimum Requirements: Comply with ASTM F2169, Type TS, rubber, vulcanized thermoset.
3. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
4. Nosing: Square.
5. Striping: 2 inch wide contrasting color abrasive strips.
6. Texture: hammered.
7. Color: As indicated on drawings.

2.4 RESILIENT BASE

- A. Resilient Base: ASTM F1861, Type TS rubber, vulcanized thermoset; style as scheduled.
 1. Manufacturers:
 - a. Johnsonite, a Tarkett Company: www.johnsonite.com/#sle.
 2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
 3. Height: as indicated.
 4. Thickness: 0.125 inch.
 5. Finish: Satin.
 6. Length: Roll.
 7. Color: As indicated on drawings.
 8. Accessories: Premolded external corners and internal corners.

2.5 ACCESSORIES

- A. Subfloor Filler (Flash patch): White premix latex; type recommended by adhesive material manufacturer. **Provide under all new flooring typical.**
- B. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.
- C. Moldings, Transition and Edge Strips: Same material as flooring.
- D. Filler for Coved Base: Plastic.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.

- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.
- C. Cementitious Subfloor Surfaces: Verify that substrates are ready for resilient flooring installation by testing for moisture and alkalinity (pH).
 - 1. Test as Follows:
 - a. Alkalinity (pH): ASTM F710.
 - b. Internal Relative Humidity: ASTM F2170.
 - c. Moisture Vapor Emission: ASTM F1869.
 - 2. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.
- D. Verify that required floor-mounted utilities are in correct location.

3.2 PREPARATION

- A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- B. Subfloor fill/Flash patch: Provide under all new flooring, typical.
- C. Remove subfloor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface.
- D. Prohibit traffic until filler is fully cured.
- E. Clean substrate.

3.3 Installation - General

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install in accordance with manufacturer's written instructions.
- C. Adhesive-Applied Installation:
 - 1. Spread only enough adhesive to permit installation of materials before initial set.
 - 2. Fit joints and butt seams tightly.
 - 3. Set flooring in place, press with heavy roller to attain full adhesion.
- D. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.
- E. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
 - 1. Resilient Strips: Attach to substrate using adhesive.
- F. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

- G. Install flooring in recessed floor access covers, maintaining floor pattern.
- H. At movable partitions, install flooring under partitions without interrupting floor pattern.
- I. Install feature strips where indicated.

3.4 Installation - Sheet Flooring

- A. Lay flooring with joints and seams parallel to longer room dimensions, to produce minimum number of seams. Lay out seams to avoid widths less than 1/3 of roll width; match patterns at seams.
- B. Cut sheet at seams in accordance with manufacturer's instructions.
- C. Seal seams by heat welding where indicated.

3.5 Installation - Tile Flooring

- A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.
- B. Lay flooring with joints and seams parallel to building lines to produce symmetrical pattern.
- C. Install square tile to pattern shown on drawings. Allow minimum 1/2 full size tile width at room or area perimeter.

3.6 Installation - Resilient Base

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.
- B. Miter internal corners. At external corners, use premolded units. At exposed ends, use premolded units.
- C. Install base on solid backing. Bond tightly to wall and floor surfaces.
- D. Scribe and fit to door frames and other interruptions.

3.7 Installation - Stair Coverings

- A. Install stair coverings in one piece for full width and depth of tread.
- B. Adhere over entire surface. Fit accurately and securely.

3.8 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's written instructions.

3.9 PROTECTION

- A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION 096500

SECTION 096566 - RESILIENT ATHLETIC FLOORING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Rubber tile, adhesively installed.

1.2 REFERENCE STANDARDS

- A. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2023.
- B. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2019a.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all affected installers; review preparation and installation procedures and coordination and scheduling necessary for related work.

1.4 SUBMITTALS

- A. Product Data: Manufacturer's printed data sheets for products specified.
- B. Shop Drawings: Fabrication and installation details, and layout, colors, and widths of game lines and equipment locations.
- C. Selection Samples: Manufacturer's color charts for flooring materials specified, indicating full range of colors and textures available.
- D. Verification Samples: Actual flooring material specified, not less than 12 inch square, mounted on solid backing.
 - 1. Include samples of game lines, illustrating colors selected.
- E. Test Reports: Submit test reports showing compliance with DIN EN 14904.
- F. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.
- G. Manufacturer's Instructions: Indicate standard and special installation procedures.
- H. Installer's qualification statement.

- I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Flooring Material: 10 square yards matching installed flooring.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.6 MOCK-UPS

- A. Mock-up may remain as part of work.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site in unopened containers clearly labeled with manufacturer's name and identification of contents.
- B. Store materials in dry and clean location until needed for installation. During installation, handle in a manner that will prevent marring and soiling of finished surfaces.

1.8 FIELD CONDITIONS

- A. Maintain temperature in spaces to receive adhesively installed resilient flooring within range of 70 to 95 degrees F for not less than 48 hours before the beginning of installation and for not less than 48 hours after installation has been completed. Subsequently, do not allow temperature in installed spaces to drop below 50 degrees F or to go above 100 degrees F.

PART 2 PRODUCTS

2.1 PREFORMED ATHLETIC FLOORING

- A. Rubber Tile Flooring: Vulcanized rubber and colored granules.
 - 1. Thickness: 8mm..
 - 2. Tile Edge/Installation: Straight, adhesive installation.
 - 3. Size, Interlocking Edge Tile: Nominal 23 inches by 23 inches.
 - 4. Surface Texture: Smooth.
 - 5. Color: As indicated on drawings.
 - 6. Products:
 - a. ECO Surfaces; ECO nights.

2.2 ACCESSORIES

- A. Leveling Compound: Latex-modified cement formulation as recommended by flooring manufacturer for substrate conditions.
- B. Flooring Adhesive: Waterproof; types recommended by flooring manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates for conditions detrimental to installation of athletic flooring. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of athletic flooring to substrate.
- C. Cementitious Subfloor Surfaces: Verify that substrates are ready for resilient flooring installation by testing for moisture and alkalinity (pH).
 - 1. Test as Follows:
 - a. Alkalinity (pH): ASTM F710.
 - b. Internal Relative Humidity: ASTM F2170.
 - c. Moisture Vapor Emission: ASTM F1869.
 - 2. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

3.2 PREPARATION

- A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- B. Concrete: Use leveling compound as necessary to achieve substrate flatness of plus or minus 1/8 inch within 10 ft radius.
- C. Remove coatings that are incompatible with flooring adhesives, using methods recommended by flooring manufacturer.
- D. Broom clean areas to receive athletic flooring immediately before beginning installation.

3.3 INSTALLATION

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install in accordance with manufacturer's written instructions.

- C. Rubber Tile Flooring:
 - 1. Lay out center lines in spaces to receive tile flooring, based on location of principal walls. Start tile installation from center, and adjust as necessary to avoid tiles less than one-half width at perimeter.
 - 2. Lay tiles square with room axis, matching for color and pattern by selecting from cartons and mixing as recommended by manufacturer.
 - 3. Spread only enough adhesive to permit installation of materials before initial set.

3.4 CLEANING

- A. Clean flooring using methods recommended by manufacturer.

3.5 PROTECTION

- A. Protect finished athletic flooring from construction traffic to ensure that it is without damage upon Date of Substantial Completion.

END OF SECTION 096566

SECTION 096700 - FLUID-APPLIED FLOORING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Fluid-applied flooring and base.

1.2 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 F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2022.
- C. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2023.
- D. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2019a.

1.3 SUBMITTALS

- A. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns and colors available.
- B. Samples: Submit two samples, illustrating color and pattern for each floor material for each color specified.
- C. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.
- D. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention, application rate for each coat, and surface preparation procedures.
- E. Manufacturer's Qualification Statement.
- F. Applicator's Qualification Statement.
- G. Maintenance Data: Include maintenance procedures, recommended maintenance materials, procedures for stain removal, repairing surface, and suggested schedule for cleaning.

1.4 QUALITY ASSURANCE

- A. Pre-Installation Conference: Conduct a Conference 2- 4 weeks prior to installation to discuss moisture testing, surface preparation, installation schedule, installation procedures and review of all related submittals. The meeting shall be attended by the Architect, the owners representative, the General Contractor, the flooring subcontractor including his forman and installer. Dates shall be established for Mockup installation and Architect Review.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum 10 years documented experience.
- C. Applicator Qualifications: Company specializing in performing the work of this section.
 - 1. Approved by manufacturer.
- D. Supervisor Qualifications: Trained by product manufacturer , under direct full time supervision of manufacturer's own foreman.
- E. VOC Content: Provide materials 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.

1.5 MOCK-UPS

- A. Construct mock-up(s) of fluid applied flooring to serve as basis for evaluation of texture and workmanship.
 - 1. Number of Mock-Ups to be Prepared: One.
 - 2. Use same materials and methods for use in the work.
 - 3. Locate where directed.
 - 4. Minimum Size: 48 inches by 48 inches.
- B. Obtain approval of mock-up by Architect before proceeding with work.
- C. Approved mock-up may remain as part of the work.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store resin materials in a dry, secure area.
- B. Store materials for three days prior to installation in area of installation to achieve temperature stability.

1.7 FIELD CONDITIONS

- A. Maintain temperature in storage area between 60 degrees Fahrenheit and 90 degrees Fahrenheit, area to be dry and shaded from the sun, per manufacturers requirements.

- B. Store materials in area of installation for minimum period of 24 hours prior to installation.
- C. Maintain ambient temperature required by manufacturer 72 hours prior to, during, and 24 hours after installation of materials.
- D. Relative humidity during installation shall be less than 85% with surface temperature at least 5 degrees Fahrenheit above the dew point.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Fluid-Applied Flooring:
 - 1. Sherwin-Williams High-Performance Flooring: www.sherwin-williams.com/resin-flooring/#sle.

2.2 Fluid-Applied Flooring SYSTEMS

- A. Abrasion, Impact and Chemical Resistant, high performance, resin based, monolithic floor surfacing system, seamless finish.
- B. Fluid-Applied Flooring over existing tile flooring: Pigmented Epoxy with vinyl chips and a clear high gloss polyurethane top coat.
 - 1. Aggregate: Vinyl flakes.
 - 2. System Thickness: 20-30 mils nominal, dry film thickness (DFT).
 - 3. Texture: Orange peel.
 - 4. Sheen: High gloss.
 - 5. Color: As selected by Architect.
 - 6. Basis of Design Product: Sherwin Williams High Performance Flooring; Resuflor Deco Flake BC.
 - 7. System Components with application rates:
 - a. Scratch Coat over existing surface prepared Tile: Resuflor EOC slurry; 100 sf per Mix. Refer to Part 3 for surface preparation of existing tile prior to installation of scratch coat.
 - 1) Mix consists of the following:
 - a) Resuflor EOC Resin, 1 g.
 - b) Resuflor EOC Hardener, 0.5 g.
 - c) F60 Sand, 1 g.
 - b. Primer: Resuprime 3579; 200-300 sf per gallon.
 - c. Body Coat: Resuflor 3746; 200-300 sf per gallon.
 - d. Broadcast: Decorative Flakes; 100-200 pounds per 1,000 sf.
 - e. Grout Coat: Resuflor 3746160-250 sf per gallon.
 - f. Seal Coat: Resutile 4686; 250-400 sf per gallon.

- C. Fluid-Applied Flooring over existing concrete, new floor leveraging product or new concrete: Pigmented Epoxy with vinyl chips and a clear high gloss polyurethane top coat.
 - 1. Aggregate: Vinyl flakes.
 - 2. System Thickness: 20-30 mils nominal, dry film thickness (DFT).
 - 3. Texture: Orange peel.
 - 4. Sheen: High gloss.
 - 5. Color: As selected by Architect.
 - 6. Basis of Design Product: Sherwin Williams High Performance Flooring; Resuflor Deco Flake BC.
 - 7. System Components with application rates:
 - a. Primer: Resuprime 3579; 200-300 sf per gallon.
 - b. Body Coat: Resuflor 3746; 200-300 sf per gallon.
 - c. Broadcast: Decorative Flakes; 100-200 pounds per 1,000 sf.
 - d. Grout Coat: Resuflor 3746160-250 sf per gallon.
 - e. Seal Coat: Resutile 4686; 250-400 sf per gallon.

2.3 ACCESSORIES

- A. Base Caps: Zinc with projecting base of 1/8 inch; color as selected.
- B. Subfloor Filler: Type recommended by fluid-applied flooring manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that subfloor surfaces are acceptable within the tolerances specified for that type of work and are ready to receive flooring.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive flooring.
- C. Verify that subfloor surfaces are dust-free and free of substances that could impair bonding of materials to subfloor surfaces.
- D. Cementitious Subfloor Surfaces: Verify that substrates are ready for fluid-applied flooring installation by testing for moisture and alkalinity (pH).
 - 1. Test as Follows:
 - a. Alkalinity (pH): ASTM F710.
 - b. Internal Relative Humidity: ASTM F2170.
 - c. Moisture Vapor Emission: ASTM F1869.
 - 2. Obtain instructions if test results are not within limits recommended by fluid-applied flooring manufacturer.

- E. Verify that required floor-mounted utilities are in correct location.

3.2 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 relative humidity test using in situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 80% relative humidity level measurement.
 2. If the relative humidity exceeds 80% then Sherwin-Williams Co., Resuflor 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. This preparation is required for all existing tile substrates scheduled to be coated with Fluid Applied flooring.
 2. 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 3-4 as described by the International Concrete Repair Institute.
 3. 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.
 4. 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.
 5. 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 manufacturer's recommendations.

3.3 APPLICATION – GENERAL

- A. The system shall be applied as follows:
 - 1. Substrate preparation.
 - 2. For Existing Tile Floors: Scratch Coat.
 - 3. Priming.
 - 4. First broadcast coat application with first chip broadcast.
 - 5. Second broadcast coat with second chip broadcast.
 - 6. Grout coat application,
 - 7. Topcoat application.
- B. 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.
- C. The system shall follow the contour of the substrate unless pitching or other leveling work has been indicated.
- D. A neat finish with well-defined boundaries and straight edges shall be provided.
- E. Primer:
 - 1. Resuflor Glaze WB Primer, mixed ratio of 1 part resin to 4 parts hardener.
 - 2. The primer shall be applied by 1/8 inch notched squeegee and back rolled at the rate of 200 sf/gal to yield a dry film thickness of 4 mils.
- F. Broadcast Coats:
 - 1. The broadcast coat shall be applied as a double broadcast system.
 - 2. The broadcast coat shall be 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 first broadcast coat shall be applied over horizontal surfaces using the dip and roll, and back roll method at the rate of 300 sf/gal using the Resuflor Gard OPF material.
 - 5. Broadcast Chips to excess into the wet material; Macro chips at the rate of 0.1 lbs/sf.
 - 6. Allow material to fully cure. Vacuum, sweep and/or blow to remove all loose aggregate.
 - 7. Scrape the floor with a trowel or floor scraper. Sweep and vacuum the floor again.
 - 8. Apply second broadcast coat of resin, applied by flat squeegee, then back rolled with a coverage rate of 150 sf/gal with the Resuflor Glaze epoxy.
 - 9. Chips shall be broadcast to excess, Macro chips at the rate of 0.1 lbs/sf.
 - 10. Allow material to fully cure. Vacuum, sweep and/or blow to remove all loose chips.
 - 11. Scrape the floor with a trowel or floor scraper. Sweep and vacuum the floor again.
- G. Grout Coat:

1. Resuflor Glaze epoxy mixed ratio of 1 part hardener to 2 parts resin, installed per the manufacturer's recommendations.
2. Grout coat shall be squeegee applied and back rolled at coverage rate of 100 sf/gal.

H. Topcoat:

1. Resutile AT shall be roller applied at the rate of 500 sf/gal to yield a dry film thickness of 3 mils.
2. The finish floor nominal thickness is 60 mils.

3.4 INSTALLATION - Accessories

- A. Install cant strips at base of walls where flooring is to be extended up wall as base.
- B. Install terminating cap strip at top of base; attach securely to wall substrate.

3.5 PROTECTION

- A. Prohibit traffic on floor finish for 48 hours after installation.
- B. Barricade area to protect flooring until fully cured.

END OF SECTION 096700

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SECTION 096813 - TILE CARPETING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Carpet tile, fully adhered.

1.2 REFERENCE STANDARDS

- A. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials; 2016 (Reapproved 2021).
- B. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2025.
- C. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2022.
- D. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2023.
- E. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2019a.
- F. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2023.

1.3 SUBMITTALS

- A. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- B. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.
- C. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- D. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.
- E. Manufacturer's Qualification Statement.
- F. Installer's Qualification Statement.

- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Carpet Tiles: Quantity equal to 5 percent of total installed of each color and pattern installed.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in installing carpet tile with minimum three years documented experience and approved by carpet tile manufacturer.

1.5 FIELD CONDITIONS

- A. Store materials in area of installation for minimum period of 24 hours prior to installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

2.2 MATERIALS

- A. Tile Carpeting:
 - 1. Product: Refer to Materials Legand.
 - 2. Tile Size: Refer to Materials Legand.
 - 3. Color: Refer to Materials Legend .
 - 4. Pattern: Refer to Materials Legend .
 - 5. Critical Radiant Flux: Minimum of 0.22 watts/sq cm, when tested in accordance with ASTM E648 or NFPA 253.
 - 6. Surface Flammability Ignition: Pass ASTM D2859 (the "pill test").

2.3 ACCESSORIES

- A. Subfloor Filler: White premix latex; type recommended by flooring material manufacturer.
 - 1. **Provide under all carpeting, typical.**
- B. Edge Strips: Rubber, color as selected by Architect.
- C. Adhesives:

1. Compatible with materials being adhered; maximum VOC content of 50 g/L; CRI (GLP) certified; in lieu of labeled product, independent test report showing compliance is acceptable.
- D. Carpet Tile Adhesive: Recommended by carpet tile manufacturer; releasable type.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that subfloor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive carpet tile.
- C. Verify that subfloor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to subfloor surfaces.
- D. Cementitious Subfloor Surfaces: Verify that substrates are ready for flooring installation by testing for moisture and alkalinity (pH).
 1. Test as Follows:
 - a. Alkalinity (pH): ASTM F710.
 - b. Internal Relative Humidity: ASTM F2170.
 - c. Moisture Vapor Emission: ASTM F1869.
 2. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.
- E. Verify that required floor-mounted utilities are in correct location.

3.2 PREPARATION

- A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- B. Remove subfloor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler. **Fill and make smooth all floor areas damaged during demolition.**
- C. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
- D. Vacuum clean substrate.

3.3 INSTALLATION

- A. Starting installation constitutes acceptance of subfloor conditions.

- B. Install carpet tile in accordance with manufacturer's instructions.
- C. Blend carpet from different cartons to ensure minimal variation in color match.
- D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
- E. Lay carpet tile in square pattern, with pile direction parallel to next unit, set parallel to building lines.
- F. Locate change of color or pattern between rooms under door centerline.
- G. Fully adhere carpet tile to substrate.
- H. Trim carpet tile neatly at walls and around interruptions.
- I. Complete installation of edge strips, concealing exposed edges.

3.4 CLEANING

- A. Remove excess adhesive without damage, from floor, base, and wall surfaces.
- B. Clean and vacuum carpet surfaces.

END OF SECTION 096813

SECTION 097200 - WALL COVERINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Wall covering.

1.2 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

1.3 SUBMITTALS

- A. Product Data: Provide data on wall covering and adhesive.
- B. Shop Drawings: Indicate wall elevations with seaming layout.
- C. Samples: Submit two samples of wall covering, illustrating color, finish, and texture.
- D. Test Reports: Indicate verification of flame and smoke ratings, when tested by UL.
- E. Manufacturer's Installation Instructions: Indicate special procedures.
- F. Maintenance Data: Submit data on cleaning, touch-up, and repair of covered surfaces.
- G. Manufacturer's Qualification Statement.
- H. Installer's Qualification Statement.
- I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Inspect roll materials at arrival on site, to verify acceptability.
- B. Protect packaged adhesive from temperature cycling and cold temperatures.
- C. Do not store roll goods on end.

1.6 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the adhesive or wall covering product manufacturer.
- B. Maintain these conditions 24 hours before, during, and after installation of adhesive and wall covering.
- C. Provide lighting level of 80 ft candles measured mid-height at substrate surfaces.

PART 2 PRODUCTS

2.1 Wall Coverings

- A. General Requirements:
 - 1. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84. Class A.
- B. Wall Covering - Type WC-#: 100 % Wool.
 - 1. Total Thickness: 3 mil (1/8 inch).
 - 2. Total Weight: 48 oz/lin yd.
 - 3. Roll Width: 70-3/4 inches.
 - 4. Color: Refer to Material Legend.
 - 5. Manufacturers:
- C. Adhesive: Type recommended by wall covering manufacturer to suit application to substrate.
- D. Substrate Filler: As recommended by adhesive and wall covering manufacturers; compatible with substrate.
- E. Substrate Primer and Sealer: Alkyd enamel type.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that substrate surfaces are prime painted and ready to receive work, and comply with requirements of wall covering manufacturer.
- B. Measure moisture content of surfaces using an electronic moisture meter. Do not apply wall coverings if moisture content of substrate exceeds level recommended by wall covering manufacturer.
- C. Verify flatness tolerance of surfaces does not vary more than 1/8 inch in 10 feet nor vary at a rate greater than 1/16 inch/ft.

3.2 PREPARATION

- A. Fill cracks in substrate and smooth irregularities with filler; sand smooth.
- B. Wash impervious surfaces with tetra-sodium phosphate, rinse and neutralize; wipe dry.
- C. Surfaces: Correct defects and clean surfaces that affect work of this section. Remove existing coatings that exhibit loose surface defects.
- D. Apply one coat of primer sealer to substrate surfaces. Allow to dry. Lightly sand smooth.
- E. Vacuum clean surfaces free of loose particles.

3.3 INSTALLATION

- A. Apply adhesive and wall covering in accordance with manufacturer's instructions.
- B. Apply wall covering smooth, without wrinkles, gaps or overlaps. Eliminate air pockets and ensure full bond to substrate surface.
- C. Install wall covering before installation of bases and items attached to or spaced slightly from wall surface.
- D. Do not install wall covering more than 1/4 inch below top of resilient base.
- E. Remove excess adhesive while wet from seam before proceeding to next wall covering sheet. Wipe clean with dry cloth.

3.4 CLEANING

- A. Clean wall coverings of excess adhesive, dust, dirt, and other contaminants.
- B. Reinstall wall plates and accessories removed prior to work of this section.

3.5 PROTECTION

- A. Do not permit construction activities at or near finished wall covering areas.

END OF SECTION 097200

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SECTION 098300 - ACOUSTIC FINISHES

PART 1 GENERAL

1.1 Section Includes

- A. Acoustic Wall Coverings.

1.2 Reference Standards

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.

1.3 Submittals

- A. Product Data: Manufacturer's data sheets for products specified.
- B. Samples: Submit one sample per color, 6 by 6 inch in size indicating colors for selection.
- C. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- D. Maintenance Data: Provide manufacturer's data on maintenance and renewal of applied finishes.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Wall Covering Materials: 10 linear feet of each color and pattern of wall covering; store where directed.
 - a. Package and label each roll by manufacturer, color and pattern, and destination room number.

1.4 Delivery, Storage, and Handling

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Store and handle materials according to manufacturer's instructions.

1.5 Field Conditions

- A. Do not apply acoustical finishes when surface and ambient temperatures are outside the temperature ranges required by manufacturer.

PART 2 PRODUCTS

2.1 Manufacturers

- A. Acoustic Wall Coverings:
 - 1. Filzfelt; 3 mm Wool Felt.

2.2 Acoustic Wall Coverings

- A. General:
 - 1. Provide materials compatible with one another and substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- B. Description: 100% Wool.
 - 1. Noise Reduction Coefficient (NRC) of not less than 0.10 when applied to 1/2-inch gypsum board.
 - 2. Surface Burning Characteristics: Flame spread index of 10, maximum; smoke developed index of 95, maximum; when tested in accordance with ASTM E84.
 - 3. Color: As indicated on drawings.
 - 4. Adhesive: Type recommended by wall covering manufacturer to suit application.

END OF SECTION 098300

SECTION 098316 - – SPRAY ACOUSTIC TREATMENT

PART 1 – GENERAL

1.1 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
- B. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.2 RELATED DOCUMENTS

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

1.3 SUMMARY

- A. Section includes spray applied acoustic finish system.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For the following products:
 - 1. Sample of finished product on rigid backing indicating finished texture.

1.5 Quality Assurance

- A. Applicator: Licensed by manufacturer.
- B. Manufacturer must subscribe to independent laboratory follow-up inspection services of Underwriters Laboratories. Each bag shall be labeled accordingly.
- C. Mockups: Provide a full-thickness finish mockup to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Architect will select representative surfaces and conditions for application of each type of gypsum veneer plaster and substrate.
 - 2. Provide mockups of ceilings in sizes of at least 100 sq. ft. (9 sq. m).
 - 3. Apply according to requirements for the completed Work, after permanent lighting and other environmental services have been activated.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Comply with manufacturer's written recommendations.

1.7 Delivery, Storage and Handling

- A. Deliver in original, unopened containers bearing name of manufacturer, product identification and reference to U.L. testing.
- B. Store materials dry, off ground and under cover.
- C. Protect liquid adhesive from freezing.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain products from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials that comply with a Class A finish.
 - 1. Flame Spread Index: 5. Per ASTM E84/UL 723.
 - 2. Smoke Developed: 5. Per ASTM E84/UL 723
- B. Manufacturer's written certification that product contains no asbestos, fiberglass or other man-made mineral fibers.

2.3 SPRAY ACOUSTIC FINISH

- A. Basis-of-Design Product: Subject to compliance with requirements, provide International Cellulose Corporation; SonaSpray FC or equal.
 - 1. Color: To be selected.
 - 2. Texture Finish: Smooth. Finish achieved by hand troweling to smooth out finish.
 - 3. Thickness: 0.50 inches.
 - 4. NRC: 0.65.

2.4 ACCESSORIES

- A. Provide primers or tie coats as recommended by the manufacturer to ensure product installation success. Primers and tie coats are to be included with this product design.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine surfaces and report unsatisfactory conditions in writing. Do not proceed until unsatisfactory conditions are corrected.
- B. Verify surfaces to receive spray insulation to determine if priming/sealing is required to ensure bonding and/or to prevent discoloration caused by migratory stains.

3.2 PREPARATION

- A. Provide masking, drop cloths or other satisfactory coverings for materials/surfaces that are not to receive insulation to protect from over-spray.
- B. Coordinate installation of the sprayed cellulose fiber with work of other trades.
- C. Prime all surfaces as required by manufacturer's instructions or as determined by examination.
- D. Clean all deck prior to start of work to ensure starting with a clean substrate. All surfaces to be primed to stop rust bleeding thru finished surface. Primer to be compatible with acoustic system.

3.3 INSTALLATION

- A. Install spray applied acoustical finish according to manufacturer's recommendations.
- B. Apply spray material to metal deck only, protect structure from overspray.
- C. Cure material with continuous natural or mechanical ventilation.
- D. Remove and dispose of over spray.

END OF SECTION 098316

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SECTION 098430 - SOUND-ABSORBING WALL AND CEILING UNITS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Sound-absorbing panels.
- B. Sound-absorbing ceiling baffles/tiles.
- C. Mounting accessories.

1.2 REFERENCE STANDARDS

- A. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2023.
- B. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2019 (Reapproved 2025).
- C. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2024a.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
- E. ASTM E795 - Standard Practices for Mounting Test Specimens during Sound Absorption Tests; 2023.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's printed data sheets for products specified.
- B. Shop Drawings: Fabrication and installation details, panel layout and fabric orientation.
- C. Selection Samples: Manufacturer's color charts for fabric covering, indicating full range of fabrics, colors, and patterns available.
- D. Verification Samples: Fabricated samples of each type of panel specified; 12 by 12 inch, showing construction, edge details, and fabric covering.
- E. Test Reports: Certified test data from an independent test agency verifying that panels meet specified requirements for acoustical and fire performance.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with at least three years of documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect acoustical units from moisture during shipment, storage, and handling. Deliver in factory-wrapped bundles; do not open bundles until units are needed for installation.
- B. Store units flat, in dry, well-ventilated space; do not stand on end.
- C. Protect edges from damage.

PART 2 PRODUCTS

2.1 FABRIC-COVERED Sound-Absorbing Units

- A. General:
 - 1. Prefinished, factory assembled fabric-covered panels.
 - 2. Surface Burning Characteristics: Flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
- B. Fabric-Covered Acoustical Panels for Walls:
 - 1. Basis of Design: Conwed Designscape/Wall Technology; Conwed Wall Panel.
 - 2. Sound Absorption: Noise Reduction Coefficient (NRC) or Sound Absorption Average (SAA) of 1.05 when tested in accordance with ASTM C423 for Type A mounting, per ASTM E795.
 - 3. Panel Thickness: 2 inches.
 - 4. Edges: Perimeter edges reinforced by a formulated resin hardener.
 - 5. Corners: Square.
 - 6. Fabric: Refer to Material Legend..
 - 7. Color: Refer to Material Legend.
 - 8. Patterns: Where fabric with directional or repeating patterns or fabric with directional weave is used, mark for installation in same direction.
 - 9. Mounting Method: Z clip.
- C. Felt-Covered Acoustical Wall Panels:
 - 1. Basis of Design: Turf Design; Tangram.
 - 2. Adhesive backed.
 - 3. 18mm thickness.
 - 4. Fabric: PET felt.
 - 5. Color: As indicated.
- D. Felt-Covered Acoustical Ceiling Baffles/Tiles:
 - 1. Basis of Design:
 - a. Type 1: 2'x2' Suspended Acoustic Ceiling Tile: Turf Design; Crease.

- 1) Suspended Grid, refer to Acoustic Ceiling specification for 15/16" grid.
 - 2) See drawings for profiles.
 - b. Ceiling Baffles: Turf Design; Ridge.
 - 1) Suspended Grid, refer to Acoustic Ceiling specification for 15/16" grid.
 - 2) See drawings for profiles.
2. Fabric: PET felt..
3. Color: As indicated.

2.2 FABRICATION

- A. Fabric Wrapped, General: Fabricate panels to sizes and configurations as indicated, with fabric facing installed without sagging, wrinkles, blisters, or visible seams.
- B. Tolerances: Fabricate to finished tolerance of plus or minus 1/16 inch for thickness, overall length and width, and squareness from corner to corner.

2.3 ACCESSORIES

- A. Back-Mounting Accessories: Manufacturer's standard accessories for concealed support, designed to allow panel removal, and as follows:
 1. Z-clip hanger and magnet system with magnets recessed into panel frame and designed to engage steel mounting plates secured to substrate with screws.
- B. Ceiling-Suspended Accessories: Manufacturer's standard accessories at locations as indicated on each acoustical unit, sized appropriately for weight of acoustical unit.
- C. Tensioned Cable System: Manufacturer's standard accessories for mounting conditions and spans indicated.
- D. Panel Adhesive: Acceptable to acoustical panel manufacturer for application as indicated.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates for conditions detrimental to installation of acoustical units. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install acoustical units in locations as indicated, following manufacturer's installation instructions.

- B. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions and as supplemented in this section.
- C. Install mounting accessories and supports in accordance with shop drawings.
- D. Align panels accurately, with edges plumb and top edges level. Scribe to fit accurately at adjoining work and penetrations.
- E. Suspend ceiling baffles at locations and heights as indicated.
- F. Install acoustical units to construction tolerances of plus or minus 1/16 inch for the following:
 - 1. Plumb and level.
 - 2. Flatness.
 - 3. Width of joints.

3.3 CLEANING

- A. Clean sound-absorptive panels upon completion of installation from dust and other foreign materials, following manufacturer's instructions.

3.4 PROTECTION

- A. Provide protection of installed acoustical panels until Date of Substantial Completion.
- B. Replace panels that cannot be cleaned and repaired to satisfaction of the Architect.

END OF SECTION 098430

SECTION 099000 - PAINTING AND COATING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Surface preparation and field painting of exposed interior items and surfaces.
- B. Surface preparation and field painting of exposed exterior items and surfaces.
- C. Painting of exposed bare and covered pipes and ducts, hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory-applied final finish.

1.2 DEFINITIONS

- A. General: Standard coating terms defined in ASTM D16.
 - 1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85 degree meter.
 - 2. Eggshell refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60 degree meter.
 - 3. Semi-Gloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60 degree meter.
 - 4. Full gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60 degree meter.
- B. Environments: The following terms distinguish between different corrosive exposures:
 - 1. "Severe environments" are highly corrosive industrial atmospheres with sustained exposure to high humidity and condensation and with frequent cleaning using strong chemicals. Environments with heavy concentrations of strong chemical fumes and frequent splashing and spilling of harsh chemical products are severe environments.
 - 2. "Moderate environments" are corrosive industrial atmospheres with intermittent exposure to high humidity and condensation, occasional mold and mildew development, and regular cleaning with strong chemicals. Environments with exposure to heavy concentrations of chemical fumes and occasional splashing and spilling of chemical products are moderate environments.
 - 3. "Mild environments" are industrial atmospheres with normal exposure to moderate humidity and condensation, occasional mold and mildew development, and infrequent cleaning with strong chemicals. Environments with low levels of mild chemical fumes and occasional splashing and spilling of chemical products are mild environments. Normal outdoor weathering is also considered a mild environment.

1.3 REFERENCE Standards

- A. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2019.

1.4 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: For each paint system indicated, including:
 - 1. Material List: An inclusive list of required coating materials. Indicate each material and cross reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
 - 2. Preparation instructions and recommendations.
 - 3. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.
- C. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this project, whose work has resulted in applications with a record of successful in-service performance.
- B. Obtain block fillers and primers for each coating system from the same manufacturer as the finish coats.
- C. Paint exposed surfaces. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.
- D. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
- E. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - 1. See Section 014000 - Quality Requirements, for general requirements for mock-up.
 - 2. Finish areas designated by Architect.
 - 3. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
 - 4. Refinish mock-up area as required to produce acceptable work.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 degrees Fahrenheit. Maintain storage containers in a clean condition, free of foreign materials and residue.

1.7 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 absolute limits.
- B. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 degrees Fahrenheit and 90 degrees Fahrenheit.
- C. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 degrees Fahrenheit and 95 degrees Fahrenheit.
- D. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 degrees Fahrenheit above the dew point; or to damp or wet surfaces.
 - 1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

1.8 EXTRA MATERIALS

- A. Furnish extra paint materials from the same production run as the materials applied and in the quantities described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to Owner.
- B. Quantity: Furnish Owner with an additional three percent, but not less than 1 gallon or 1 case, as appropriate, of each material and color applied.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design Manufacturer: Pittsburgh Paints, 400 Bertha Lamme Drive Cranberry, PA 16066. Toll-Free Tel: 888-PPG-IDEA. Web: www.pittsburghpaintsco.com/#sle.

2.2 PAINT MATERIALS - GENERAL

- A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- B. VOC Classification: Provide high-performance coating materials, including primers, undercoats, and finish-coat materials, that meet the applicable local, state, or federal VOC requirements.
- C. Color: Refer to Finish Schedule and Paint Legend for paint colors.

2.3 INTERIOR PAINT SYSTEMS

- A. Gypsum Board Walls:
 - 1. Acrylic Finish: Two finish coats over a primer.
 - a. Eggshell Finish:
 - 1) Primer: Pittsburgh Paints; 9-900 Pure Performance Interior Latex Primer.
 - a) Applied at a dry film thickness of not less than 1.4 mils.
 - 2) Eggshell Finish: Pittsburgh Paints; 9-310XI Series Pure Performance Interior Latex Eggshell.
 - a) Applied at a dry film thickness of not less than 1.4 mils.
 - b. Semi-Gloss Finish:
 - 1) Primer: Pittsburgh Paints; 9-900 Pure Performance Interior Latex Primer
 - a) Applied at a dry film thickness of not less than 1.4 mils.
 - 2) Semi-Gloss Finish: Pittsburgh Paints; 9-510XI Series Pure Performance Interior Latex Semi-Gloss.
 - a) Applied at a dry film thickness of not less than 1.4 mils.
- B. Gypsum Board Ceilings:
 - 1. Acrylic Finish: Two finish coats over a primer.
 - a. Flat Finish:
 - 1) Primer: Pittsburgh Paints; 9-900 Pure Performance Interior Latex Primer.
 - a) Applied at a dry film thickness of not less than 1.4 mils.
 - 2) Flat Finish: Pittsburgh Paints; 9-110XI Series Pure Performance Interior Latex Flat.
 - a) Applied at a dry film thickness of not less than 1.5 mils.
- C. Concrete Masonry Units (CMU):
 - 1. Acrylic Finish: Two finish coats over a block filler.
 - a. Eggshell Finish:

- 1) Block Filler: Pittsburgh Paints; 6-15XI Speedhide Interior/Exterior Hi Fill Acrylic Masonry Block Filler.
 - a) Applied at a dry film thickness of not less than 7.0 mils.
 - 2) Eggshell Finish: Pittsburgh Paints; 9-310XI Series Pure Performance Interior Latex Semi-Gloss.
 - a) Applied at a dry film thickness of not less than 1.4 mils.
 - b. Semi-Gloss Finish:
 - 1) Block Filler: Pittsburgh Paints; 6-15XI Speedhide Interior/Exterior Hi Fill Acrylic Masonry Block Filler.
 - a) Applied at a dry film thickness of not less than 7.0 mils.
 - 2) Semi-Gloss Finish: Pittsburgh Paints; 9-510XI Series Pure Performance Interior Latex Semi-Gloss.
 - a) Applied at a dry film thickness of not less than 1.4 mils.
- D. Painted Wood:
 - 1. Acrylic Pre-Catalyzed Epoxy Finish: Two finish coats over a primer.
 - a. Semi-Gloss Finish:
 - 1) Primer: Pittsburgh Paints; 17-921XI Series Seal Grip 100 Percent Acrylic Universal Primer.
 - a) Applied at a dry film thickness of not less than 1.6 mils.
 - 2) Semi-Gloss Finish: Pittsburgh Paints; 16-510 Series Pitt-Glaze WB1 Interior Pre-Catalyzed Water-Borne Acrylic Epoxy Semi-Gloss.
 - a) Applied at a dry film thickness of not less than 1.5 mils.
- E. Clear Coat over Stained Wood:
 - 1. Acrylic Finish: Two polyurethane coats over stained wood.
 - a. Satin Finish:
 - 1) Stain: Pittsburgh Paints; DFT 400 Series Deft Interior Oil Based Stain.
 - a) Coverage figures will vary with wood type, preparation, and application.
 - 2) Satin Finish: Pittsburgh Paints; PLX259 Series ProLuxe Interior/Exterior Polyurethane Water Based Acrylic Satin.
 - a) Applied at a dry film thickness of not less than 0.8 mils.
 - b. Semi-Gloss Finish:
 - 1) Stain: Pittsburgh Paints; DFT 400 Series Deft Interior Oil Based Stain.
 - a) Coverage figures will vary with wood type, preparation, and application.
 - 2) Semi-Gloss Finish: Pittsburgh Paints; PLX258 Series ProLuxe Interior/Exterior Polyurethane Water Based Acrylic Semi-Gloss.
 - a) Applied at a dry film thickness of not less than 0.8 mils.
 - c. Gloss Finish:
 - 1) Stain: Pittsburgh Paints; DFT 400 Series Deft Interior Oil Based Stain.

- a) Coverage figures will vary with wood type, preparation, and application.
 - 2) Gloss Finish: Pittsburgh Paints; PLX257 Series ProLuxe Interior/Exterior Polyurethane Water Based Acrylic Gloss.
 - a) Applied at a dry film thickness of not less than 0.8 mils.
- F. Ferrous Metal Doors, Frames, and Miscellaneous Metals:
 - 1. Acrylic Pre-Catalyzed Epoxy Finish: Two finish coats over a primer.
 - a. Eggshell Finish:
 - 1) Primer: Pittsburgh Paints; 90-1912 Series Pitt-Tech Plus EP Interior/Exterior DTM Industrial Primer.
 - a) Applied at a dry film thickness of not less than 2.0 mils.
 - 2) Eggshell Finish: Pittsburgh Paints; 16-1310 Series Pitt-Glaze WB1 Interior High Performance Pre-Catalyzed Water-Borne Acrylic Epoxy Eggshell.
 - a) Applied at a dry film thickness of not less than 1.5 mils.
 - b. Semi-Gloss Finish:
 - 1) Primer: Pittsburgh Paints; 90-1912 Series Pitt-Tech Plus EP Interior/Exterior DTM Industrial Primer.
 - a) Applied at a dry film thickness of not less than 2.0 mils.
 - 2) Semi-Gloss Finish: Pittsburgh Paints; 16-1510 Series Pitt-Glaze WB1 Interior High Performance Pre-Catalyzed Water-Borne Acrylic Epoxy Semi-Gloss.
 - a) Applied at a dry film thickness of not less than 1.5 mils.
- G. Ferrous and Non-Ferrous Metals for High Performance Finish (Including Handrails):
 - 1. Acrylic Epoxy Finish: Two finish coats over a primer.
 - a. Semi-Gloss Finish:
 - 1) Primer: Pittsburgh Paints; 90-1912 Series Pitt-Tech Plus EP Interior/Exterior DTM Industrial Primer.
 - a) Applied at a dry film thickness of not less than 2.0 mils.
 - 2) Semi-Gloss Finish: Pittsburgh Paints; 98E-1/98E-100 Series Aquapon WB EP Two-Component Waterborne Epoxy Coating Semi-Gloss.
 - a) Applied at a dry film thickness of not less than 2.0 mils.
 - b. Gloss Finish:
 - 1) Primer: Pittsburgh Paints; 90-1912 Series Pitt-Tech Plus EP Interior/Exterior DTM Industrial Primer.
 - a) Applied at a dry film thickness of not less than 2.0 mils.
 - 2) Gloss Finish: Pittsburgh Paints; 98E-1/98E-98 Series Aquapon WB EP Two-Component Waterborne Epoxy Coating Gloss.
 - a) Applied at a dry film thickness of not less than 2.0 mils.

2.4 Exterior Paint Systems

- A. Plaster, Stucco, Exterior Gypsum Sheathing and EIFS Surfaces:
 - 1. Acrylic Finish: Two finish coats over a primer.
 - a. Satin Finish - High Build Coating:
 - 1) Primer: Pittsburgh Paints; 4-603XI Perma-Crete Interior/Exterior Alkali Resistant Primer.
 - a) Applied at a dry film thickness of not less than 1.2 mils.
 - 2) Satin Finish: Pittsburgh Paints; 4-422 Series Perma-Crete High Build 100% Acrylic Topcoat Satin.
 - a) Applied at a dry film thickness of not less than 3.0 mils.
- B. Ferrous and Non-Ferrous Metals:
 - 1. Primer is not required on shop-primed items.
 - 2. Epoxy/Urethane Finish: Two finish coats over epoxy primer.
 - a. Gloss Finish (High Performance):
 - 1) Primer (if required): PPG Paints; Amerlock 2 VOC High Solids Epoxy.
 - a) Applied at a dry film thickness of not less than 4.0 mils.
 - 2) Finish: PPG Paints; Amershield VOC Polyester Acrylic Polyurethane Gloss.
 - a) Applied at a dry film thickness of not less than 3.0 mils.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Coordination of Work: Review other sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
 - 1. Notify Architect about anticipated problems when using the materials specified over substrates primed by others.
 - 2. If a potential incompatibility of primers applied by others exists, obtain the following from the primer applicator before proceeding:
 - a. Confirmation of primer's suitability for expected service conditions.
 - b. Confirmation of primer's ability to be top coated with materials specified.

3.2 PREPARATION

- A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
- B. Cleaning: Before applying paint or other surface treatments, clean substrates of substances that could impair bond of the various coatings. Remove oil and grease before cleaning.
 - 1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
- C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each substrate condition and as specified.
 - 1. Provide barrier coats over incompatible primers or remove and reprime.
 - 2. Cementitious Substrates: Prepare concrete, brick, concrete masonry block, and cement plaster surfaces to be coated. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods to prepare surfaces.
 - 3. Wood Substrates: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Smoothly sand surfaces exposed to view and dust off.
 - 4. Ferrous Metal Substrates: Clean ungalvanized ferrous metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC recommendations.
 - 5. Non-Ferrous Metal Substrates: Clean non-ferrous and galvanized surfaces according to manufacturer's written instructions for the type of service, metal substrate, and application required.
- D. Material Preparation: Carefully mix and prepare coating materials according to manufacturer's written instructions.
 - 1. Maintain containers used in mixing and applying coatings in a clean condition, free of foreign materials and residue.
 - 2. Stir materials before applying to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into the material. Remove film and, if necessary, strain coating material before using.
 - 3. Use only the type of thinners approved by manufacturer and only within recommended limits.

4. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

- A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
- B. Application Procedures: Apply coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
 1. The number of coats and film thickness required is the same regardless of application method.
 2. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or recoat work that does not comply with specified requirements.

3.4 CLEANING

- A. After completing painting, clean glass and paint spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.

3.5 PROTECTION

- A. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.
- B. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.
- C. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces.

END OF SECTION 099000

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SECTION 099300 - STAINING AND TRANSPARENT FINISHING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Transparent finishes.

1.2 Reference Standards

- A. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2019.
- B. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials; 2020.

1.3 Submittals

- A. Product Data: Provide complete list of products to be used, including manufacturer's name, product name and catalog number, and general product category.
- B. Certificate: Certify that stains and transparent finishes comply with VOC limits specified.
- C. Manufacturer's Instructions: Indicate special surface preparation procedures.
- D. Applicator's qualification statement.
- E. Maintenance Data: Submit data including finish schedule showing where each product, color, and finish was used, product technical data sheets, safety data sheets (SDS), care and cleaning instructions, and touch-up procedures.

1.4 Quality Assurance

- A. Applicator Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.5 Delivery, Storage, and Handling

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of stain or transparent finish, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

- C. Stain and Transparent Finish Materials: Store at minimum ambient temperature of 60 degrees F and a maximum of 80 degrees F in ventilated area and as required by manufacturer's instructions.
- D. Handling: Maintain a clean, dry storage area to prevent contamination or damage to materials.

1.6 Field Conditions

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by manufacturer of stains and transparent finishes.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply materials when relative humidity is below 33 percent or exceeds 85 percent, at temperatures less than 5 degrees F above the dew point, or to damp or wet surfaces.
- D. Minimum Application Temperature: 50 degrees F, unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 fc measured mid-height at substrate surface.

PART 2 PRODUCTS

2.1 Stains and Transparent Finishes - General

- A. Finishes:
 - 1. Provide finishes capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 2. Provide materials compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
 - 3. Supply each finish material in quantity required to complete entire project's work from a single production run.
 - 4. Do not reduce, thin, or dilute finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Volatile Organic Compound (VOC) Content: In compliance with NYS code requirements.
- C. Flammability: Comply with applicable code for surface burning characteristics.
- D. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.

2.2 STAIN AND TRANSPARENT FINISH SYSTEMS

- A. Finish on Wood - Floors:
 - 1. Sealer: Water-based sealer for wood athletic floors and Stage Floor, clear.
 - a. Products:
 - 1) Bona US; SuperSport DTS: www.bona.com/#sle.
 - 2. Top Coat: One- or two-component, water-based coating for wood athletic floors.
 - a. Products:
 - 1) Bona US; SuperSport ONE: www.bona.com/#sle.
 - 3. Top Coat Sheen:
 - a. Gloss: Gloss level 6; use this sheen at all locations.

2.3 Accessory Materials

- A. Accessory Materials: Cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of finished surfaces.

PART 3 EXECUTION

3.1 Examination

- A. Do not begin application of stains and finishes until substrates have been properly prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces is below the following maximums:
 - 1. Wood: 15 percent, measured in accordance with ASTM D4442.

3.2 Preparation

- A. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- B. Remove existing finishes..
- C. Clean surfaces thoroughly and correct defects prior to application.

- D. Prepare surfaces using the methods recommended by the manufacturer to achieve the best result for the substrate under the project conditions.
- E. Wood Surfaces to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.

3.3 Application

- A. Apply products in accordance with manufacturer's written instructions.
- B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- C. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
- D. Reinstall items removed prior to finishing.

3.4 Cleaning

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.5 Protection

- A. Protect finishes from subsequent construction operations.
- B. Do not permit traffic over unprotected floor surface.
- C. Touch up damaged finishes after Substantial Completion.

END OF SECTION 099300

SECTION 101100 - VISUAL DISPLAY UNITS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Porcelain enamel steel markerboards.
- B. Electronic markerboards.
- C. Tackboards.
- D. Porcelain markerboard wall.

1.2 REFERENCE STANDARDS

- A. ANSI A135.4 - Basic Hardboard; 2012 (Reaffirmed 2020).
- B. ANSI A208.1 - American National Standard for Particleboard; 2022.
- C. ASTM A424/A424M - Standard Specification for Steel, Sheet, for Porcelain Enameling; 2018.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
- E. PS 1 - Structural Plywood; 2023.

1.3 SUBMITTALS

- A. Product Data: Provide manufacturer's data on porcelain enamel steel markerboard, tackboard, and trim.
- B. Shop Drawings: Indicate wall elevations, dimensions, joint locations , special anchor details.
- C. Maintenance Data: Include data on regular cleaning, stain removal .

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.5 WARRANTY

- A. Provide minimum five year warranty for markerboard to include warranty against discoloration due to cleaning, crazing or cracking, and staining.

PART 2 PRODUCTS

2.1 VISUAL DISPLAY UNITS

- A. Porcelain Magnetic Enamel Steel Markerboards:
 - 1. Manufacturers:
 - a. Claridge Products and Equipment, Inc; Series 1 - Magnetic:
www.claridgeproducts.com/#sle.
 - 2. Color: White.
 - 3. Music Striping: White board with black lines. Sizes and locations as indicated.
 - 4. Steel Face Sheet Thickness: 24 gauge, 0.0239 inch .
 - 5. Core: Particleboard, manufacturer's standard thickness, laminated to face sheet.
 - 6. Backing: Aluminum sheet, laminated to core.
 - 7. Size: As indicated on drawings.
 - 8. Frame: Extruded aluminum , with concealed fasteners.
 - 9. Frame Profile: Square.
 - 10. Frame Finish: Anodized, natural.
 - 11. Accessories: Provide marker tray, map rail, and flag holder.
- B. Electronic Markerboards: Interactive video whiteboard, Owner provided, Contractor installed.
- C. Tackboards:
 - 1. Manufacturers:
 - a. Claridge; Series 4 Tackboard with Fabricork.
 - 2. Cork Thickness: 1/8 inch.
 - 3. Fabric: Refer to Material Legend for fabric.
 - 4. Color: As selected from manufacturer's full range.
 - 5. Backing: Hardboard, 1/4 inch thick, laminated to tack surface.
 - 6. Surface Burning Characteristics: Flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84.
 - 7. Size: As indicated on drawings.
 - 8. Frame: Extruded aluminum , with concealed fasteners.
 - 9. Frame Profile: Manufacturer's standard.
 - 10. Frame Finish: Anodized, natural.
- D. Porcelain Enamel Steel Markerboard Wall: Room-size presentation surface made of multiple porcelain enamel steel markerboard panels.
 - 1. Manufacturers:
 - a. Claridge Products and Equipment, Inc; Wall-Write Wall:
www.claridgeproducts.com/#sle.

2. Color: White.
3. Steel Face Sheet Thickness: 24 gauge, 0.0239 inch .
4. Core: Medium density fiberboard (MDF), 7/16 inch thick, laminated to face sheet.
5. Backing: Aluminum sheet, laminated to core.
6. Size: As indicated on drawings.
7. Edge Molding: Provide metal J-mold type edge trim for exposed edges at door and window openings and similar conditions.
8. Adhesives: Manufacturer's recommended adhesive for substrate indicated on drawings.

2.2 MATERIALS

- A. Porcelain Enameled Steel Sheet: ASTM A424/A424M, Type I, Commercial Steel, with fired-on vitreous finish.
- B. Plywood: PS 1 Grade C-D , softwood.
- C. Hardboard for Cores: ANSI A135.4, Class 1 - Tempered, S2S (smooth two sides).
- D. Particleboard: ANSI A208.1; wood chips, set with waterproof resin binder, sanded faces.
- E. Adhesives: Type used by manufacturer.

2.3 ACCESSORIES

- A. Map Rail: Extruded aluminum, manufacturer's standard profile, with cork insert and runners for accessories; 1 inch wide overall , full width of frame.
- B. Map Supports: Formed aluminum sliding hooks and roller brackets to fit map rail.
- C. Flag Holders: Cast aluminum bored to receive 1 inch diameter flag staff, bracketed to fit top rail of board.
- D. Marker Tray: Aluminum, manufacturer's standard profile, one piece full length of markerboard, molded ends, concealed fasteners, same finish as frame.
- E. Mounting Brackets: Concealed.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field measurements are as indicated on shop drawings.
- B. Verify that internal wall blocking is ready to receive work and positioning dimensions are as indicated on shop drawings.

- C. Verify flat wall surface for frameless adhesive-applied boards.

3.2 PREPARATION

- A. Acclimatize tackable wall panels by removing from packaging in installation area not less than 24 hours before application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install boards in accordance with manufacturer's instructions.
- B. Secure units level and plumb.
- C. Butt Joints: Install with tight hairline joints.

3.4 CLEANING

- A. Clean board surfaces in accordance with manufacturer's instructions.
- B. Cover with protective cover, taped to frame.
- C. Remove temporary protective cover at Date of Substantial Completion.

END OF SECTION 101100

SECTION 101200 - DISPLAY CASES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Recessed display cases.

1.2 REFERENCE STANDARDS

- A. AAMA 611 - Specification for Anodized Architectural Aluminum; 2024.
- B. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
- C. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.
- D. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2025.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.

1.3 SUBMITTALS

- A. Product Data: Submit complete printed data and installation details indicating products to be provided as specified.
 - 1. Submit color charts for selection by the Architect.
- B. Shop Drawings: Submit complete installation details. Include dimensioned elevations.
- C. Specimen Warranty.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least three years of documented experience.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver display cases and materials to the Project site with manufacturer's protective crate covering and do not open until ready for use.

- B. Protect display cases before, during, and after installation. In case of damage, immediately provide necessary repairs and replacements.

1.6 FIELD CONDITIONS

- A. Field Measurements: Verify field measurements for recessed application for display cases before preparation of shop drawings and before fabrication to ensure proper installation.

1.7 WARRANTY

- A. Correct defective Work within a five year period after Date of Substantial Completion.
- B. Provide five year manufacturer warranty against defects and in materials, finish product and workmanship.

PART 2 PRODUCTS

2.1 DISPLAY CASES

- A. Manufacturers:
 - 1. Claridge Products and Equipment, Inc; 390 Series Recessed Display Case:
www.claridgeproducts.com/#sle.
- B. Recessed Display Case: Factory-fabricated wood-framed display case with adjustable glass shelves, finished interior, and aluminum trim on face to cover edge of recessed opening.
 - 1. Width: As indicated on drawings.
 - 2. Height: As indicated on drawings.
 - 3. Depth: As indicated on drawings.
 - 4. Components:
 - a. Glazed Doors: Sliding.
 - 1) Number of Doors: As indicated on drawings.
 - b. Side Panels: Laminate-faced substrate.
 - c. Back Panel: Tackable.
 - d. Top Panel: Laminate-faced substrate.
 - e. Bottom Panel: Laminate-faced substrate.
 - f. Lighting: LED.

2.2 COMPONENTS

- A. Aluminum Framed Case Construction: 1-1/2 inch by 2 inch extruded aluminum tube frame with tempered glass, laminate-faced, and stained veneer plywood infill panels.

- B. Face Frame Trim for Recessed Installation: 2 inch flat face dimension extruded aluminum trim mitered with corner clips and mechanical fasteners.
- C. Glazed Sliding Doors:
 - 1. 1/4 inch clear tempered glass with plastic finger pulls.
 - 2. Door track: Extruded aluminum glass shoe with bottom rollers and top plastic guide.
 - 3. Lock: Glass door cylinder lock.
- D. Glass Shelves:
 - 1. 1/4 inch clear tempered glass with flat-polished edges.
 - 2. Shelf Depth: 10 inches.
 - 3. Shelves per Unit: Two.
- E. Shelf Standards and Brackets: Single-slotted channel standards for brackets adjustable in 1 inch increments along entire length of standard, drilled and countersunk for screws.
 - 1. Standards Mounting: Recess-mounted into back panel.
 - 2. Face Width: 5/8 inch.
 - 3. Material: 16 gauge, 0.0598 inch sheet steel.
 - 4. Lengths: As indicated on drawings.
 - 5. Finish: Anochrome.
 - 6. Brackets: Boltless with lip front; 16 gauge, 0.0598 inch sheet steel, reinforced, locking into slots; size to suit shelves; same finish as standards.
- F. Tackable Back Panel: Fabric laminated to cork on hardboard.
 - 1. Cork Thickness: 1/8 inch.
 - 2. Fabric: Refer to Material Legend; minimum fabric weight: 13 oz/sq yd.
 - 3. Color, Texture, Weave, and Pattern: As indicated on drawings.
 - 4. Backing: Hardboard, 1/4 inch thick, factory laminated to tack surface.
 - 5. Surface Burning Characteristics: Flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84.
- G. Lighting: Manufacturer's standard LED light fixture housed at top of case with louvered aluminum access door with keyed lock.
 - 1. Recessed: Fixture with egg crate diffuser.
 - 2. Controls: On/Off using dedicated wall switch.

2.3 MATERIALS

- A. Aluminum Extrusions for Framing and Trim: Alloy as recommended by manufacturer for construction and specified finish; nominal 1/8 inch wall thickness.
- B. Aluminum Extrusions: ASTM B221 (ASTM B221M), 6063 alloy, T5 temper.
 - 1. Finish: Factory anodized; AAMA 611: Clear anodized.

- C. Plywood: Softwood plywood with veneer core, waterproof glue, 3/4 inch thick.
- D. Heat-Strengthened and Fully Tempered Glass: ASTM C1048, Kind FT.

PART 3 EXECUTION

3.1 PREPARATION

- A. Rough openings, electrical pre-wiring, and final finishing are by other trades.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide factory trained installers.
- C. Locate fastening devices to secure cases securely to back and sides of rough opening.
- D. Refer to drawings for display case mounting heights.
- E. Clean case and glass using manufacturers recommended procedures.
- F. Provide mitered and wrapped hairline joints for all trims.

3.3 ADJUSTING AND CLEANING

- A. Verify that all accessories are installed as detailed for each unit.
- B. At completion of work, clean glass surfaces, back panels and trim in accordance with manufacturer's recommendations leaving units ready for use.

END OF SECTION 101200

SECTION 101423 - PANEL SIGNAGE

PART 1 GENERAL

1.1 Section Includes

- A. Panel signage.

1.2 Reference Standards

- A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- B. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

1.3 Submittals

- A. Product Data: Manufacturer's product literature for each type of panel sign, indicating styles, font, foreground and background colors, locations, and overall dimensions of each sign.
- B. Shop Drawings:
 - 1. Include dimensions, locations, elevations, materials, text and graphic layout, attachment details, and schedules.
 - 2. Schedule: Provide information sufficient to completely define each panel sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
 - a. When room numbers to appear on signs differ from those on drawings, include the drawing room number on schedule.
 - b. When content of signs is indicated to be determined later, request such information from Owner through Architect at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
 - c. Submit for approval by Owner through Architect prior to fabrication.
- C. Samples: Submit one sample of each type of sign, of size similar to that required for project, indicating sign style, font, and method of attachment.
- D. Manufacturer's Installation Instructions: Include installation templates and attachment devices.

1.4 Quality Assurance

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.5 Delivery, Storage, and Handling

- A. Package signs as required to prevent damage before installation.
- B. Package room and door signs in sequential order of installation, labeled by floor or building.
- C. Store under cover and elevated above grade.
- D. Store tape adhesive at normal room temperature.

1.6 Field Conditions

- A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.
- B. Maintain minimum ambient temperature during and after installation.

PART 2 PRODUCTS

2.1 Manufacturers

- A. Panel Signage:
 - 1. Best Sign Systems, Inc: www.bestsigns.com/#sle.
 - 2. FASTSIGNS International, Inc: www.fastsigns.com/#sle.
 - 3. Mohawk Sign Systems, Inc: www.mohawksign.com/#sle.

2.2 Regulatory Requirements

- A. Accessibility Requirements: Comply with ADA Standards and ICC A117.1 and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most restrictive requirements.

2.3 Panel Signage

- A. Panel Signage:
 - 1. Application: Room and door signs.
 - 2. Description: Flat signs with engraved panel media, tactile characters.
 - 3. Sign Size: 4 inches by 6 inches, unless otherwise note.
 - 4. Total Thickness: 1/8 inch.
 - 5. Sign Edges: Squared.
 - 6. Corners: Squared.
 - 7. Color and Font, unless otherwise indicated:
 - a. Character Font: to be provided by the Architect.
 - b. Character Case: Upper and lower case (title case).

- c. Background Color: to be provided by the Architect.
- d. Character Color: Contrasting color, selected by the Architect.
- 8. Material: Laminated colored plastic engraved through face to expose core as background color.
- 9. Profile: Flat panel without frame.
- 10. Tactile Letters: Raised 1/32 inch minimum.
- 11. Braille: Grade II, ADA-compliant.
- 12. One-Sided Wall Mounting: Adhesive tape on Glass, Screws all other locations.
- 13. Blanks: Same color and material as sign, provide back blanks when signs are adhered to glass.

2.4 Accessories

- A. Exposed Screws: Chrome plated.
- B. Tape Adhesive: Double-sided tape, permanent adhesive.
 - 1. On Glass only.

PART 3 EXECUTION

3.1 Examination

- A. Verify that substrate surfaces are ready to receive work.
- B. Notify Architect if conditions are not suitable for installation of signs; do not proceed until conditions are satisfactory.

3.2 Installation

- A. Install in accordance with manufacturer's instructions.
- B. Install with horizontal edges level.
- C. Locate panel signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.
- D. Provide blank backs at all locations where signs are adhered to glass.

END OF SECTION 101423

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SECTION 101453 – TRAFFIC SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes regulatory signs, sign posts and mounting.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 033000: Cast-in-Place Concrete Site Work.
- C. Section 312000: Earthwork.

1.3 REFERENCES

- A. National Manual of Uniform Traffic Control Devices", latest edition, and the "NYS Supplement
- B. New York State Department of Transportation Specification Section 730

1.4 SUBMITTALS

- A. Product Data: Provide data on regulatory signs, custom signs, sign posts and mounting.
- B. Shop Drawings: Indicate color, wording, lettering size and style, overall sign size, construction details and installation details for each type of sign.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Regulatory signs: Dimensions and details as specified by NYSDOT Standard Specifications Section 645, latest edition, and the "National Manual of Uniform Traffic Control Devices", latest edition, the "NYS Supplement" and custom signs as noted on the sign schedule. Provide sign face, size, color and mounting as indicated on the sign schedule.
- B. Exterior regulatory sign posts: NYSDOT Standard Specifications Section 730, 3" galvanized "U" channel.
- C. Welded steel plate: 1/4" x 8" x 24"

2.2 MANUFACTURERS

- A. Signage and graphics shall be manufactured by Seton Name Plate Company, Branford, Connecticut, or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install signs in the locations and quantities as shown on the Contract Drawings.
- B. Regulatory post mounted signs shall be mounted on galvanized steel post, 84" from finish grade to the bottom of sign or as indicated on the Contract Drawings and shall comply with all NYSDOT specifications. Mounting height may be adjusted only in accordance with provisions outlined in the "National Manual of Uniform Traffic Control Devices", latest edition, and the "NYS Supplement".
- C. Where shown on the Contract Drawings, signs shall be surface mounted using adequate and appropriate fasteners.
- D. Protect surfaces and finishes from abrasion and other damage during handling and installation.
- E. Replace damaged or faulty signs.

END OF SECTION 101453

SECTION 102113.19 - PLASTIC TOILET COMPARTMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Solid plastic toilet compartments.
- B. Urinal and vestibule screens.

1.2 REFERENCE STANDARDS

- A. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth; 2024.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate the work with placement of support framing and anchors in walls and ceilings.

1.4 SUBMITTALS

- A. Product Data: Provide data on panel construction, hardware, and accessories.
- B. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall supports, door swings.
- C. Manufacturer's Installation Instructions: Indicate special procedures.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Solid Plastic Toilet Compartments:
 - 1. Scranton Products; Hiny Hiders Partitions: www.scrantonproducts.com/#sle.

2.2 PLASTIC TOILET AND CHANGING COMPARTMENTS

- A. Solid Plastic Toilet Compartments: Factory fabricated doors, pilasters, and divider panels made of solid molded high density polyethylene (HDPE), tested in accordance with NFPA 286; floor-mounted unbraced.
 - 1. Color: Single color as selected.
 - 2. Doors:

- a. Thickness: 1 inch.
 - b. Width: 24 inch.
 - c. Width for Handicapped Use: 36 inch, out-swinging.
 - d. Height: 55 inch, unless otherwise detailed.
3. Panels:
 - a. Thickness: 1 inch.
 - b. Height: 55 inch, unless otherwise detailed.
 - c. Depth: As indicated on drawings.
4. Pilasters:
 - a. Thickness: 1 inch.
 - b. Width: As required to fit space; minimum 3 inch.
5. Screens: Without doors; to match compartments; mounted to wall with two panel brackets.

2.3 ACCESSORIES

- A. Pilaster Shoes: Plastic, to match compartments, 3 inches high; concealing floor fastenings.
 1. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster.
- B. Head Rails: Extruded aluminum, anti-grip profile.
 1. Size: Manufacturer's standard size.
- C. Wall and Pilaster Brackets: Stainless steel; continuous type.
- D. Attachments, Screws, and Bolts: Stainless steel , tamper proof type.
 1. For attaching panels and pilasters to brackets: Through-bolts and nuts ; tamper proof.
- E. Hinges: Stainless steel.
- F. Door Hardware: Stainless steel, manufacturer's standard finish.
 1. Door Latch: Slide type with exterior emergency access feature.
 2. Door Strike and Keeper with Rubber Bumper: Mount on pilaster in alignment with door latch.
 3. Provide door pull for outswinging doors.
- G. Coat Hook: One per compartment, mounted on door.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field measurements are as indicated.

- B. Verify correct spacing of and between plumbing fixtures.
- C. Verify correct location of built-in framing, anchorage, and bracing.

3.2 INSTALLATION

- A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.
- B. Maintain 3/8 inch to 1/2 inch space between wall and panels and between wall and end pilasters.
- C. Attach panel brackets securely to walls using anchor devices.
- D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.
- E. Field touch-up of scratches or damaged finish will not be permitted. Replace damaged or scratched materials with new materials.

3.3 TOLERANCES

- A. Maximum Variation From True Position: 1/4 inch.
- B. Maximum Variation From Plumb: 1/8 inch.

3.4 ADJUSTING

- A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.
- B. Adjust hinges to position doors in partial opening position when unlatched. Return out-swinging doors to closed position.
- C. Adjust adjacent components for consistency of line or plane.

END OF SECTION 102113.19

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SECTION 102123 - CUBICLE CURTAINS AND TRACK

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Surface mounted overhead curtain track and guides.
- B. Cubicle curtains.

1.2 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
- B. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films; 2023, with Errata.

1.3 SUBMITTALS

- A. Product Data: Provide data for curtain fabric characteristics.
- B. Shop Drawings: Indicate a reflected ceiling plan view of curtain track, hangers and suspension points, attachment details, schedule of curtain sizes.
- C. Samples: Submit 12 by 12 inch sample patch of curtain cloth with representative top, bottom, and edge hem stitch detail, heading with reinforcement and carrier attachment to curtain header.
- D. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention .
- E. Maintenance Data: Include recommended cleaning methods and materials and stain removal methods.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Accept curtain materials on site and inspect for damage.
- B. Store curtain materials on site and deliver to Owner for installation when requested.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Cubicle Track and Curtains:
 - 1. Inpro; Whisper Cube Cubicle Track: www.inprocorp.com/#sle.

2.2 TRACKS AND TRACK COMPONENTS

- A. Tracks: Extruded aluminum sections; one piece per track run.
 - 1. Profile: Channel.
 - 2. Mounting: Surface.
 - 3. Structural Performance: Capable of supporting vertical test load of 50 lbs without visible deflection of track or damage to supports, safely supporting moving loads, and sufficiently rigid to resist visible deflection and without permanent set.
 - 4. Track End Stop: To fit track section.
 - 5. Track Bends: Minimum 12 inch radius; fabricated without deformation of track section or impeding movement of carriers.
 - 6. Escutcheons: Where suspension rod meets finished ceiling or structure, provide escutcheons to match rod finish.
 - 7. Finish on Exposed Surfaces: White enamel.
- B. Curtain Carriers: Nylon rollers, size and type compatible with track; designed to eliminate bind when curtain is pulled; fitted to curtain to prevent accidental curtain removal.
- C. Wand: Plastic, attached to lead carrier, for pull-to-close action.
- D. Installation Accessories: Types required for specified mounting method and substrate conditions.

2.3 CURTAINS

- A. Cubicle Curtains:
 - 1. Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
 - 2. Inherently flame resistant or flameproofed; capable of passing NFPA 701 test.
 - 3. Material: Close weave material; anti-bacterial, self deodorizing, sanitized, and preshrunk.
 - 4. Color/Pattern: to be selected by Architect, if not scheduled on the Material Legend. .
 - 5. Open Mesh Cloth: Open weave to permit air circulation; flameproof material, manufacturer's standard color.
 - 6. Attachment of Curtain Fabric to Open Mesh Cloth: Snap fasteners.
- B. Curtain Fabrication:
 - 1. Width of curtain to be 10 percent wider than track length.
 - 2. Length of curtain to end 10 inches above finished floor.

3. Include open mesh cloth at top 20 inches of curtain for room air circulation, attached to curtain as specified above.
4. Curtain Heading: Fabric band matching curtain panel with metal grommet holes for carriers spaced 6 inches on center.
5. Seams and Hems: Manufacturer's standard fabrication method for securely sewn and finished seams and hems.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces and supports above ceiling are ready to receive work of this Section.
- B. Verify that field measurements are as indicated.

3.2 INSTALLATION

- A. Install curtain track to be secure, rigid, and true to ceiling line.
- B. Secure track to ceiling system.
- C. Install end cap and stop device.
- D. Install curtains on carriers ensuring smooth operation.

END OF SECTION 102123

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SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Feminine hygiene vendors and disposals.
- B. Grab bars.
- C. Hand dryers.
- D. Mirrors.
- E. Shower and tub accessories.

1.2 REFERENCE STANDARDS

- A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- B. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2015a (Reapproved 2019).
- C. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.
- D. ASTM C1036 - Standard Specification for Flat Glass; 2021.
- E. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

1.4 SUBMITTALS

- A. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.
- B. Wiring diagram for hand dryers.
- C. Warranty: Submit warranty for hand dryers. Submit executed warranty for Closeout.

- D. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design Manufacturer: American Specialties, Inc:
www.americanspecialties.com/#sle.
- B. Basis of Design for Hand Dryers: Dyson Airblade dB.

2.2 Feminine Hygiene Vendors and Disposals

- A. Combination Sanitary Napkin/Tampon Dispenser with Disposal: Stainless steel.
 - 1. Door: Seamless 18 gauge, 0.05 inch door with returned edges and tumbler lock.
 - 2. Cabinet: Fully welded, 22 gauge, 0.03 inch thick sheet.
 - 3. Products:
 - a. Model 0864-F - Free Operation - Sanitary Napkin (30) and Tampon (27) Dispenser - Satin Stainless Steel Finish - Surface-mounted.
- B. Sanitary Napkin Disposal Unit: Stainless steel, self-closing door, locking bottom panel with full-length heavy-duty stainless steel multi-staked piano hinge, removable receptacle.
 - 1. Cabinet and Door: Fully welded, 22 gauge, 0.03 inch thick sheet.
 - 2. Products:
 - a. Model 20852 - Roval Collection - Sanitary Waste Receptacle - Surface-mounted.

2.3 Grab Bars

- A. Grab Bars: Type 304 stainless steel.
 - 1. Standard Duty Grab Bars:
 - a. Push/Pull Point Load: 250 lbf, minimum.
 - b. Clearance: 1-1/2 inch clearance between wall and inside of grab bar.
 - c. Length and Configuration: As indicated in product listing.
 - d. Products:
 - 1) Model 3801-18", 30". 36" length - Snap Flange, 1-1/2 inch OD, Smooth - Straight Grab Bar.

2.4 Hand Dryers

- A. Electric Hand Dryers:
 - 1. Operation: Automatic, sensor-operated on and off.

2. Mounting: Surface mounted.
3. Cover:
 - a. Color: To be selected by the Architect.
4. Supply Voltage: 15 amp, 120 volt.
5. Warranty: 5 year parts and 1 year limited labor.
6. Sound Pressure: Less than 81 dB(A).
7. Products:
 - a. Dyson Ariblade dB; Low Voltage Model.

2.5 Hospitality Accessories

- A. Shower Curtain Rod: Stainless steel tube, 1 inch OD, 0.04 inch wall thickness, satin-finished, with 3 inch OD, minimum 0.04 inch thick satin-finished flanges, for installation with exposed fasteners.
 1. Products:
 - a. Model 1204-1.

2.6 Mirrors

- A. Mirrors: Stainless steel framed, 1/4 inch thick tempered safety glass, ASTM C1048.
 1. Channel Frame: One piece roll formed 20 gauge, 0.0375 inch, 1/2 inch by 1/2 inch Type 304 stainless steel channel that encases mirror and backing with tight mitered corners, and tamperproof hanging system; satin finish.
 2. Products:
 - a. Model 0620 Series - Stainless Steel Chan-Lok Frame - Tempered Glass Mirror- Channel Frame.

2.7 Shower and Tub Accessories

- A. Shower Curtain Rod: Stainless steel tube, 1 inch OD, 0.04 inch wall thickness, satin-finished, with 3 inch OD, minimum 0.04 inch thick satin-finished stainless steel flanges, for installation with exposed fasteners.
 1. Products:
 - a. Model 1204-2 - Shower Curtain Rod - 1-1/4 inch OD Bar - Stainless Steel.
- B. Shower Curtain:
 1. Material: Opaque vinyl, 0.008 inch thick, matte finish, with antibacterial treatment, flameproof and stain resistant.
 2. Size: 36 by 72 inches, hemmed edges.
 3. Grommets: Stainless steel; pierced through top hem on 6 inch centers.
 4. Color: White.
 5. Shower Curtain Hooks: Chrome-plated or stainless steel spring wire designed for snap closure.
 6. Products:

- a. Unless otherwise indicated, provide Model 1200-V - Shower Curtain - 8 gauge (0.008 inch) White Vinyl.
 - b. Model 1200-SHU - Shower Curtain Hook - Stainless Steel.
- C. Shower Seat: Wall-mounted; welded tubular seat frame, structural support members, hinges, and mechanical fasteners of Type 304 stainless steel, rectangular seat.
 - 1. Seat: Phenolic or polymeric composite one-piece seat or seat slats, of white color.
 - 2. Size: ADA Standards compliant.
 - 3. Products:
 - a. Model 8203 - Folding Shower Seat, White.

2.8 Materials

- A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
 - 1. Grind welded joints smooth.
- B. Keys: Provide 4 keys for each accessory to Owner; master key lockable accessories.
- C. Stainless Steel Sheet: ASTM A666/A666M, Type 304.
- D. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.
- E. Mirror Glass: Tempered safety glass, ASTM C1048; and ASTM C1036 Type I, Class 1, Quality Q2, with silvering as required.
- F. Fasteners, Screws, and Bolts: Hot dip galvanized; tamperproof; security type.

2.9 Finishes

- A. Stainless Steel: Satin finish, unless otherwise noted except for hand dryer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.
- C. For electrically-operated accessories, verify that electrical power connections are ready and in the correct locations.
- D. Verify that field measurements are as indicated on drawings.

3.2 PREPARATION

- A. Deliver inserts and rough-in frames to site for timely installation.
- B. Provide templates and rough-in measurements as required.

3.3 INSTALLATION

- A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.
- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.
 - 1. Electric Hand Dryers: Measured from floor to bottom of nozzle as indicated.
 - 2. Other Accessories: As indicated on drawings.

3.4 PROTECTION

- A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION 102800

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SECTION 104400 - FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Fire extinguishers.
- B. Fire blankets.
- C. Fire extinguisher cabinets.
- D. Accessories.

1.2 REFERENCE STANDARDS

- A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2024.
- B. FM (AG) - FM Approval Guide; current edition.
- C. NFPA 10 - Standard for Portable Fire Extinguishers; 2022.
- D. UL (DIR) - Online Certifications Directory; Current Edition.

1.3 SUBMITTALS

- A. Product Data: Provide extinguisher operational features, extinguisher ratings and classifications, anchorage details, and installation instructions.
- B. Shop Drawings: Indicate locations of cabinets and cabinet physical dimensions.
- C. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.4 FIELD CONDITIONS

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Fire Extinguishers:
 - 1. Activar Construction Products Group, Inc. - JL Industries; Cosmic Extinguisher - Multipurpose Chemical: www.activarcpg.com/#sle.
- B. Fire Extinguisher Cabinets and Accessories:
 - 1. Activar Construction Products Group, Inc. - JL Industries; Academy Series: www.activarcpg.com/#sle.
- C. Fire Extinguisher/Fire Blanket Combination Cabinet:
 - 1. Activar Construction Products Group, Inc. - JL Industries; Royal Series, Series 3600 Combinaton Cabinet.

2.2 FIRE EXTINGUISHERS

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
 - 1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated.
- B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gauge.
 - 1. Class: A:B:C type.
 - 2. Size: 10 pound.
 - 3. Finish: Baked polyester powder coat, color as selected.
 - 4. Temperature range: Minus 65 degrees F to ___ degrees F.

2.3 FIRE EXTINGUISHER and FIRE BLANKET CABINETS

- A. Fire Rating: Listed and labeled in accordance with ASTM E814 requirements for fire resistance rating of walls where being installed.
- B. Cabinet Construction: Non-fire rated.
- C. Fire Rated Cabinet Construction: One-hour fire rated.
- D. Cabinet Configuration: Semi-recessed type.
 - 1. Size to accommodate accessories.
 - 2. Projected Trim: Returned to wall surface, with 2-1/2 inch .
 - 3. Provide cabinet enclosure with right angle inside corners and seams, and with formed perimeter trim and door stiles.

- E. Door Glazing: Tempered glass, clear, 1/8 inch thick, and set in resilient channel glazing gasket.
- F. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.
- G. Fabrication: Weld, fill, and grind components smooth.
- H. Finish of Cabinet Exterior Trim and Door: No.4 - Brushed stainless steel.
- I. Finish of Cabinet Interior: White colored enamel.

2.4 ACCESSORIES

- A. Fire Blanket: Fire retardant treated wool; red, 62 by 84 inch size.
- B. Extinguisher Brackets: Formed steel, chrome-plated.
- C. Lettering: "FIRE EXTINGUISHER" decal, or vinyl self-adhering, prespaced black lettering in accordance with authorities having jurisdiction (AHJ).

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify rough openings for cabinet are correctly sized and located.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Secure rigidly in place.
- C. Place extinguishers in cabinets.
- D. Position cabinet signage.

END OF SECTION 104400

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SECTION 105617 - WALL MOUNTED STANDARDS AND SHELVING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Steel shelf standards, brackets, and accessories.
- B. Shelves.
- C. See drawings for locations and configurations.

1.2 REFERENCE STANDARDS

- A. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store products under cover and elevated above grade.
- B. Store products in manufacturer's unopened packaging until ready for installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Steel Shelf Standards and Brackets:
 - 1. Knappe & Vogt Manufacturing Company; 85™/185™ Series:
www.knappeandvogt.com/#sle.

2.2 COMPONENTS

- A. Steel Shelf Standards, Brackets, and Accessories:
 - 1. Extra-Duty Shelf Standards and Brackets: Double-slotted channel standards for brackets adjustable in 1 inch increments along entire length of standard, drilled and countersunk for screws.
 - a. Product: KV 85/187.
 - b. Load Capacity: Recommended by manufacturer for loading of 300 to 680 pounds per pair of standards.

- c. Material: Steel.
 - d. Lengths: As indicated on drawings.
 - e. Finish: Electroplated, chrome-look.
 - f. Brackets: Double tab type, locking into slots; size to suit shelves; same finish as standards.
 - g. Bracket Quantity: Provide one bracket for each 12 inches of standard length.
- B. Shelving:
 - 1. Laminate Faced Shelves: Particleboard or medium density fiberboard covered with high pressure decorative laminate on both sides.
 - a. Edge Finish: Matching laminate, all four edges.
 - b. Substrate Thickness: 3/4 inch, nominal.
 - c. Laminate: NEMA LD 3 Type HGL.
 - d. Laminate Color and Pattern: To be selected by Architect from manufacturer's full line.
 - e. Shelf Quantity: Provide one shelf for each 12 inches of length of standard, per pair of standards, unless otherwise indicated.
- C. Fasteners: Screws as recommended by manufacturer for intended application or as otherwise required by project conditions. Finish of exposed to view fasteners to match finish of standards and other components.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 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.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Mount standards or brackets to solid backing capable of supporting intended loads.
- C. Install brackets, shelving, and accessories.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 105617

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SECTION 108223 - INTERIOR GRILLES AND SCREENS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Interior metal grilles, lazer cut.

1.2 REFERENCE STANDARDS

- A. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- B. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.
- C. ASTM C1036 - Standard Specification for Flat Glass; 2021.
- D. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs; 2024.

1.3 SUBMITTALS

- A. Product Data: Provide manufacturer's data on metal materials, and finishes.
- B. Shop Drawings: Submit detailed shop drawings, indicating component profiles, sections, finishes, fastening details, special details, and manufacturer's technical and descriptive data.
 - 1. Include field dimensions of openings and elevations on shop drawings.
- C. Samples: Submit samples for color verification, 8 inches by 8 inches minimum.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site in manufacturer's original, unopened packaging, with labels clearly identifying manufacturer and material.
- B. Store materials indoors, protected from moisture, humidity, and extreme temperature fluctuations.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Interior Aluminum Grilles and Screens:
 - 1. Architectural Grille, Div. of Gimentia Corp.; 203 Honeycomb Perforated Grille; .

2.2 Screens

- A. Aluminum Screens: Provide shop fabricated, shop finished screens assembled into panels.
 - 1. Screen Type: Perforated metal sheet. Aluminum 1/8 inch, Powder Coat color to be selected by the Architect.
 - 2. Screen Type: Laser-cut metal sheet.
 - a. Panel Depth: 3/16" inch.
 - 3. Panel Size and Configuration: As indicated on drawings.
 - 4. Panel Mounting: As indicated on drawings.

2.3 MATERIALS

- A. Aluminum Sheet: ASTM B209/B209M alloy 5052, with temper as required for forming.

2.4 FABRICATION

- A. Shop fabricate grilles and screens to the greatest extent possible.
- B. Disassemble as necessary for shipping and handling, clearly mark units for proper reassembly.
- C. Provide supports, anchorages, and accessories as required for complete assembled system.
- D. Fabricate grilles to ensure proper fit into openings of sizes indicated, with tolerances for installation.

2.5 FINISHES

- A. Pigmented Organic Coatings: AAMA 2603, polyester or acrylic baked enamel finish.
- B. Finish Color: As selected by Architect from manufacturer's required custom color range.

2.6 ACCESSORIES

- A. Fasteners: ASTM F593 stainless steel, sizes to suit installation conditions.
- B. Anchors and Inserts: Corrosion resistant; type, size, and material required for loading and installation as indicated.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify dimensions, tolerances, and method of attachment with other work.
- B. Verify that painting and other adjacent work that might damage grille finish have been completed prior to start of installation.
- C. Verify that anchorage devices have been properly installed and located.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's written installation instructions.
- B. Set grilles level, plumb, with uniform joints, and in alignment with adjacent work as indicated.
- C. Mechanically secure grilles to supporting structure.
- D. Do not cut or trim aluminum members without approval of manufacturer; do not install damaged members.

3.3 TOLERANCES

- A. Maximum Variation From True Position: 1/8 inch.
- B. Maximum Offset From True Alignment: 1/8 inch.

3.4 CLEANING

- A. Remove temporary protective covering as grilles are installed.
- B. Clean finished surfaces as recommended by manufacturer and maintain clean condition until Date of Substantial Completion.
- C. Touch-up damaged finish coating using material provided by manufacturer to match original coating.
- D. Replace grilles that have been damaged beyond touch-up repair.

3.5 PROTECTION

- A. Protect installed grilles to ensure grilles are without damage until Date of Substantial Completion.

END OF SECTION 108223

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SECTION 113013 - RESIDENTIAL APPLIANCES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Kitchen appliances.

1.2 REFERENCE STANDARDS

- A. UL (DIR) - Online Certifications Directory; Current Edition.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's data indicating dimensions, capacity, and operating features of each piece of residential equipment specified.
- B. Copies of Warranties: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.4 QUALITY ASSURANCE

- A. Electric Appliances: Listed and labeled by UL (DIR) and complying with NEMA Standards (National Electrical Manufacturers Association).

1.5 WARRANTY

- A. Provide one year manufacturer warranty on refrigeration system of refrigerators.

PART 2 PRODUCTS

2.1 KITCHEN APPLIANCES

- A. Provide Equipment Eligible for Energy Star Rating: Energy Star Rated.
- B. Refrigerator: Free-standing.
 - 1. Capacity: Total minimum storage of 19.2 cubic ft; minimum 15 percent freezer capacity.
 - 2. Energy Usage: Minimum 20 percent more energy efficient than energy efficiency standards set by U.S. Department of Energy (DOE).
 - 3. Features: Include glass shelves.
 - 4. Exterior Finish: Porcelain enameled steel.
 - 5. Manufacturers:

- a. GE Appliances; Model # GTE19JTNRWW: www.geappliances.com/#sle.
- C. Refrigerator: Under-Counter.
 - 1. Energy Usage: Minimum 20 percent more energy efficient than energy efficiency standards set by U.S. Department of Energy (DOE).
 - 2. Manufacturers:
 - a. GE Appliances; Model # GCE06GSHSB: www.geappliances.com/#sle.
- D. Range: Electric, free-standing, with glass-ceramic cooktop.
 - 1. Size: 30 inches wide.
 - 2. Oven: Self-cleaning with electronic ignition.
 - 3. Elements: Four (4).
 - 4. Controls: Solid state electronic.
 - 5. Features: Include oven door window and oven light.
 - 6. Exterior Finish: Porcelain enameled steel, color as indicated.
 - 7. Manufacturers:
 - a. GE Appliances; JB480DYWW: www.geappliances.com/#sle.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify utility rough-ins are provided and correctly located.V
- B. Verify appliances will fit within casework.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Anchor built-in equipment in place.

3.3 ADJUSTING

- A. Adjust equipment to provide efficient operation.

3.4 CLEANING

- A. Remove packing materials from equipment and properly discard.
- B. Wash and clean equipment.

END OF SECTION 113013

SECTION 116143 - STAGE CURTAINS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Stage curtain fabrics.
- B. Stage curtain track support systems.

1.2 REFERENCE STANDARDS

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- C. FM (AG) - FM Approval Guide; Current Edition.
- D. ITS (DIR) - Directory of Listed Products; Current Edition.
- E. NEMA MG 00001 - Motors and Generators; 2024.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films; 2023, with Errata.
- H. UL (DIR) - Online Certifications Directory; Current Edition.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Conduct a preinstallation meeting at least one week prior to the start of the work of this section; require attendance by all affected installers.

1.4 SUBMITTALS

- A. Product Data: Provide for each type of product as follows:
 - 1. Stage Curtains: Provide information on type of curtain, weight, location for use on project, and type of flame retardancy.
 - 2. Draw-Curtain Operators: Provide rated capacities, and operating and electrical characteristics.

3. Tracks: Provide capacity of each curtain track to support curtain weight and control curtain operation.
- B. Shop Drawings: Indicate installation information for components not dimensioned or detailed in product data.
 1. Submit floor plans, elevations, sections, attachment details of curtains and operating clearances.
 2. Submit fabric assembly and support details.
 3. Submit documentation indicating load capacity of each batten, track, attachment, and rigging components.
 4. Submit attachment locations for curtain, and corresponding loads imposed on structure.
 5. Submit locations of equipment components, switches, and controls; identify between manufacturer installed and field installed wiring.
 6. Submit wiring diagrams for power, signal, and control wiring.
- C. Selection Samples: Submit color chart for each type of stage curtain indicated that includes full range of colors, textures, and patterns available, along with 12-inch square fabric sample, in any color, of each fabric type and seam.
- D. Delegated Design Data: Indicate stage curtain system structural attachments, including analysis data signed and sealed by qualified designer responsible for their preparation.
- E. Designer's Qualification Statement.
- F. Manufacturer's Qualification Statement.
- G. Installer's Qualification Statement.
- H. Operation and Maintenance Data: For stage curtains and rigging operations.
- I. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.5 QUALITY ASSURANCE

- A. Designer Qualifications: Perform design of track support system under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- C. Installer Qualifications: Company specializing in performing work of the type specified and with minimum three years of documented experience.

1.6 FIELD CONDITIONS

- A. Ambient Conditions: Do not install stage curtains until spaces are fully enclosed and watertight, and the following:
 - 1. Wet work in adjacent areas is complete and surfaces are dry.
 - 2. Work at and above ceiling level has been completed.
 - 3. Ambient temperatures and humidity of adjacent areas are maintained at levels when occupied for intended use.
- B. Field Measurements: Confirm supporting structural element locations and adjacent construction for stage curtains and rigging, and complete field measurements prior to fabrication and include these dimensions on shop drawings.

1.7 WARRANTY

- A. Correct defective Work within a two year period after Date of Substantial Completion.
 - 1. Defective Work includes, but is not limited to, stage curtain support and rigging that is not operating properly.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Stage Curtain Fabrics:
 - 1. Refer to Material Legend for Manufacturer, Model and colors for Stage Curtains..
- B. Stage Curtain Track Systems:
 - 1. Beck Studios Inc: www.beckstudios.net/#sle.
 - 2. Fred Krieger & Company: www.fredkriegerfabrics.com/#sle.
 - 3. LuXout Stage Curtains: www.luxout.com/#sle.

2.2 PERFORMANCE REQUIREMENTS

- A. Stage Curtain Systems Design: Engage qualified designer to develop design of stage curtain system, including comprehensive project specific analysis of necessary structural system attachments in compliance with performance requirements.
- B. Structural Performance: Ensure attachment of stage curtain system to structure withstands material weight and operational loads applicable for this project and in compliance with local building codes and authorities having jurisdiction.
 - 1. Design Loads: Weight of stage curtains and track system.
- C. Fire-Test Characteristics: Stage curtain fabrics in compliance with NFPA 701 flame propagation fire test requirements conducted by authorized testing agency, listed by UL (DIR), ITS (DIR), or FM (AG) and acceptable to authorities having jurisdiction.
 - 1. Permanently attach label to fabric of each curtain assembly indicating fabric treatment as follows:

- a. Inherently Flame Retardant (IFR), fibers/yarns that are non-combustible for life of fabric.
 - b. Durable Flame Retardant (DFR), fibers/yarns that are non-combustible for life of fabric.
 - c. Flame Retardant (FR), fabric has been topically treated in an immersion process with chemical fire retardant.
 - 1) Indicate retreatment requirements after cleaning or after designated period of time.
 - 2. Permanently attach swatch of matching fabric from same dye lot, at least 12 inches square, to backside of curtain assembly for use as fire-resistance test strip.
- D. Electrical Components: Devices that are listed and labeled in compliance with NFPA 70, by a qualified testing agency, and marked for designated application.

2.3 STAGE CURTAIN FABRICS

- A. Provide curtains of matching fabric and color from single dye lot, and when size and quantity of curtains exceeds maximum dye lot size, provide curtain or adjacent pair of curtains from only one dye lot, and arrange curtain dye lots to minimize exposure of any differences.
- B. Type B - Polyester Velour: Weighing at least 20 oz/linear yd, ight of 75 mil, 0.075 inch and minimum width of 62 inches.

2.4 CURTAIN TRACK

- A. Steel Track: Commercial quality, roll-formed, galvanized steel sheet, ASTM A653/A653M, with G60 coating designation; with continuous bottom slot and each half of track in single continuous piece; black paint finish; including support and operation accessories.
 - 1. Thickness: ____.
 - a. Heavy-Duty: 14-gauge, 0.0747-inch minimum thickness.
- B. Curtain Rails: Provide single curtain capacity as indicated on drawings, and end stops.
- C. Clamp and Bracket Hangers: Steel clamps and brackets of required strength to support loads for attaching track to overhead support.
- D. Track-Lap Clamp: Clamp that matches track channel finish as necessary for attaching two tracks at center overlap.
- E. Operation:
 - 1. Motorized Operation: Curtain track with cord and pulleys.
 - a. Operating Line: 1/4-inch diameter, stretch-resistant operating cord with braided synthetic-fiber cover over galvanized wire cable.

- b. End Pulleys: One single dead-end and one double live-end pulley, with sheaves having shielded ball bearings housed in plated-steel covers that match track finish, and with bracket for securing off-stage end of curtain.
- F. Track System: Provide heavy-duty curtain track with components as recommended by manufacturer for loads and operation, including track end stops.
 - 1. Carriers: Standard plated-steel carriers with a pair of nylon tired ball-bearing wheels riveted parallel to body, and equip carriers with rubber or neoprene bumpers to reduce noise and plated-steel swivel eye and trim chain for attaching curtain snap or S-hook, and required number of curtain carriers for track length and curtain fabrication.
 - 2. Pulleys: One dead-end, single-wheel pulley; one live-end, double-wheel pulley; and one adjustable pulley to maintain proper tension on operating line; each with molded-nylon-tired ball-bearing sheaves enclosed in steel housings; pulleys with steel housing finished to match track and with bracket for securing off-stage end of curtain.

2.5 CURTAIN TRACK OPERATORS

- A. General: Provide operating machine as recommended by track manufacturer of size and capacity for each motorized curtain as indicated on drawings, with electric motor and factory wired motor controls, starter, gear-reduction unit, brake, and control station.
- B. Type of Operator:
 - 1. Traction drive device.
- C. Motor: In compliance with NEMA MG 00001 requirements, and sized to start, accelerate, and operate curtain in either direction and from any position on track at rated speeds and service factor.
 - 1. Electrical Characteristics: 120 VAC; 3-phase; 60 hertz; continuous running duty type.
 - 2. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with electrical system available for each location.
- D. Controllers, Disconnect Switches, Wiring and Wiring Devices: Manufacturer's standard, unless otherwise indicated.
- E. Control Station: Momentary contact, three-button control station with push-button controls labeled - Open, Close, and Stop.
 - 1. Switches: Key-operated and keyed alike, with one key for each switch and one extra key.
- F. Limit Switches: Fully closed and fully opened preset stops.

2.6 FABRICATION - CURTAINS

- A. General: Provide vertical seams unless otherwise indicated, locate vertical seams so they do not fall on faces of pleats, and only use fabric that is cut greater than half the width of fabric.
 - 1. Curtains that are tabled square, and hems that don't pucker.
 - 2. 1-1/2-inch clearance from floor at bottom of curtain.
- B. Vertical and Top Hems: Machine sew hems as follows, unless otherwise indicated:
 - 1. Vertical Hems: Fabricate at least 2 inches wide, and at least 4 inches wide with at least 1-inch tuck and without visible selvedge material from front of curtain; sew open ends of hems closed.
 - 2. Top Hems: Fabricate by double-stitching 3-1/2-inch wide heavy jute or laminated synthetic webbing to top edge at back side of curtain, and with at least 2 inches of face fabric turned under.
- C. Fullness:
 - 1. 50 Percent Fullness: Provide this fullness, exclusive of turnbacks and hems, and spaced at 12 inches on center along top hem reinforcement as follows:
 - a. Sewing additional material into 3-inch double-stitched, flat, box pleats.
 - b. Tying or hooking together adjacent grommets into round pleats.
- D. Grommets:
 - 1. Black Colored Curtains: No. 3 brass, No. 4 brass, or aluminum grommets with black finish.
 - 2. Pleated Curtains: Provide grommets centered on each box pleat and placed 1 inch from corner of curtain; for snap hooks or S-hooks.
- E. Bottom Hems: Machine sew hems as follows, unless otherwise indicated:
 - 1. For Curtains With Fullness:
 - a. Curtains That Don't Hang to Floor: Hems at least 3 inches deep, with weight tape, 3/4 inch, and open ends of hems sewn closed.
 - b. Floor Length Curtains: Hems at least 6 inches deep, with 1-inch weight tape sewn to top seam of bottom hem, clear of finished bottom edge, and open ends of hems sewn closed.

2.7 ACCESSORIES

- A. S-Hooks: Manufacturer's standard heavy-duty plated wire hooks, at least 2 inches long.
- B. Support, Clamps, and Anchors: Galvanized after fabrication sheet steel, Class B in accordance with ASTM A153/A153M; manufacturer's standard thickness.
- C. Trim and Support Cable: 1/4-inch diameter, 7x19 galvanized steel cable with minimum breaking load (MBL) of 7,000 lb.

1. Provide fittings in accordance with cable manufacturer's written instructions for size, number, and method of installation, including a drop-forged galvanized turnbuckle to allow for leveling.
- D. Inserts, Bolts, Rivets, and Fasteners: Manufacturer's standard and corrosion-resistant.
- E. Weight Tape: Curtain manufacturer's standard continuous weight tape to suit each curtain fabric type and location.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with installer present, for compliance with requirements for supporting structural members, blocking, clearances, installation tolerances, and other conditions that may impact performance of stage curtain assembly.
- B. Examine placement and condition of inserts, clips, blocking, or other supports installed by others and for use in supporting track and battens of stage curtain assembly.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Install stage curtain assembly in accordance with curtain and track manufacturers written instructions.

3.3 INSTALLATION - CURTAIN

- A. Track Hung: Secure curtains to track carriers with S-hooks.

3.4 INSTALLATION - TRACK

- A. Mounting of Track Assembly:
 1. Batten Mounted: Install track by suspending from pipe batten with manufacturer's acceptable track clamp hangers securely attached to batten pipe clamps and within intervals indicated in manufacturer's written instructions for on center spacing.
- B. Track Support Spacing: Comply with manufacturer's recommendations for applied loads, and not to exceed the following dimensions between track supports:
 1. Heavy-Duty Track: 6 feet, maximum.

3.5 CLOSEOUT ACTIVITIES

- A. Demonstration: Demonstrate operation of system to Owner's personnel.

1. Use operation and maintenance data as reference during demonstration.
 2. Briefly describe function, operation, and maintenance of each component.
- B. Training: Train Owner's personnel on operation and maintenance of system.
1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
 2. Provide minimum of two hours of training.
 3. Location: At project site.

3.6 PROTECTION

- A. Protect installed stage curtain assembly from subsequent construction operations until Date of Substantial Completion.

END OF SECTION 116143

SECTION 116623 - GYMNASIUM EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Gymnasium exercise equipment.
- B. Gym divider curtains.
- C. Scoreboard.

1.2 REFERENCE STANDARDS

- A. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021.
- B. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2022).
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.3 SUBMITTALS

- A. Product Data: Provide manufacturer's data showing configuration, sizes, materials, finishes, hardware, and accessories; include:
 - 1. Electrical characteristics and connection locations.
 - 2. Manufacturer's installation instructions.
- B. Shop Drawings: For custom fabricated equipment indicate, in large scale detail, construction methods; method of attachment or installation; type and gauge of metal, hardware, and fittings; plan front elevation; elevations and dimensions; minimum one cross section; utility requirements as to types, sizes, and locations.
- C. Erection Drawings: Detailed dimensional requirements for proper location of equipment.
- D. Samples: Submit samples of wall pad coverings in manufacturer's available range of colors.
- E. Operating and maintenance data for each operating equipment item.
- F. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.

- G. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified with minimum three years of experience.
- C. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and no more than 12 months before start of scheduled welding work.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to project site in manufacturer's original packaging with factory original labels attached.
- B. Store products indoors and elevated above floor; prevent warping, twisting, or sagging.
- C. Store products in accordance with manufacturer's instructions; protect from extremes of weather, temperature, moisture, and other damage.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. See drawings for sizes and locations, unless noted otherwise.
- B. Where mounting dimensions or sizes are not indicated, comply with applicable requirements of the following:
 - 1. National Federation of State High School Associations (NFHS) sports rules.
- C. Provide mounting plates, brackets, and anchors of sufficient size and strength to securely attach equipment to building structure; comply with requirements of Contract Documents.
- D. Hardware: Heavy duty steel hardware, as recommended by manufacturer.
- E. Electrical Wiring and Components: Comply with NFPA 70; provide UL-listed equipment.
- F. Structural Steel Fabrications: Welded in accordance with AWS D1.1/D1.1M, using certified welders.

2.2 GYMNASIUM DIVIDER CURTAINS

- A. Gymnasium Divider Curtains:
1. Curtain Material: Class A rated, self-extinguishing vinyl coated polyester complying with NFPA 101.
 2. Upper Section: 9 oz/sq yd vinyl mesh fabric.
 - a. Color: As selected by Architect.
 - b. Overall Curtain Height: As indicated on drawings.
 3. Lower Section: 18 oz/sq yd solid vinyl coated polyester.
 - a. Color: As selected by Architect.
 - b. Height Above Floor: 9 feet.
 4. Operation: Vertical lift roll-up, curtain coils on top rail.
 5. Controls: key controlled wall switch.
 6. Width: As indicated on drawings.
 7. Manufacturers:
 - a. Draper, Inc; Roll Up, Motorized: www.draperinc.com/#sle.

2.3 SCOREBOARD

- A. Basis of Design: Single Sided LED scoreboard. All Sport 5000 Wireless Indoor All Sport Lite Controller. Daktronics; #BB-2101. 4'h x 8'w x 6" d. digit size 10", 13". Colors selected by the Architect. 5-year warranty. 120 pounds weight. 150W power.
1. Provide all cords and components. Include console controller and components including storage case.
 2. Colors selected by Architect.

2.4 EXERCISE EQUIPMENT

- A. Chinning Bar: Wall mounted steel bar, parallel to floor; adjustable for height.
1. Bar Diameter: 1 inch.
 2. Steel Bar Finish: Zinc-plated.
 3. Steel Frame Finish: Powder coating, manufacturer's standard color.
 4. Mounting Pads: Wood; nominal 6 inches wide by length of unit plus 6 inches.
 5. Manufacturers:
 - a. Porter; product code: 00197100.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Take field measurements to ensure proper fitting of work. If taking field measurements before fabrication will delay work, allow for adjustments within recommended tolerances.

- B. Inspect areas and conditions before installation, and notify Architect in writing of unsatisfactory or detrimental conditions.
- C. Do not proceed with this work until conditions have been corrected; commencing installation constitutes acceptance of work site conditions.
- D. Verify that electrical services are correctly located and have proper characteristics.

3.2 INSTALLATION

- A. Install in accordance with Contract Documents and manufacturer's instructions.
- B. Install equipment rigid, straight, plumb, and level.
- C. Secure equipment with manufacturer's recommended anchoring devices.

3.3 ADJUSTING

- A. Verify proper placement of equipment.
- B. Verify proper placement of equipment anchors and sleeves, and use actual movable equipment to be anchored if available.
- C. Adjust operating equipment for proper operation; remove and replace equipment causing noise or vibration; lubricate equipment as recommended by manufacturer.

3.4 CLEANING

- A. Remove masking or protective covering from finished surfaces.
- B. Clean equipment in accordance with manufacturer's recommendations.

3.5 PROTECTION

- A. Protect installed products until Date of Substantial Completion.
- B. Replace damaged products before Date of Substantial Completion.

END OF SECTION 116623

SECTION 122400 - WINDOW SHADES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Interior manual roller shades.
- B. Interior motorized roller shades.
- C. Motor controls.

1.2 REFERENCE STANDARDS

- A. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).
- B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films; 2023, with Errata.
- D. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.
- E. WCMA A100.1 - Standard for Safety of Window Covering Products; 2022.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Where motorized shades are to be controlled by control systems provided under other sections, coordinate the work with other trades to provide compatible products.
 - 2. Coordinate the work with other trades to provide rough-in of electrical wiring as required for installation of hardwired motorized shades.
- B. Preinstallation Meeting: Convene prior to commencing work related to products of this section; require attendance of affected installers.
- C. Sequencing:
 - 1. Do not fabricate shades until field dimensions for each opening have been taken with field conditions in place.
 - 2. Do not install shades until final surface finishes and painting are complete.

1.4 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets, including materials, finishes, fabrication details, dimensions, profiles, mounting requirements, and accessories.
 - 1. Motorized Shades: Include power requirements and standard wiring diagrams for specified products.
- B. Shop Drawings: Include shade schedule indicating size, location and keys to details, head, jamb and sill details, mounting dimension requirements for each product and condition, and operation direction.
 - 1. Motorized Shades: Provide schematic system riser diagram indicating component interconnections. Include requirements for interface with other systems.
- C. Certificates: Manufacturer's documentation that line voltage components are UL listed or UL recognized.
- D. Source Quality Control Submittals: Provide test reports indicating compliance with specified fabric properties.
- E. Selection Samples: Include fabric samples in full range of available colors and patterns.
 - 1. Motorized Shades: Include finish selections for controls.
- F. Manufacturer's Instructions: Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- G. Project Record Documents: Record actual locations of control systems and show interconnecting wiring.
- H. Operation and Maintenance Data: List of all components with part numbers, sources of supply, and operation and maintenance instructions; include copy of shop drawings.
- I. Warranty: Submit sample of manufacturer's warranty and documentation of final executed warranty completed in Owner's name and registered with manufacturer.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of this type with minimum three years of documented experience with shading systems of similar size and type.
 - 1. Manufacturer's authorized representative.
 - 2. Factory training and demonstrated experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver shades in manufacturer's unopened packaging, labeled to identify each shade for each opening.
- B. Handle and store shades in accordance with manufacturer's recommendations.

1.7 FIELD CONDITIONS

- A. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8 WARRANTY

- A. Provide manufacturer's warranty from Date of Substantial Completion, covering the following:
 - 1. Shade Hardware: 25 years.
 - 2. Electric Motors: One year.
 - 3. Electronic Control Equipment: One year.
 - 4. Fabric: 25 years.
 - 5. Aluminum and Steel Coatings: One year.

PART 2 PRODUCTS

2.1 Manufacturers

- A. Interior Manually Operated Roller Shades:
 - 1. Draper, Inc; Manual LightBloc FlexShade: www.draperinc.com/#sle.
- B. Interior Motorized Roller Shades, Motors and Motor Controls:
 - 1. Draper, Inc; Motorized FlexShade: www.draperinc.com/#sle.
- C. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.

2.2 Roller Shades

- A. General:
 - 1. Provide shade system components that are easy to remove or adjust without removal of mounted shade brackets.
 - 2. Provide shade system that operates smoothly when shades are raised or lowered.
 - 3. Motorized Shades: Motor system housed inside roller tube, controlling shade movement via motor controls indicated; listed or recognized to UL 325.
 - a. Comply with NFPA 70.

- b. Electrical Components: Listed, classified, and labeled as suitable for the purpose intended. Where applicable, system components to be FCC compliant.
 - c. Motors: Size and configuration as recommended by manufacturer for the type, size, and arrangement of shades to be operated; integrated into shade operating components and concealed from view; fully compatible with controls to be installed.
- B. Interior Roller Shades - Basis of Design: Draper, Inc; Manual LightBloc FlexShade: www.draperinc.com/#sle.
 - 1. Description: Single roller, manually operated fabric window shade system complete with mounting brackets, roller tubes, hembars, hardware, and other components necessary for complete installation.
 - a. Drop Position: Regular roll.
 - b. Mounting: Wall mounted.
 - c. Roll Direction: Roll down, closed position is at window sill.
 - d. Size: As indicated on drawings.
 - e. Fabric: As indicated under Shade Fabric article.
 - 2. Brackets and Mounting Hardware: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.
 - 3. Roller Tubes: As required for type of shade operation; designed for removal without removing mounting hardware.
 - a. Material: Extruded aluminum or steel, with wall thickness and material selected by manufacturer.
 - b. Size: As recommended by manufacturer; selected for suitability for installation conditions, span, and weight of shades.
 - 4. Hembars: Designed to maintain bottom of shade straight and flat, selected from manufacturer's standard options.
 - 5. Manual Operation:
 - a. Drive Chain: Continuous loop stainless steel beaded ball chain, 95 lb minimum breaking strength. Provide upper and lower limit stops.
 - 1) Polyester Chain Color: to be selected.
 - b. Shade Lift Assistance: Manufacturer's standard spring device contained in the idler end of roller tube to reduce force required to lift shades; as required based on shade weight.
 - c. Chain Retainer:
 - 1) Chain tensioning device complying with WCMA A100.1.
 - 6. Accessories:
 - a. Light Gap Reduction Channels: Provide extruded aluminum side, center, and sill channels as required for room-darkening shade applications.
 - b. Fascia: Extruded aluminum, size as required to conceal shade mounting, attachable to mounting end caps, without exposed fasteners; clear anodized finish.

- 1) Color: to be selected..
 - c. Fasteners: Noncorrosive, and as recommended by shade manufacturer.
- C. Interior Roller Shades - Basis of Design: Draper, Inc; Motorized FlexShade: www.draperinc.com/#sle.
1. Description: Single roller, motor-operated fabric window shade system complete with mounting brackets, roller tubes, hembars, hardware, and other components necessary for complete installation.
 - a. Drop Position: Regular roll.
 - b. Mounting: Wall mounted.
 - c. Size: As indicated on drawings.
 - d. Fabric: As indicated under Shade Fabric article.
 2. Mounting Hardware: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.
 3. Roller Tubes: As required for type of shade operation; designed for removal without removing mounting hardware.
 - a. Material: Extruded aluminum or steel, with wall thickness and material selected by manufacturer.
 - b. Size: As recommended by manufacturer; selected for suitability for installation conditions, span, and weight of shades.
 4. Hembars: Designed to maintain bottom of shade straight and flat, selected from manufacturer's standard options.
 5. Shade Motor: Standard 120V AC motor, located as indicated on drawings.
 6. Accessories:
 - a. Fascia: Extruded aluminum, size as required to conceal shade mounting, attachable to mounting end caps, without exposed fasteners; powder coat finish.
 - b. Exposed Headbox: Extruded aluminum, size as required to conceal shade mounting; powder coat finish.
 - c. Fasteners: Noncorrosive, and as recommended by shade manufacturer.

2.3 Shade Fabric

- A. Fabric for Light-Filtering Shades: Nonflammable, color-fast, impervious to heat and moisture, glare control, and able to retain its shape under normal operation.
1. Manufacturers:
 - a. Mermet Corporation; E-Screen - 3%: www.mermetusa.com/#sle.
 2. Material: Vinyl coated fiberglass.
 3. Performance Requirements:
 - a. Flammability: Pass NFPA 701 large and small tests.
 - b. Fungal Resistance: No growth when tested according to ASTM G21.
 4. Openness Factor: 3%.
 5. Color: As selected by Architect from manufacturer's full range of colors.

- B. Fabric for Room-Darkening Shades: Nonflammable, color-fast, impervious to heat and moisture, black out, and able to retain its shape under normal operation.
 - 1. Manufacturers:
 - a. Phifer, Inc; SheerWeave SW7000 RD: www.phifer.com/#sle.
 - 2. Material: 100 percent polyester with acrylic backing.
 - 3. Performance Requirements:
 - a. Flammability: Pass NFPA 701 large and small tests.
 - b. Fungal Resistance: No growth when tested according to ASTM G21.
 - 4. Openness Factor: Opaque.
 - 5. Color: As selected by Architect from manufacturer's full range of colors.

2.4 MOTOR CONTROLS

- A. Unless specifically indicated to be excluded, provide all required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, software, system programming, etc. as necessary for a complete operating system that provides the control intent indicated.
- B. Provide all components and connections necessary to interface with other systems as indicated.
- C. Digital Network Controls:
 - 1. Intelligent Motors and Devices: Identifiable over network without separate interface.
 - 2. Provide suitable interface modules as indicated or as required for connection to standard (nonintelligent) motors and devices.
 - 3. Capable of reprogrammed control without requiring wiring modifications.
 - 4. Capable of assigning shade motors to shade groups/sub-groups.
 - 5. Capable of storing programmable open and close limits and minimum of three intermediate preset stop positions for each shade.
 - 6. Capable of aligning adjacent shades within accuracy of plus/minus 0.25 inch.
 - 7. Provide 10 year nonvolatile power failure memory for system configuration settings.
- D. Manual Controls:
 - 1. Control Functions:
 - a. Open: Automatically open controlled shade(s) to fully open position when button is pressed.
 - b. Close: Automatically close controlled shade(s) to fully closed position when button is pressed.
 - c. Raise: Raise controlled shade(s) only while button is pressed.
 - d. Lower: Lower controlled shade(s) only while button is pressed.
 - e. Presets: For selection of predetermined shade positions.

- f. Multiple Shade Groups: Provide individual controls for each shade group as indicated.
- 2. Wall Controls: Provided by shade manufacturer.
 - a. Button Engraving: Manufacturer's standard engraving, unless otherwise indicated.

2.5 Roller Shade FABRICATION

- A. Field measure finished openings prior to ordering or fabrication.
- B. Dimensional Tolerances: As recommended in writing by manufacturer.
- C. At openings requiring continuous multiple shade units with separate rollers, locate roller joints at window mullion centers; butt rollers end-to-end.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine finished openings for deficiencies that may preclude satisfactory installation.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Start of installation shall be considered acceptance of substrates.

3.2 PREPARATION

- A. Prepare surfaces using methods recommended by manufacturer for achieving best result for substrate under the project conditions.
- B. Coordinate with window installation and placement of concealed blocking to support shades.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions and approved shop drawings, using mounting devices as indicated.
- B. Replace shades that exceed specified dimensional tolerances at no extra cost to Owner.
- C. Adjust level, projection, and shade centering from mounting bracket. Verify there is no telescoping of shade fabric. Ensure smooth shade operation.

3.4 SYSTEM STARTUP

- A. Motorized Shade System: Provide services of a manufacturer's authorized representative to perform system startup.

3.5 CLEANING

- A. Clean soiled shades and exposed components as recommended by manufacturer.
- B. Replace shades that cannot be cleaned to "like new" condition.

3.6 CLOSEOUT ACTIVITIES

- A. Demonstration: Demonstrate operation and maintenance of window shade system to Owner's personnel.
- B. Training: Train Owner's personnel on operation and maintenance of system.
 - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
 - 2. Provide minimum of two hours training by manufacturer's authorized personnel at location designated by the Owner.

3.7 PROTECTION

- A. Protect installed products from subsequent construction operations.
- B. Touch-up, repair, or replace damaged products before Substantial Completion.

END OF SECTION 122400

SECTION 123200 - MANUFACTURED WOOD CASEWORK

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Manufactured casework, with cabinet hardware.
 - 1. Wall, Base, and Tall Cabinets.
- B. Special purpose units.
 - 1. Music Sheet Music Storage System.

1.2 DEFINITIONS

- A. Exposed: Portions of casework visible when drawers and cabinet doors are closed, including end panels, bottoms of cases more than 42 inches above finished floor, tops of cases less than 72 inches above finished floor and all members visible in open cases or behind glass doors.
- B. Semi-Exposed: Portions of casework and surfaces behind solid doors, tops of cases more than 72 inches above finished floor and bottoms of cabinets more than 30 inches but less than 42 inches above finished floor.
- C. Concealed: Sleepers, web frames, dust panels and other surfaces not generally visible after installation and cabinets less than 30 inches above finished floor.

1.3 REFERENCE STANDARDS

- A. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.
- B. AWI (QCP) - Quality Certification Program; Current Edition.
- C. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).
- D. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.
- E. BHMA A156.9 - Cabinet Hardware; 2020.
- F. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; 2024.
- G. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.
- B. Keying Conference: Conduct conference prior to ordering keys. Incorporate conference decisions into keying submittal.

1.5 SUBMITTALS

- A. Product Data: Component dimensions, configurations, construction details, joint details, attachments.
- B. Shop Drawings: Indicate casework types, sizes, and locations, using large scale plans, elevations, and cross sections. Include rough-in and anchors and reinforcements, placement dimensions and tolerances, clearances required, and keying information.
- C. Samples for Finish Selection: Fully finished, for color selection. Minimum sample size: 2 inches by 3 inches.
 - 1. Plastic laminate samples, for color, texture, and finish selection.
- D. Manufacturer's Qualification Statement.
- E. Installer's Qualification Statement.
- F. Maintenance Data: Manufacturer's recommendations for care and cleaning.
- G. Finish touch-up kit for each type and color of materials provided.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- B. Quality Certification: Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section.
- C. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect items provided by this section, including finished surfaces and hardware items during handling and installation. For metal surfaces, use polyethylene film or other protective material standard with the manufacturer.

- B. Acceptance at Site:
 - 1. Do not deliver or install casework until the conditions specified under Part 3, Examination Article of this section have been met. Products delivered to sites that are not enclosed and/or improperly conditioned will not be accepted if warping or damage due to unsatisfactory conditions occurs.
- C. Storage:
 - 1. Store casework in the area of installation. If necessary, prior to installation, temporarily store in another area, meeting the environmental requirements specified under Part 3, "Site Verification of Conditions" Article of this section.

1.8 WARRANTY

- A. Correct defective Work within a five year period after Date of Substantial Completion, at no additional cost to Owner. Defects include, but are not limited to:
 - 1. Ruptured, cracked, or stained finish coating.
 - 2. Discoloration or lack of finish integrity.
 - 3. Cracking or peeling of finish.
 - 4. Delamination of components.
 - 5. Failure of hardware.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Plastic Laminate Casework:
 - 1. Case Systems: www.casesystems.com/#sle.
- B. Musics Library System:
 - 1. Wenger; Sheet Music Storage.
 - a. Color and finish to be selected by the Architect.
- C. Obtain casework from single source and manufacturer, unless otherwise indicated.

2.2 CASEWORK, GENERAL

- A. Quality Standard: AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Plastic Laminate Faced Cabinets: Custom Grade.

2.3 FABRICATION

- A. Assembly: Shop assemble casework items for delivery to site in units easily handled and to permit passage through building openings.

- B. Construction: As required for selected grade.
- C. Structural Performance: Safely support the following minimum loads:
 - 1. Base Units: 500 pounds per linear foot across the cabinet ends.
 - 2. Suspended Units: 300 pounds static load.
 - 3. Drawers: 125 pounds, minimum.
 - 4. Hanging Wall Cases: 300 pounds.
 - 5. Shelves: 100 pounds, minimum.
- D. Fittings and Fixture Locations: Cut and drill components for fittings and fixtures.
- E. Hardware Application: Factory-machine casework members for hardware that is not surface applied.
- F. Access Panels: Where indicated, for maintenance of utility service and mechanical and electrical components.
- G. Removable back panels on indicated base cabinets. Provide partial height back panels at sink cabinets.
- H. Fixed panels at backs of open spaces between base cabinets.
 - 1. Provide cutouts for power receptacles where indicated on drawings.
- I. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
- J. Scribes and Fillers: Panels of matching construction and finish, for locations where cabinets do not fit tight to adjacent construction.
- K. Apron Frames: Construction similar to other cabinets, with modifications.
 - 1. Frames fabricated from panels standard with the manufacturer. Include front and back panels, with drawer suspension framing mechanically fastened to support channels spanning between them.
- L. Countertop Panel-Type Supports: Materials similar to adjacent casework, 1-1/2 inch in width, with front-to-back and toe space dimensions matching base cabinet. Designed to be secured in a concealed fashion to countertop material. Include two leveling devices per support panel.

2.4 PLASTIC-LAMINATE-CLAD CASEWORK

- A. Plastic-Laminate-Clad Casework: Solid wood and wood panel construction; each unit self-contained and not dependent on adjacent units or building structure for rigidity; in sizes necessary to avoid field cutting except for scribes and filler panels. Include adjustable levelers for base cabinets.
 - 1. Style: Flush overlay. Ease doors and drawer fronts slightly at edges.

2. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline.
 - a. Finish: Matte or suede, gloss rating of 5 to 20.
 - b. Surface Color and Pattern: As indicated on drawings.
 - c. Exposed Interior Surfaces: Thermally fused laminate.
 - 1) Color: White.
 - d. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.

2.5 COUNTERTOPS

- A. Countertops: See Section 123600.

2.6 SPECIAL PURPOSE UNITS

- A. Musical Instrument Storage Special Units.
 1. Primary Construction: Plastic-laminate clad units.
 - a. Design: Modular units with through-bolted fastening for reconfigurable assembly.
 - b. Cabinet Hardware: Manufacturer's standard, types as required for drawers, doors, shelves, levelers and similar items.
 - c. Finish, Surface Color and Pattern: As selected by Architect from manufacturer's standard line.
 2. Large and Small Instrument Storage Units: Manufacturer's standard; sizes and configurations indicated on drawings.
 - a. Basis of Design: Wenger.
 - 1) Doors:
 - a) Metal Grille: 3/16 inch diameter wire welded grille, with manufacturer's standard paint finish. Individual compartment and full-length, as indicated for each cabinet type.
 - 2) Locking: Manufacturer's standard locking slide bolt with strike plate designed for padlocks.
 - 3) Optional Acoustical Padding: Manufacturer's standard sound-absorbent material.
 3. Stringed Instrument Storage Units: Manufacturer's standard; sizes and configurations indicated on drawings.
 - a. Basis of Design: Wenger Cello Rack.

2.7 CABINET HARDWARE

- A. Comply with BHMA A156.9 requirements.
- B. Label Holders: Manufacturer's standard, sized to hold standard label cards, satin chromium plated over nickel on base material.

1. Attachments: Wood screws, with finish matching label holders.
- C. Locks: Provide locks on casework drawers and doors, everywhere. Lock with 5 pin cylinder and 2 keys per lock. **Locks on all doors and drawers.**
 1. Hinged Doors: Cam type lock, bright chromium plated over nickel on base material.
 2. Framed Sliding Doors: Plunger-type sliding showcase lock, bright chromium plated over nickel on base material.
 3. Tall Hinged Doors: Three-point latching system.
 4. Keying: Key locks alike within a space; key each room separately.
 5. Master Key System: All locks operable by master key.
- D. Shelves in Cabinets:
 1. Shelf Standards and Rests: Vertical standards with rubber button fitted rests, satin chromium plated over nickel on base material.
- E. Swinging Doors: Hinges, pulls, and catches.
 1. Hinges: Visible, number as required by referenced standards for width, height, and weight of door.
 2. Pulls: Chrome wire pulls, 4 inches wide.
 3. Catches: Magnetic.
- F. Drawers: Pulls and slides.
 1. Slides: Steel, full extension arms, ball bearings; self-closing; capacity as recommended by manufacturer for drawer height and width.

2.8 MATERIALS

- A. Adhesives Used for Assembly: Comply with VOC requirements for adhesives and sealants; see Section 016116.
- B. Wood-Based Materials:
 1. Solid Wood: Air-dried to 4.5 percent moisture content, then tempered to 6 percent moisture content before use.
- C. Solid Wood: Clear, dry, sound, plain sawn, selected for compatible species, grain and color, no defects.
- D. Semi-Exposed Solid Wood: Dry, sound, plain sawn, no appearance defects, any species similar in color and grain to exposed portions.
- E. Hardwood Plywood: Veneer core; HPVA HP-1 Grade as indicated; same species as exposed solid wood, clear, compatible grain and color, no defects. Band exposed edges with solid wood of same species as veneer.

- F. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications. complying with Grade requirements, and standard with the manufacturer.
- G. Stainless Steel Sheet: ASTM A666/A666M Type 304.

2.9 ACCESSORIES

- A. Plastic Edge Banding: Extruded PVC, convex shaped; smooth finish; self locking serrated tongue; of width to match component thickness.
 - 1. Color: As selected by Architect from manufacturer's standard range.
 - 2. Use at exposed edges.
- B. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.
- C. Grommets: Standard plastic, painted metal, or rubber grommets for cut-outs, in color to match adjacent surface.
- D. Sealant for Use in Casework Installation:
 - 1. Manufacturer's recommended type.

PART 3 EXECUTION

3.1 PREPARATION

- A. Large Components: Ensure that large components can be moved into final position without damage to other construction.

3.2 EXAMINATION

- A. Site Verification of Environmental Conditions:
 - 1. Do not deliver casework until the following conditions have been met:
 - a. Building has been enclosed (windows and doors sealed and weather-tight).
 - b. An operational HVAC system that maintains temperature and humidity at occupancy levels has been put in place.
 - c. Ceiling, overhead ductwork, piping, and lighting have been installed.
 - d. Installation areas do not require further "wet work" construction.
- B. For Base Cabinets Installation: Examine floor levelness and flatness of installation space. Do not proceed with installation if encountered floor conditions required more than 1/2 inch leveling adjustment. When installation conditions are acceptable, for each space, establish the high point of the floor. Set and make level and plumb first cabinet in relation to this high point.

- C. For Wall Cabinets Installation: Examine wall surfaces in installation space. Do not proceed with installation if the following conditions are encountered:
 - 1. Maximum variation from plane of masonry wall exceeds 1/4 inch in 10 ft and 1/2 inch in 20 ft or more, and/or maximum variation from plumb exceeds 1/4 inch per story.
 - 2. Maximum Variation of finished gypsum board surface from true flatness: 1/8 inch in 10 feet in any direction.
- D. Verify adequacy of support framing and anchors.
- E. Verify that service connections are correctly located and of proper characteristics.

3.3 INSTALLATION

- A. Perform installation in accordance with manufacturer's instructions.
- B. Use anchoring devices to suit conditions and substrate materials encountered. Use concealed fasteners to the greatest degree possible. Use exposed fasteners only where allowed by approved shop drawings, or where concealed fasteners are impracticable.
- C. Set casework items plumb and square, securely anchored to building structure.
- D. Align cabinets to adjoining components, install filler and/or scribe panels where necessary to close gaps.
- E. Fasten together cabinets in continuous runs, with joints flush, uniform and tight. Misalignment of adjacent units not to exceed 1/16 inch. In addition, do not exceed the following tolerances:
 - 1. Variation of Tops of Base Cabinets from Level: 1/16 inch in 10 feet.
 - 2. Variation of Bottoms of Wall Cabinets from Level: 1/8 inch in 10 feet.
 - 3. Variation of Faces of Cabinets from a True Plane: 1/8 inch in 10 feet.
 - 4. Variation of Adjacent Surfaces from a True Plane (Lippage): 1/32 inch.
 - 5. Variation in Alignment of Adjacent Door and Drawer Edges: 1/16 inch.
- F. Secure wall and floor cabinets to concealed reinforcement at gypsum board assemblies.
- G. Base Cabinets: Fasten cabinets to service space framing and/or wall substrates, with fasteners spaced not more than 16 inches on center. Bolt adjacent cabinets together with joints flush, tight, and uniform.
 - 1. Where base cabinets are installed away from walls or service space framing, anchor to floor at toe space at not more than 24 inches on center, and at sides of cabinets with not less than two fasteners per side.
- H. Wall Cabinets: Fasten to hanging strips, and/or wall substrates. Fasten each cabinet through back, near top, at not less than 16 inches on center.
- I. Install hardware uniformly and precisely.

- J. Countertops: Install countertops intended and furnished for field installation in one true plane, with ends abutting at hairline joints, and no raised edges.
- K. Replace units that are damaged, including those that have damaged finishes.

3.4 ADJUSTING

- A. Adjust operating parts, including doors, drawers, hardware, and fixtures to function smoothly.

3.5 CLEANING

- A. Clean casework and other installed surfaces thoroughly.

3.6 PROTECTION

- A. Do not permit finished casework to be exposed to continued construction activity.
- B. Protect casework and countertops from ongoing construction activities. Prevent workmen from standing on, or storing tools and materials on casework or countertops.
- C. Repair damage, including to finishes, that occurs prior to Date of Substantial Completion, using methods prescribed by manufacturer; replace units that cannot be repaired to like-new condition.

END OF SECTION 123200

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SECTION 123553.13 - METAL LABORATORY CASEWORK

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Standard and custom metal cabinets and cabinet hardware.

1.2 RELATED REQUIREMENTS

- A. Section 123600 - Countertops: Additional requirements for countertops.

1.3 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- B. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.
- C. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2021a.
- D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018 (Reapproved 2024).
- E. ASTM D522/D522M - Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings; 2017 (Reapproved 2021).
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
- G. BHMA A156.9 - Cabinet Hardware; 2020.
- H. SEFA 2 - Installations; 2010.
- I. SEFA 3 - Laboratory Work Surfaces; 2010.
- J. SEFA 7 - Laboratory Fixtures; 2010.
- K. SEFA 8M - Laboratory Grade Metal Casework; 2016.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate installation of casework with related items.

- B. Preinstallation Meeting: Conduct a preinstallation meeting at least one week prior to the start of the work of this section; require attendance by all affected installers.

1.5 SUBMITTALS

- A. Product Data: Details of materials, component dimensions and configurations, construction details, joint details, attachments; manufacturer's catalog literature on hardware and keying, accessories, and service fittings, if any.
- B. Shop Drawings: Indicate casework types, sizes, and locations, using large scale plans, elevations, and cross sections. Include rough-in and anchors and reinforcements placement dimensions and tolerances, clearances required, and utility locations, if any. Include coordinated information for laboratory equipment specified in another section and/or furnished by Owner.
- C. Samples For Color Selection: Color charts for each different finish material.
- D. Manufacturer's Installation Instructions.
- E. Manufacturer's qualification statement.
- F. Installer's qualification statement.
- G. Maintenance Data: Manufacturer's recommendations for care and cleaning.
- H. Finish touch-up kit for each type and color of materials provided.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect items provided by this section, including finished surfaces and hardware items during handling and installation. For metal surfaces, use polyethylene film or other protective material standard with the manufacturer.

1.8 WARRANTY

- A. Manufacturer Warranty: Provide 5-year warranty against defects. Complete forms in Owner's name and register with manufacturer. Covered defects include, but are not limited to:

1. Ruptured, cracked, or stained finish coating.
2. Discoloration, or lack of finish integrity.
3. Cracking or peeling of finish.
4. Weld or any other structural failure.
5. Failure of hardware.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Metal Laboratory Casework:
1. CiF Lab Solutions LP: www.cifsolutions.com/#sle.

2.2 METAL LABORATORY CASEWORK

- A. Casework: Die-formed metal sheet; each unit self-contained and not dependent on adjacent units or building structure for rigidity; factory-fabricated, factory-assembled, and factory-finished.
1. Style: Flush overlay - square edge.
 2. Primary Cabinet Material: Galvanized steel.
 3. Steel Sheet Metal:
 - a. Gables, Front and Bottom Panels, Shelves, Gusset Plates, Aprons, and Rails: 18 gauge, 0.0478 inch minimum thickness.
 - b. Drawers, Cabinet Floors, Filler Panels, Back Panels, and Drawer Dividers: 20 gauge, 0.0359 inch minimum thickness.
 4. Structural Performance: In addition to the requirements of SEFA 3, SEFA 7 and SEFA 8M, provide components that safely support the following minimum loads, without deformation or damage:
 - a. Base Units: 500 pounds per linear foot across the cabinet ends.
 - b. Drawers: 125 pounds.
 - c. Hanging Upper Cases: 300 pounds.
 - d. Shelves: 100 pounds.
 5. Corners and Joints: Without gaps or inaccessible spaces or areas where dirt or moisture could accumulate.
 6. Edges and Seams: Smooth. Form counter tops, shelves, and drain boards from continuous sheets.
 7. Shelf Edges: Turned down 3/4 inch on each side and returned 3/4 inch front and back.
 8. Ends: Close open ends with matching construction.
 9. Welding: Electric spot welded; joints ground smooth and flush.
 10. Drawers and Doors: Fabricate drawer and door fronts of sandwiched sheets of sheet steel welded together and reinforced for hardware.
 - a. Fill with sound-deadening core.

11. Shelves: Adjustable and fixed shelves formed down 3/4 inch, returned back 7/8 inch, and up 1/4 inch into a channel shape, front and rear; formed down 3/4 inch at each end. Shelves over 42 inches long reinforced with a channel welded to underside of shelf.
12. Access Panels: Where indicated, for maintenance of utility service fixtures and fittings and mechanical and electrical components.
13. Removable back panels on all base cabinets. Partial height back panels at sink cabinets.
14. Fixed panels at backs of open spaces between base cabinets and at ends of utility spaces not otherwise enclosed.
 - a. Cutouts for power receptacles where indicated on drawings.
15. Filler Panels: Flanged on both sides, of matching construction and finish, for locations where cabinets do not fit tight to adjacent construction.
16. Surface Finish on Sheet Steel: With chemical resistance equal to Level 0 (no change) or Level 1 (slight change of gloss or slight discoloration) according to SEFA 8M. Test applied finishes using procedures specified in ASTM D522/D522M.
 - a. Coating Type: Baked on epoxy; minimum two coats.
 - b. Color: As selected from manufacturer's standard selection.

2.3 CABINET HARDWARE

- A. Manufacturer's standard styles, and as indicated below.
- B. Comply with BHMA A156.9 requirements.
- C. Finish of exposed stainless steel components: No.4 finish.
- D. Locks: On casework drawers and doors, all locations. Lock with 5 pin cylinder and 2 keys per lock. **Provide locks for all doors and drawers.**
 1. Hinged Doors: Cam type lock, bright chromium plated over nickel on base material.
 2. Tall Hinged Doors: Three-point latching system.
 3. Keying: Key locks alike within a space; key each room separately.
 4. Master Key System: All locks operable by master key.
- E. Shelves in Cabinets:
 1. Shelf Standards and Rests: Vertical standards with rubber button fitted rests, satin chromium plated over nickel on base material.
- F. Swinging Doors:
 1. Hinges: Butt, number as required by referenced standards for width, height, and weight of door.
 - a. Butt Hinges for Inset Doors: five-knuckle, projecting barrel, minimum 2-1/2 inches long. Stainless steel with No.4 finish.
 2. Catches: Magnetic.

3. Pulls: Stainless steel wire pulls, 4 inches wide.

G. Drawers:

1. Pulls: Stainless steel wire pulls, 4 inches wide.
2. Slides: Steel, full extension arms, ball bearings; self-closing; capacity as recommended by manufacturer for drawer height and width.

2.4 COUNTERTOPS

- A. Countertops: See Section 123600.

2.5 MATERIALS

- A. Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, CS or FS Type B, with G90/Z275 coating; stretcher leveled.
- B. Stainless Steel Sheet: ASTM A666/A666M, Type 304.

2.6 FINISHES

- A. Sheet Steel Finish: Having chemical resistance equal to Level 0 (no change) or Level 1 (slight change of gloss or slight discoloration) according to SEFA 8M. Test applied finishes using procedures specified in ASTM D522/D522M.
1. Coating Type, New Casework: Baked on epoxy; minimum two coats.
 2. Color: As selected from manufacturer's standard selection.
- B. Stainless Steel Finish: No.4, brushed finish.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify adequacy of support framing and anchors.
- B. Verify that service connections are correctly located and of proper characteristics.

3.2 INSTALLATION

- A. Perform installation in accordance with manufacturer's instructions and with SEFA 2.
- B. Large Components: Ensure that large components can be moved into final position without damage to other construction.
- C. Use anchoring devices to suit conditions and substrate materials encountered. Use concealed fasteners to the greatest degree possible. Use exposed fasteners only where allowed by approved shop drawings, or where concealed fasteners are impracticable.

- D. Set casework items plumb and square, securely anchored to building structure, with no distortion.
 - 1. Base Cabinets: Examine floor levelness and flatness of installation space. Do not proceed with installation if encountered floor conditions required more than 3/4 inch leveling adjustment. When installation conditions are acceptable, for each space, establish the high point of the floor. Set and make level and plumb first cabinet in relation to this high point.
 - 2. Wall Cabinets: Examine wall surfaces in installation space. Do not proceed with installation if the following conditions are encountered:
 - a. Maximum variation from plane of masonry wall exceeds 1/4 inch in 10 feet and 1/2 inch in 20 feet or more, and/or maximum variation from plumb exceeds 1/4 inch per story.
 - b. Maximum variation of finished gypsum board surface from true flatness exceeds 1/8 inch in 10 feet in any direction.
 - E. Align cabinets to adjoining components, install filler and/or scribe panels where necessary to close gaps.
 - F. Fasten together cabinets in continuous runs, with joints flush, uniform and tight. Misalignment of adjacent units not to exceed 1/16 inch. In addition, do not exceed the following tolerances:
 - 1. Variation of Tops of Base Cabinets from Level: 1/16 inch in 10 feet.
 - 2. Variation of Bottoms of Upper Cabinets from Level: 1/8 inch in 10 feet .
 - 3. Variation of Faces of Cabinets from a True Plane: 1/8 inch in 10 feet.
 - 4. Variation of Adjacent Surfaces from a True Plane (Lippage): 1/32 inch.
 - 5. Variation in Alignment of Adjacent Door and Drawer Edges: 1/16 inch.
 - G. Separate dissimilar metals to prevent galvanic action.
 - H. Base Cabinets: Fasten cabinets to service space framing and/or wall substrates, with fasteners spaced not more than 16 inches on center. Bolt adjacent cabinets together with joints flush, tight, and uniform.
 - I. Install hardware uniformly and precisely. Set hinges snug and flat in mortises.
 - J. Replace units that are damaged, including those that have damaged finishes.
- 3.3 ADJUSTING
- A. Adjust operating parts, including doors, drawers, hardware, and fixtures to function smoothly.
- 3.4 CLEANING
- A. Clean casework and other installed surfaces thoroughly.

3.5 PROTECTION

- A. Do not permit finished casework to be exposed to continued construction activity.
- B. Protect casework and countertops from ongoing construction activities. Prevent installers from standing on or storing tools and materials on casework or countertops.
- C. Repair damage that occurs prior to Date of Substantial Completion, including finishes, using methods prescribed by manufacturer; replace units that cannot be repaired to like-new condition.

END OF SECTION 123553.13

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SECTION 123600 - COUNTERTOPS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Countertops for architectural cabinet work.
- B. Countertops for manufactured casework.
- C. Wall-hung counters.

1.2 REFERENCE STANDARDS

- A. ANSI A208.1 - American National Standard for Particleboard; 2022.
- B. ANSI A208.2 - Medium Density Fiberboard (MDF) for Interior Applications; 2022.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
- D. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).
- E. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.
- F. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; 2013.
- G. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.
- H. PS 1 - Structural Plywood; 2023.
- I. SEFA 2 - Installations; 2010.
- J. SEFA 3 - Laboratory Work Surfaces; 2010.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Specimen warranty.
- B. Shop Drawings: Complete details of materials and installation .

- C. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.
- D. Test Reports: Chemical resistance testing, showing compliance with specified requirements.
- E. Installer's qualification statement.
- F. Installation Instructions: Manufacturer's installation instructions and recommendations.
- G. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience.
- B. Quality Certification:
 - 1. Provide labels or certificates indicating that the installed work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.
 - 2. Provide designated labels on shop drawings as required by certification program.
 - 3. Provide designated labels on installed products as required by certification program.
 - 4. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.6 FIELD 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 absolute limits.

PART 2 PRODUCTS

2.1 COUNTERTOPS

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Quality Standard: SEFA 3 for laboratory worksurfaces.
- C. Plastic Laminate Countertops: High-pressure decorative laminate (HPDL) sheet bonded to substrate.
 - 1. Laminate Sheet: NEMA LD 3, Grade HGS, 0.048 inch nominal thickness.
 - a. Manufacturers:
 - 1) Wilsonart: www.wilsonart.com/#sle.
 - b. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
 - c. Wear Resistance: In addition to specified grade, comply with NEMA LD 3 High Wear Grade requirements for wear resistance.
 - d. Finish: Matte or suede, gloss rating of 5 to 20.
 - e. Surface Color and Pattern: As indicated on drawings.
 - 2. Exposed Edge Treatment: Molded PVC edge with T-spline, sized to completely cover edge of panel.
 - a. Color: As selected by Architect from the manufacturer's full line.
 - 3. Back and End Splashes: Same material, same construction.
 - 4. Fabricate in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 11 - Countertops, Custom Grade.
- D. Solid Surfacing Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
 - 1. Flat Sheet Thickness: 1/2 inch, minimum.
 - 2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
 - a. Manufacturers:
 - 1) Dupont; Corian: www.corian.com/#sle.
 - 2) Durat; Murumuru..
 - b. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
 - c. Finish on Exposed Surfaces: Matte, gloss rating of 5 to 20.
 - d. Color and Pattern: As indicated on drawings.
 - 3. Exposed Edge Treatment: Built up to minimum 1-1/4 inch thick; square edge; use marine edge at sinks.
 - 4. Back and End Splashes: Same sheet material, square top; minimum 4 inches high.

5. Fabricate in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 11 - Countertops, Premium Grade.

2.2 MATERIALS

- A. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch thick; join lengths using metal splines.
- B. Particleboard for Supporting Substrate: ANSI A208.1 Grade 2-M-2, 45 pcf minimum density; minimum 3/4 inch thick; join lengths using metal splines.
- C. Medium Density Fiberboard for Supporting Substrate: ANSI A208.2.
- D. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.
- E. Joint Sealant: Mildew-resistant silicone sealant, white.

2.3 ACCESSORIES

- A. Fixed Top-Mounted Countertop Support Brackets:
 1. Material: Steel.
 2. Finish: Manufacturer's standard, factory-applied, textured powder coat.
 3. Color: Black.
 4. Products:
 - a. Rakks; Counter & Vanity Support Brackets.

2.4 FABRICATION

- A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
 1. Join lengths of tops using best method recommended by manufacturer.
 2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
 - a. Rout a 1/8 inch drip groove at underside of exposed overlapping edges, set back 1/2 inch from face of edge.
 3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
- B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
 1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
 2. Height: 4 inches, unless otherwise indicated.

- C. Solid Surfacing: Fabricate tops and wall panels up to 144 inches long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.
- D. Wall-Mounted Counters: Provide skirts, aprons, brackets, and braces as indicated on drawings, finished to match.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

3.2 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.

3.3 INSTALLATION

- A. Install laboratory worksurface countertops in compliance with requirements of SEFA 2.
- B. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
- C. Attach plastic laminate countertops using screws with minimum penetration into substrate board of 5/8 inch.
- D. Seal joint between back/end splashes and vertical surfaces.

3.4 TOLERANCES

- A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.
- B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.
- C. Field Joints: 1/8 inch wide, maximum.

3.5 CLEANING

- A. Clean countertops surfaces thoroughly.

3.6 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION 123600

SECTION 126605 - TELESCOPING BLEACHERS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Electrically operated telescoping stands.

1.2 DEFINITIONS

- A. Forward Folding: Wall- or floor-attached bleachers that open in the forward direction by moving the front row away from the stack to the fully extended position.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for telescoping stands.
 - 2. Include load capacities, assembly characteristics, and furnished accessories.
 - 3. Include electrical characteristics of electrical components, devices, and accessories.
- B. Shop Drawings: For telescoping stands in both stacked and extended positions.
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Include load capacities.
 - 3. Show seating layout, aisle widths, and wheelchair accessibility provisions.
 - 4. Show locations and details for installing operator components, switches, and controls. Indicate motor size, electrical characteristics, drive arrangement, mounting, and grounding provisions.
 - 5. Include diagrams for power, signal, and control wiring.
- C. Samples for Initial Selection: For each type of exposed product and for each color and texture required.
 - 1. Include Samples of accessories involving color and finish selection.
- D. Samples for Verification: For the following products prepared on Samples of size indicated below:
 - 1. Decking: 6-inch- (150-mm-) square Samples of finished material.

2. Seating Material: 6-inch- (150-mm-) square Sample of each seating material, color, and finish indicated.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Welding certificates.
- C. Product Certificates: For each type of telescoping stand assembly.
- D. Material Certificates: For each type of flame-retardant treatment of upholstery fabric.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For telescoping stands to include in operation and maintenance manuals.
 1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
 - a. Procedures for conducting periodic inspections.
 - b. Precautions for cleaning materials and methods that could be detrimental to telescoping-stand finishes and performance.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

1.8 FIELD CONDITIONS

- A. Finished Spaces: Do not deliver or install telescoping stands until finishes in spaces to receive them are complete, including suspended ceilings, floors, and painting.
- B. Field Measurements: Indicate measurements on Shop Drawings.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Telescoping stands shall withstand the effects of gravity loads, operational loads, and other loads and stresses according to ICC 300.

- B. Accessibility Standard: Comply with applicable provisions in the DOJ's 2010 ADA Standards for Accessible Design and ICC A117.1.
- C. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design all components. Provide signed and sealed design documents and certify the design complies with the Uniform Code of NYS."

2.2 TELESCOPING STANDS

- A. System Description: Operable system of multiple-tiered seating on interconnected folding platforms that close for storage, without being dismantled, into a nested stack. Telescoping-stand units permit opening and closing of adjacent, individual and multiple rows, and close with vertical faces of platforms in the same vertical plane.
 - 1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 2. Telescoping-Stands Standard: ICC 300.
- B. Wall-Attached Telescoping Stands: Forward-folding system, in which the bleachers open in the forward direction by moving the front row away from the stack to the fully extended position and the rear of bleacher understructure permanently attaches to wall construction.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Hussey Seating Company; MAXAM or equal.
 - 2. Row Spacing: 26 inches (660 mm).
 - 3. Row Rise: As indicated on Drawings.
 - 4. Seat Type: Benches.
 - 5. Elevated Front Row: Height indicated on Drawings.
 - 6. Operation: Electrically operated, with friction-type, integral power unit.
 - 7. Electrical Characteristics for Each Seating Section:
 - a. Horsepower: 1/2.
 - 8. Voltage 208 V, three phase. Electrical Controls:
 - a. Control Devices: Wall-attached control system.
 - b. Limit Switches: Automatically stop power system when telescoping stands reach fully opened or closed positions.
 - c. Motion Monitor: Flashing light with self-contained warning horn, rated at 85 dB at 10 feet (3 m), mounted under telescoping seating for audio and visual warning during operation.
 - d. Transformer: As required to coordinate current characteristics of motor and control station with building electrical system.

2.3 COMPONENTS

- A. Benches: Seats and skirts.

1. Material: Molded plastic with contour surfaces.
 - a. Color: As selected by Architect from manufacturer's standard.
2. Bench Height: Not less than 16 inches (406 mm) or more than 18 inches (457 mm).
3. Bench Depth: 10 inches (254 mm).
- B. Wheelchair-Accessible Seating: Locate retractable truncated benches to provide wheelchair-accessible seating at locations indicated on Drawings.
 1. Equip tiers adjacent to wheelchair-accessible seating with front rails as required by ICC 300.
- C. Deck: Plywood, 5/8 inch (16 mm) thick.
 1. Finish: Transparent.
- D. Risers: Steel sheet with manufacturer's standard, rust-inhibiting coating or hot-dip galvanized finish.
- E. Safety Rails: Steel, finished with manufacturer's standard powder coat system.
 1. Self-storing mid-aisle handrails located at centerline of each aisle with seating on both sides.
 2. End rails (guards) that are telescoping and self-storing.
 3. Color: As selected by the Architect.
- F. Understructure: Structural steel.
 1. Finish: Manufacturer's standard rust-inhibiting finish.
 2. Color: Manufacturer's standard.
- G. Support Column Wheels: Nonmarring, soft, rubber-face wheel assembly under each support column.
 1. Include wheels of size, number, and design required to support stands and operate smoothly without damaging the flooring surface, but no fewer than four per column or less than 4 inches (100 mm) in diameter and 1-1/2 inch (32 mm) wide.
- H. Control Devices:
 1. Wall Attached: Keyed-switch control station, located within full view of each stand and its movement area. Provide two keys per station.
- I. Fasteners: Vibration proof, in manufacturer's standard size and material.

2.4 ACCESSORIES

- A. Steps:
 1. Slip-resistant, abrasive tread nosings at aisles.
 2. Transitional top step, fully enclosed, at each aisle where last row of telescoping stands is adjacent to a cross aisle.

3. Removable front steps, fully enclosed, at each aisle, that engage with front row to prevent accidental separation or movement and are equipped with a minimum of four skid-resistant feet.
- B. Closure Panels and Void Fillers:
 1. Aisle closures at foot level that produce flush vertical face at aisles when system is stored.
 2. End panels covering exposed ends of stands in the stored position.
 3. Panels at cutouts and truncations for accessible seating.
 4. Rear fillers including supports for closing openings between top row and rear wall of adjoining construction.
 5. Gap fillers for closing openings between stand units or between stand units and adjoining construction.
- C. Scorer's Table: Removable unit that attaches to mounting sockets installed in telescoping stand unit.

2.5 MATERIALS

- A. Lumber: Kiln dried, surfaced four sides; southern pine complying with SPIB's "Standard Grading Rules for Southern Pine Lumber" for B & B finish (B and better) grade-of-finish requirements.
- B. Plywood: PS 1 as standard with manufacturer.
- C. Molded Plastic: High-density polyethylene; blow or injection molded, color-pigmented, textured, impact-resistant, with integral reinforcing ribs for attachment and anchoring points. Provide with UV inhibitors to retard fading. Class A finish.

2.6 FABRICATION

- A. Fabricate telescoping stands to operate easily without special tools or separate fasteners unless otherwise indicated.
- B. Round corners and edges of components and exposed fasteners to reduce snagging and pinching hazards.
- C. Form exposed work with flat, flush surfaces, level and true in line.
- D. Supports: Fabricate supports to withstand, without damage to components, the forces imposed by use of stands without failure or other conditions that might impair their usefulness.
 1. Cantilever bench seat supports to produce toe space uninterrupted by vertical bracing.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install telescoping stands according to ICC 300 and manufacturer's written instructions.

3.3 ADJUSTING

- A. Adjust backrests so that they are at proper angles and aligned with each other in uniform rows.
- B. Adjust hardware and moving parts to function smoothly, and lubricate, test, and adjust each telescoping stand unit to operate according to manufacturer's written instructions.
- C. Clean installed telescoping stands on exposed and semiexposed surfaces. Touch up factory-applied finishes or replace components as required to restore damaged or soiled areas.
- D. Replace upholstery fabric damaged during installation or work of other trades.

3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to inspect, adjust, operate, and maintain telescoping stands.

END OF SECTION 126605

SECTION 142400 - MACHINE ROOM-LESS HYDRAULIC PASSENGER ELEVATORS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Machine room-less hydraulic passenger elevators as shown and specified. Elevator work includes:
1. Standard pre-engineered hydraulic passenger elevators.
 2. Elevator car enclosures, hoistway entrances and signal equipment.
 3. Operation and control systems.
 4. Jack(s).
 5. Accessibility provisions for physically disabled persons.
 6. Equipment, machines, controls, systems and devices as required for safely operating the specified elevators at their rated speed and capacity.
 7. Materials and accessories as required to complete the elevator installation.
- B. Work Not Included: General contractor shall provide the following in accordance with the requirements of the Model Building Code and ANSI A17.1 Code. For specific rules, refer to ANSI A17.1, Part 3 for hydraulic elevators. State or local requirements must be used if more stringent. The cost of this work is not included in the TK Elevator's proposal, since it is a part of the building construction.
1. Elevator hoist beam to be provided at top of elevator shaft. Beam must be able to accommodate proper loads and clearances for elevator installation and operation.
 2. Supply in ample time for installation by other trades, inserts, anchors, bearing plates, brackets, supports and bracing including all setting templates and diagrams for placement.
 3. Hatch walls require a minimum two hours of fire rating. Hoistway should be clear and plumb with variations not to exceed 1/2" at any point.
 4. Elevator hoistways shall have barricades, as required.
 5. Install bevel guards at 75° on all recesses, projections or setbacks over 2" (4" for A17.1 2000 areas) except for loading or unloading.
 6. Provide rail bracket supports at pit, each floor and roof. For guide rail bracket supports, provide divider beams between hoistway at each floor and roof.
 7. Pit floor shall be level and free of debris. Reinforce dry pit to sustain normal vertical forces from rails and buffers.

8. Where pit access is by means of the lowest hoistway entrance, a vertical ladder of non-combustible material extending 42" minimum, (48" minimum for A17.1-2000 areas) shall be provided at the same height, above sill of access door or handgrips.
9. All wire and conduit should run remote from the hoistways.
10. When heat, smoke or combustion sensing devices are required, connect to elevator control cabinet terminals. Contacts on the sensors should be sided for 12 volt D.C.
11. Install and furnish finished flooring in elevator cab.
12. Finished floors and entrance walls are not to be constructed until after sills and door frames are in place. Consult elevator contractor for rough opening size. The general contractor shall supply the drywall framing so that the wall fire resistance rating is maintained, when drywall construction is used.
13. Where sheet rock or drywall construction is used for front walls, it shall be of sufficient strength to maintain the doors in true lateral alignment. Drywall contractor to coordinate with elevator contractor.
14. Before erection of rough walls and doors; erect hoistway sills, headers, and frames. After rough walls are finished; erect fascias and toe guards. Set sill level and slightly above finished floor at landings.
15. To maintain legal fire rating (masonry construction), door frames are to be anchored to walls and properly grouted in place.
16. The elevator wall shall interface with the hoistway entrance assembly and be in strict compliance with the elevator contractor's requirements.
17. General Contractor shall fill and grout around entrances, as required.
18. All walls and sill supports must be plumb where openings occur.
19. Locate a light fixture (200 lx / 19 fc) and convenience outlet in pit with switch located adjacent to the access door.
20. Provide telephone line, light fixture (200 lx / 19 fc), and convenience outlet in the hoistway at the landing where the elevator controller is located. Typically this will be at the landing above the 1st floor. Final location must be coordinated with elevator contractor.
21. As indicated by elevator contractor, provide a light outlet for each elevator, in center of hoistway.
22. For signal systems and power operated door: provide ground and branch wiring circuits.
23. For car light and fan: provide a feeder and branch wiring circuits to elevator control cabinet.

24. Controller landing wall thickness must be a minimum of 8 1/2 inches thick. This is due to the controller being mounted on the second floor landing in the door frame on the return side of the door. For center opening doors, the controller is located on the right hand frame (from inside the elevator cab looking out). These requirements must be coordinated between the general contractor and the elevator contractor.
25. Cutting, patching and recesses to accommodate hall button boxes, signal fixtures, etc..

1.02 SUBMITTALS

- A. Product data: When requested, the elevator contractor shall provide standard cab, entrance and signal fixture data to describe product for approval.
- B. Shop drawings:
 1. Show equipment arrangement in the corridor, pit, and hoistway and/or optional control room. Provide plans, elevations, sections and details of assembly, erection, anchorage, and equipment location.
 2. Indicate elevator system capacities, sizes, performances, safety features, finishes and other pertinent information.
 3. Show floors served, travel distances, maximum loads imposed on the building structure at points of support and all similar considerations of the elevator work.
 4. Indicate electrical power requirements and branch circuit protection device recommendations.
- C. Powder Coat paint selection: Submit manufacturer's standard selection charts for exposed finishes and materials.
- D. Plastic laminate selection: Submit manufacturer's standard selection charts for exposed finishes and materials.
- E. Metal Finishes: Upon request, standard metal samples provided.
- F. Operation and maintenance data. Include the following:
 1. Owner's manuals and wiring diagrams.
 2. Parts list, with recommended parts inventory.

1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: An approved manufacturer with minimum 15 years of experience in manufacturing, installing, and servicing elevators of the type required for the project.
1. The manufacturer of machines, controllers, signal fixtures, door operators cabs, entrances, and all other major parts of elevator operating equipment.
 - a. The major parts of the elevator equipment shall be manufactured by the installing company, and not be an assembled system.
 2. The manufacturer shall have a documented, on-going quality assurance program.
 3. ISO-9001:2000 Manufacturer Certified
 4. ISO-14001:2004 Environmental Management System Certified
 5. LEED Gold certified elevator manufacturing facility.
- B. Installer Qualifications: The manufacturer or an authorized agent of the manufacturer with not less than 15 years of satisfactory experience installing elevators equal in character and performance to the project elevators.
- C. Regulatory Requirements:
1. ASME A17.1 Safety Code for Elevators and Escalators, latest edition or as required by the local building code.
 2. Building Code: National.
 3. NFPA 70 National Electrical Code.
 4. NFPA 80 Fire Doors and Windows.
 5. Americans with Disabilities Act - Accessibility Guidelines (ADAAG)
 6. Section 407 in ICC A117.1, when required by local authorities
 7. CAN/CSA C22.1 Canadian Electrical Code
 8. CAN/CSA B44 Safety Code for Elevators and Escalators.
 9. California Department of Public Health Standard Method V1.1–2010, CA Section 01350
- D. Fire-rated entrance assemblies: Opening protective assemblies including frames, hardware, and operation shall comply with ASTM E2074, CAN4-S104 (ULC-S104), UL10(b), and NFPA Standard 80. Provide entrance assembly units bearing Class B or 1 1/2 hour label by a Nationally Recognized Testing Laboratory (2 hour label in Canada).
- E. Inspection and testing:
1. Elevator Installer shall obtain and pay for all required inspections, tests, permits and fees for elevator installation.
 2. Arrange for inspections and make required tests.

3. Deliver to the Owner upon completion and acceptance of elevator work.
- F. Sustainable Product Qualifications:
1. Environmental Product Declaration:
 - a. GOOD: If Product Category Rules (PCR) are not available, produce a publicly available, critically reviewed life-cycle assessment conforming to ISO 14044 that has at least a cradle to gate se.
 - b. BEST: If Product Category Rules (PCR) are available, produce and publish an Environmental Product Declaration (EPD) based on a critically reviewed life-cycle assessment conforming to ISO 14044, with external verification recognized by the EPD program operator.
 2. Material Transparency:
 - a. GOOD: Provide Health Product Declaration at any level
 - b. BETTER: Provide Health Product Declaration (HPD v2 or later). Complete, published declaration with full disclosure of known hazards, prepared using the Health Product Declaration Collaborative's "HPD builder" on-line tool.
 - c. BEST: Cradle to Cradle Material Health Certificate v3, Bronze level or higher.
 3. LEED v4 – Provide documentation for all Building Product Disclosure AND Optimization credits in LEED v4 for product specified.
 4. Living Building Challenge Projects: Provide Declare label for products specified.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Manufacturing shall deliver elevator materials, components and equipment and the contractor is responsible to provide secure and safe storage on job site.

1.05 PROJECT CONDITIONS

- A. Temporary Use: Elevators shall not be used for temporary service or for any other purpose during the construction period before Substantial Completion and acceptance by the purchaser unless agreed upon by Elevator Contractor and General Contractor with signed temporary agreement.

1.06 WARRANTY

- A. Warranty: Submit elevator manufacturer's standard written warranty agreeing to repair, restore or replace defects in elevator work materials and workmanship not due to ordinary wear and tear or improper use or care for 12 months after final acceptance.

1.07 MAINTENANCE

- A. Furnish maintenance and call back service for a period of 12 months for each elevator after completion of installation or acceptance thereof by beneficial use, whichever is earlier, during normal working hours excluding callbacks.
 - 1. Service shall consist of periodic examination of the equipment, adjustment, lubrication, cleaning, supplies and parts to keep the elevators in proper operation. Maintenance work, including emergency call back repair service, shall be performed by trained employees of the elevator contractor during regular working hours.
 - 2. Submit parts catalog and show evidence of local parts inventory with complete list of recommended spare parts. Parts shall be produced by manufacturer of original equipment.
 - 3. Manufacturer shall have a service office and full time service personnel within a 100 mile radius of the project site.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturer: Design based around TK Elevator's endura Machine Room-Less hydraulic elevator.

2.02 MATERIALS, GENERAL

- A. All Elevator Cab materials including frame, buttons, lighting, wall and ceiling assembly, laminates and carpet shall have an EPD and an HPD, and shall meet the California Department of Public Health Standard Method V1.1-2010, CA Section 01350 as mentioned in 1.03.9 of this specification.
- B. Colors, patterns, and finishes: As selected by the Architect from manufacturer's full range of standard colors, patterns, and finishes.
- C. Steel:
 - 1. Shapes and bars: Carbon.
 - 2. Sheet: Cold-rolled steel sheet, commercial quality, Class 1, matte finish.
 - 3. Finish: Factory-applied baked enamel for structural parts, powder coat for architectural parts. Color selection must be based on elevator manufacture's standard selections.

- D. Plastic laminate: Decorative high-pressure type, complying with NEMA LD3, Type GP-50 General Purpose Grade, nominal 0.050" thickness. Laminate selection must be based on elevator manufacture's standard selections.
- E. Flooring by others.

2.03 HOISTWAY EQUIPMENT

- A. Platform: Fabricated frame of formed or structural steel shapes, gusseted and rigidly welded with a wood sub-floor. Underside of the platform shall be fireproofed. The car platform shall be designed and fabricated to support one-piece loads weighing up to 25% of the rated capacity.
- B. Sling: Steel stiles bolted or welded to a steel crosshead and bolstered with bracing members to remove strain from the car enclosure.
- C. Guide Rails: Steel, omega shaped, fastened to the building structure with steel brackets.
- D. Guides: Slide guides shall be mounted on top and bottom of the car.
- E. Buffers: Provide substantial buffers in the elevator pit. Mount buffers on continuous channels fastened to the elevator guide rail or securely anchored to the pit floor. Provide extensions if required by project conditions.
- F. Jack: A jack unit shall be of sufficient size to lift the gross load the height specified. Factory test jack to ensure adequate strength and freedom from leakage. Brittle material, such as gray cast iron, is prohibited in the jack construction. Provide the following jack type: Twin post holeless. Two jacks piped together, mounted one on each side of the car with a polished steel hydraulic plunger housed in a sealed steel casing having sufficient clearance space to allow for alignment during installation. Each plunger shall have a high pressure sealing system which will not allow for seal movement or displacement during the course of operation. Each Jack Assembly shall have a check valve built into the assembly to allow for automatically re-synching the two plunger sections by moving the jack to its fully contracted position. The jack shall be designed to be mounted on the pit floor or in a recess in the pit floor. Each jack section shall have a bleeder valve to discharge any air trapped in the section..
- G. Automatic Self-Leveling: Provide each elevator car with a self-leveling feature to automatically bring the car to the floor landings and correct for over travel or under

travel. Self-leveling shall, within its zone, be automatic and independent of the operating device. The car shall be maintained approximately level with the landing irrespective of its load.

- H. Wiring, Piping, and Oil: Provide all necessary hoistway wiring in accordance with the National Electrical Code. All necessary code compliant pipe and fittings shall be provided to connect the power unit to the jack unit. Provide proper viscosity grade inherently biodegradable oil as specified by the manufacturer of the power unit (see Power Unit section 2.04.G for further details)
- I. Pit moisture/water sensor located approximately 1 foot above the pit floor to be provided. Once activated, elevator will perform "flooded pit operation", which will run the car up to the designated floor, cycle the doors and shut down and trip the circuit breaker shunt to remove 3 phase power from all equipment, including pit equipment.
- J. Motorized oil line shut-off valve shall be provided that can be remotely operated from the controller landing service panel. Also a means for manual operation at the valve in the pit is required.

2.04 POWER UNIT

- A. Power Unit (Oil Pumping and Control Mechanism): A self-contained unit located in the elevator pit consisting of the following items:
 - 1. NEMA 4/Sealed Oil reservoir with tank cover including vapor removing tank breather
 - 2. An oil hydraulic pump.
 - 3. An electric motor.
 - 4. Electronic oil control valve with the following components built into single housing; high pressure relief valve, check valve, automatic unloading up start valve, lowering and leveling valve, and electro-magnetic controlling solenoids.
- B. Pump: Positive displacement type pump specifically manufactured for oil-hydraulic elevator service. Pump shall be designed for steady discharge with minimum pulsation to give smooth and quiet operation. Output of pump shall not vary more than 10 percent between no load and full load on the elevator car.
- C. Motor: Standard manufacture motor specifically designed for oil-hydraulic elevator service. Duty rating – motors shall be capable of 80 starts per hour with a 30% motor run time during each start.

- D. Oil Control Unit: The following components shall be built into a single housing. Welded manifolds with separate valves to accomplish each function are not acceptable. Adjustments shall be accessible and be made without removing the assembly from the oil line.
1. Relief valve shall be adjustable and be capable of bypassing the total oil flow without increasing back pressure more than 10 percent above that required to barely open the valve.
 2. Up start and stop valve shall be adjustable and designed to bypass oil flow during start and stop of motor pump assembly. Valve shall close slowly, gradually diverting oil to or from the jack unit, ensuring smooth up starts and up stops.
 3. Check valve shall be designed to close quietly without permitting any perceptible reverse flow.
 4. Lowering valve and leveling valve shall be adjustable for down start speed, lowering speed, leveling speed and stopping speed to ensure smooth "down" starts and stops. The leveling valve shall be designed to level the car to the floor in the direction the car is traveling after slowdown is initiated.
 5. Provided with constant speed regulation in both up and down direction. Feature to compensate for load changes, oil temperature, and viscosity changes.
 6. Solid State Starting: Provide an electronic starter featuring adjustable starting currents.
 7. A secondary hydraulic power source (powered by 110VAC single phase) must be provided. This is required to be able to raise (reposition) the elevator in the event of a system component failure (i.e. pump motor, starter, etc.)
 8. Oil Type: Provide a zinc free, inherently biodegradable lubricant formulated with premium base stocks to provide outstanding protection for demanding hydraulic systems, especially those operating in environmentally sensitive areas.

2.05 HOISTWAY ENTRANCES

- A. Doors and Frames: Provide complete hollow metal type hoistway entrances at each hoistway opening bolted\knock down construction.
1. Manufacturer's standard entrance design consisting of hangers, doors, hanger supports, hanger covers, fascia plates (where required), sight guards, and necessary hardware.
 2. Main landing door & frame finish: Stainless steel panels, no. 4 brushed finish with no. 4 brushed finish entrance frame.

3. Typical door & frame finish: Stainless steel panels, no. 4 brushed finish with no. 4 brushed finish entrance frame.
- B. Integrated Control System: the elevator controller to be mounted to hoistway entrance above 1st landing. The entrance at this level, shall be designed to accommodate the control system and provide a means of access to critical electrical components and troubleshooting features. See section 2.09 Control System for additional requirements.
- C. At the controller landing, the hoistway entrance frame shall have space to accommodate and provide a lockable means of access (group 2 security) to a 3 phase circuit breaker. See section 2.11 Miscellaneous Elevator Components for further details
- D. Interlocks: Equip each hoistway entrance with an approved type interlock tested as required by code. Provide door restriction devices as required by code.
- E. Door Hanger and Tracks: Provide sheave type two point suspension hangers and tracks for each hoistway horizontal sliding door.
 1. Sheaves: Polyurethane tires with ball bearings properly sealed to retain grease.
 2. Hangers: Provide an adjustable device beneath the track to limit the up-thrust of the doors during operation.
 3. Tracks: Drawn steel shapes, smooth surface and shaped to conform to the hanger sheaves.
- F. Hoistway Sills: Extruded metal, with groove(s) in top surface. Provide mill finish on aluminum.

2.06 PASSENGER ELEVATOR CAR ENCLOSURE

- A. Car Enclosure:
 1. Walls: Cab type TKS, reinforced cold-rolled steel. Walls shall be finished with factory applied powder coat.
 2. Reveals and frieze: Not Applicable
 3. Canopy: Cold-rolled steel with hinged exit.
 4. Ceiling: Suspended type, LED lighting with translucent diffuser mounted in a metal frame. Framework shall be finished with a factory applied powder coat finish.
 5. Cab Fronts, Return, Transom, Soffit and Strike: Provide panels faced with brushed stainless steel

6. Doors: Horizontal sliding car doors reinforced with steel for panel rigidity. Hang doors on sheave type hangers with polyurethane tires that roll on a polished steel track and are guided at the bottom by non-metallic sliding guides.
 - a. Door Finish: Stainless steel panels: No. 4 brushed finish.
 - b. Cab Sills: Extruded aluminum, mill finish.
 7. Handrail: Provide 2' flat metal bar on side and rear walls on front opening cars and side walls only on front and rear opening cars. Handrails shall have a stainless steel, no. 4 brushed finish.
 8. Ventilation: Manufacturer's standard exhaust fan, mounted on the car top.
 9. Protection pads and buttons: Not required
- B. Car Top Inspection: Provide a car top inspection station with an "Auto-Inspection" switch, an "emergency stop" switch, and constant pressure "up and down" direction and safety buttons to make the normal operating devices inoperative. The station shall give the inspector complete control of the elevator. The car top inspection station shall be mounted in the door operator assembly.

2.07 DOOR OPERATION

- A. Door Operation: Provide a direct or alternating current motor driven heavy duty operator designed to operate the car and hoistway doors simultaneously. The door control system shall be digital closed loop and the closed loop circuit shall give constant feedback on the position and velocity of the elevator door. The motor torque shall be constantly adjusted to maintain the correct door speed based on its position and load. All adjustments and setup shall be through the computer based service tool. Door movements shall follow a field programmable speed pattern with smooth acceleration and deceleration at the ends of travel. The mechanical door operating mechanism shall be arranged for manual operation in event of power failure. Doors shall automatically open when the car arrives at the landing and automatically close after an adjustable time interval or when the car is dispatched to another landing. AC controlled units with oil checks, or other deviations are not acceptable.
1. No Un-Necessary Door Operation: The car door shall open only if the car is stopping for a car or hall call, answering a car or hall call at the present position or selected as a dispatch car.
 2. Door Open Time Saver: If a car is stopping in response to a car call assignment only (no coincident hall call), the current door hold open time is changed to a shorter field programmable time when the electronic door protection device is activated.

3. Double Door Operation: When a car stops at a landing with concurrent up and down hall calls, no car calls, and no other hall call assignments, the car door opens to answer the hall call in the direction of the car's current travel. If an onward car call is not registered before the door closes to within 6 inches of fully closed, the travel shall reverse and the door shall reopen to answer the other call.
 4. Nudging Operation: The doors shall remain open as long as the electronic detector senses the presence of a passenger or object in the door opening. If door closing is prevented for a field programmable time, a buzzer shall sound. When the obstruction is removed, the door shall begin to close at reduced speed. If the infra-red door protection system detects a person or object while closing on nudging, the doors shall stop and resume closing only after the obstruction has been removed.
 5. Door Reversal: If the doors are closing and the infra-red beam(s) is interrupted, the doors shall reverse and reopen. After the obstruction is cleared, the doors shall begin to close.
 6. Door Open Watchdog: If the doors are opening, but do not fully open after a field adjustable time, the doors shall recycle closed then attempt to open six times to try and correct the fault.
 7. Door Close Watchdog: If the doors are closing, but do not fully close after a field adjustable time, the doors shall recycle open then attempt to close six times to try and correct the fault.
 8. Door Close Assist: When the doors have failed to fully close and are in the recycle mode, the door drive motor shall have increased torque applied to possibly overcome mechanical resistance or differential air pressure and allow the door to close.
- B. Door Protection Device: Provide a door protection system using microprocessor controlled infra-red light beams. The beams shall project across the car opening detecting the presence of a passenger or object. If door movement is obstructed, the doors shall immediately reopen.

2.08 CAR OPERATING STATION

- A. Car Operating Station, General: The main car control in each car shall contain the devices required for specific operation mounted in an integral swing return panel requiring no applied faceplate. Wrap return shall have a brushed stainless steel finish. The main car operating panel shall be mounted in the return and comply with handicap requirements. Pushbuttons that illuminate using long lasting LED's shall be included for each floor

served, and emergency buttons and switches shall be provided per code. Switches for car light and accessories shall be provided.

- B. Emergency Communications System: Integral phone system provided.
- C. Auxiliary Operating Panel:
- D. Column Mounted Car Riding Lantern: A car riding lantern shall be installed in the elevator cab and located in the entrance. The lantern, when illuminated, will indicate the intended direction of travel. The lantern will illuminate and a signal will sound when the car arrives at a floor where it will stop. The lantern shall remain illuminated until the door(s) begin to close.
- E. Special Equipment:
Limited Access Operation: Keyswitch and card reader space.(card reader by others)
- F. Digital Services: Cloud-based IoT monitoring system comes standard with these options:
 - 1. Remote Monitoring with Application Programming Interface (API) Integration.
 - 2. ADA Phone - Code Compliant Cellular Connectivity.
 - 3. A17.1 2019 Code - Enhanced Communications.
 - 4. Smart Device Elevator Calling with occupant app API integration.

2.09 CONTROL SYSTEMS

- A. Controller: Shall be integrated in a hoistway entrance jamb. Should be microprocessor based, software oriented and protected from environmental extremes and excessive vibrations in a NEMA 1 enclosure. Control of the elevator shall be automatic in operation by means of push buttons in the car numbered to correspond to floors served, for registering car stops, and by "up-down" push buttons at each intermediate landing and "call" push buttons at terminal landings.
- B. Service Panel – to be located outside the hoistway in the controller entrance jamb and shall provide the following functionality/features:
 - 1. Access to main control board and CPU
 - 2. Main controller diagnostics
 - 3. Main controller fuses
 - 4. Universal Interface Tool (UIT)
 - 5. Remote valve adjustment

6. Electronic motor starter adjustment and diagnostics
 7. Operation of pit motorized shut-off valve with LED feedback to the state of the valve in the pit
 8. Operation of auxiliary pump/motor (secondary hydraulic power source)
 9. Operation of electrical assisted manual lowering
 10. Provide male plug to supply 110VAC into the controller
 11. Run/Stop button
- C. Automatic Light and Fan shut down: The control system shall evaluate the system activity and automatically turn off the cab lighting and ventilation fan during periods of inactivity. The settings shall be field programmable.
- D. Emergency Power Operation: (Battery Lowering 10D-0C) When the loss of normal power is detected, a battery lowering feature is to be activated. The elevator will lower to a predetermined level and open the doors. After passengers have exited the car, the doors will close and the car will shutdown. When normal power becomes available, the elevator will automatically resume operation. The battery lowering feature is included in the elevator contract and does not utilize a building-supplied standby power source.
- E. Digital Services:
1. Cloud-based IoT Monitoring System (standard): Contractor shall provide a cloud-based IoT (internet of things) monitoring system capable of tracking door movements and timing, trips, power cycles, car calls, out-of-service events and modes. This observation will continue 24/7 and it shall be capable of providing service technicians a minimum of three recommended solutions for defined failure events and automatically dispatch service technicians in the event of failure(s) while sending notifications to end users of changes in their equipment's state via both email and mobile device. Access to IoT and related equipment data and status will be made available in both a web portal and mobile application secured by password and username with at least two-factor authentication. Finally, this system must be self-contained and not require internet provision by others.
 2. Along with the monitoring system, options are available.
 3. Remote Monitoring with Application Programming Interface (API) Integration: Contractor shall provide a portal and mobile device application (app) that communicates relevant service and operational information such as elevator operational status, open service call tickets, call ticket history and performance and service history. This system shall provide a REST application programming interface (API) capable of transmitting relevant information from the cloud-based IoT monitoring system. This data includes equipment operational status, door movements, service and maintenance history, traffic statistics and failure alerts.

4. ADA Phone – Code Compliant Cellular Connectivity: Contractor shall provide a phone service through a self-contained cellular based VoIP system. This system shall meet code, include a backup battery capable of powering the emergency communication equipment for 4+ hours in the event of a power outage. The solution shall have remote monitoring capability to ensure continuous connectivity with a means of remote troubleshooting. Remote monitoring capability shall include, at a minimum, the ability to monitor connectivity and power supply. Remote monitoring shall be capable of providing local alerts to response personnel when on-site intervention is required.
5. A17.1 2019 Code – Enhanced Communications: For jobs installed under enforcement of 2018 International Building Code or ASME A17.1-2019/CSA B44:19 Safety Code, contractor will provide a video camera necessary for viewing the elevator cab interior floor as well as a position indicator display in the cab operating panel capable of providing means of two-way, text-based communication when the emergency call button is engaged in the elevator car. These components, and associated cloud-based monitoring platform, will be non-proprietary in nature, allowing customization on where to direct emergency calls, while offering capability for any party to provide the emergency monitoring services.
6. Smart Device Elevator Calling with Occupant app API Integration: Contractor will provide an elevator calling application for smart devices (app) that can be accessed through Android and IOS smart device operating systems. This calling service shall be accomplished on both, Destination Dispatch and Traditional ETA elevator control system applications. Furthermore, a single, common and consistent app shall have the same user experience and user interface on both Destination Dispatch and Traditional ETA dispatching control systems. To enable mobile calling functionality without creating unnecessary wear on elevator components resulting from false calls, proximity detection beacons shall be installed in the elevator lobby at each floor. These beacons shall detect user smart devices and restrict calling of elevators when the user is not within a pre-configured range of elevator entrance. Beacon-based proximity detection distance must be configurable to accommodate various building and floor layouts. Once Bluetooth signal is detected, the user can place a floor call directly from their handheld or wearable device. The elevator calling app shall remove the need for interaction with hall fixtures, buttons or kiosks. This system shall be capable of placing an automatic call to a user-configured destination floor automatically based on both location in building (floor) and time of day. App users shall be able to configure their own source or starting floor, destination floor and schedule of automatic calling service, and be able to configure multiple automatic calling services and routines. System shall have reasonable ability to auto-provision users from access control system and not require duplicate entry of users for access control purposes. Finally, all services above shall be made available via an application programming interface (API) so that a 3rd party or tenant occupant app could be integrated with elevator smart device calling service so that users could receive multiple occupant experience-based services in a single, common, 3rd party mobile device application (app).

2.10 HALL STATIONS

- A. Hall Stations, General: Buttons shall illuminate to indicate call has been registered at that floor for the indicated direction.
 - 1. Provide one pushbutton riser with faceplates having a brushed stainless steel finish.
 - a. Phase 1 firefighter's service key switch, with instructions, shall be incorporated into the hall station at the designated level.
- B. Floor Identification Pads: Provide door jamb pads at each floor. Jamb pads shall comply with Americans with Disabilities Act (ADA) requirements.
- C. Hall Position Indicator: Not Applicable
- D. Hall lanterns: Not Applicable
- E. Special Equipment:
Limited access operation: Not Applicable

2.11 MISCELLANEOUS ELEVATOR COMPONENTS

- A. Oil Hydraulic Silencer: Install multiple oil hydraulic silencers (muffler device) at the power unit location. The silencers shall contain pulsation absorbing material inserted in a blowout proof housing.
- B. Lockable three phase circuit breaker with auxiliary contact with shunt trip capability to be provided. Circuit breaker to be located behind locked panel (Group 2 security access) at controller landing entrance jamb and should be sized according to the National Electrical Code.
- C. Lockable single phase 110V circuit breaker for cab light and fan to be provided. Circuit breaker to be located behind locked panel (Group 2 security access) at controller landing entrance jamb should be sized according to the National Electrical Code

PART 3 EXECUTION

3.01 EXAMINATION

- A. Before starting elevator installation, inspect hoistway, hoistway openings, pits and/or control room, as constructed, verify all critical dimensions, and examine supporting structures and all other conditions under which elevator work is to be installed. Do not proceed with elevator installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 INSTALLATION

- A. Install elevator systems components and coordinate installation of hoistway wall construction.
 - 1. Work shall be performed by competent elevator installation personnel in accordance with ASME A17.1, manufacturer's installation instructions and approved shop drawings.
 - 2. Comply with the National Electrical Code for electrical work required during installation.
- B. Perform work with competent, skilled workmen under the direct control and supervision of the elevator manufacturer's experienced foreman.
- C. Supply in ample time for installation by other trades, inserts, anchors, bearing plates, brackets, supports, and bracing including all setting templates and diagrams for placement.
- D. Welded construction: Provide welded connections for installation of elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualification of welding operators.
- E. Coordination: Coordinate elevator work with the work of other trades, for proper time and sequence to avoid construction delays. Use benchmarks, lines, and levels designated by the Contractor, to ensure dimensional coordination of the work.
- F. Install machinery, guides, controls, car and all equipment and accessories to provide a quiet, smoothly operating installation, free from side sway, oscillation or vibration.

- G. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with cars. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum safe, workable dimensions at each landing.
- H. Erect hoistway sills, headers, and frames before erection of rough walls and doors; erect fascia and toe guards after rough walls finished. Set sill units accurately aligned and slightly above finish floor at landings.
- I. Lubricate operating parts of system, where recommended by manufacturer.

3.03 FIELD QUALITY CONTROL

- A. Acceptance testing: Upon completion of the elevator installation and before permitting use of elevator, perform acceptance tests as required and recommended by Code and governing regulations or agencies. Perform other tests, if any, as required by governing regulations or agencies.
- B. Advise Owner, Contractor, Architect, and governing authorities in advance of dates and times tests are to be performed on the elevator.

3.04 ADJUSTING

- A. Make necessary adjustments of operating devices and equipment to ensure elevator operates smoothly and accurately.

3.05 CLEANING

- A. Before final acceptance, remove protection from finished surfaces and clean and polish surfaces in accordance with manufacturer's recommendations for type of material and finish provided. Stainless steel shall be cleaned with soap and water and dried with a non-abrasive surface; it shall not be cleaned with bleach-based cleansers.
- B. At completion of elevator work, remove tools, equipment, and surplus materials from site. Clean equipment rooms and hoistway. Remove trash and debris.

1. Use environmentally preferable and low VOC emitting cleaners for each application type. Cleaners that contain solvents, pine and/or citrus oils are not permitted.

3.06 PROTECTION

- A. At time of Substantial Completion of elevator work, or portion thereof, provide suitable protective coverings, barriers, devices, signs, or other such methods or procedures to protect elevator work from damage or deterioration. Maintain protective measures throughout remainder of construction period.

3.07 DEMONSTRATION

- A. Instruct Owner's personnel in proper use, operations, and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of failure in operation and other building emergencies. Train Owner's personnel in normal procedures to be followed in checking for sources of operational failures or malfunctions.
- B. Make a final check of each elevator operation, with Owner's personnel present, immediately before date of substantial completion. Determine that control systems and operating devices are functioning properly.

3.08 ELEVATOR SCHEDULE

- A. Elevator Qty. 1
 1. Elevator Model: endura MRL Twinpost above-ground 1-stage
 2. Elevator Type: Hydraulic Machine Room-Less, Passenger
 3. Rated Capacity: 2500 lbs.
 4. Rated Speed: 80 ft./min.
 5. Operation System: TAC32H
 6. Travel: 14'-8"
 7. Landings: 2 total
 8. Openings:
 - a. Front: 2
 - b. Rear: 0
 9. Clear Car Inside: 6'-8" wide x 4'-3" deep
 10. Inside clear height: 7'-4" standard

11. Door clear height: 7'-0" standard
12. Hoistway Entrance Size: 3'-6" wide x 7'-0" high
13. Door Type: One-speed | LH Side opening
14. Power Characteristics: 460 volts, 3 Phase, 60 Hz.
15. Seismic Requirements: Zone
16. Hoistway Dimensions: 8'-4" wide x 5'-9" deep
17. Pit Depth: 4'-0"
18. Button & Fixture Style: Traditional Signal Fixtures
19. Special Operations:
 - Limited Access with card readers by others
20. Digital Services:
 - Remote Monitoring with Application Programming Interface (API) Integration
 - ADA Phone - Code Compliant Cellular Connectivity
 - A17.1 2019 Code - Enhanced Communications
 - Smart Device Elevator Calling with occupant app API integration

END OF SECTION