SECTION 02 4119
SELECTIVE DEMOLITION

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. This section describes each Prime Contractor's requirements for:
   1. Selective removal and subsequent disposal of portions of existing building indicated on drawings and as required to accommodate new construction.
   2. Salvage of existing fixtures, materials, and equipment indicated.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Applicable provisions of Bidding Requirements, Contract Requirements in Division 0 and all applicable Division 1 sections.

1.03 SUBMITTALS

A. Schedule: Indicate proposed sequence of operations for selective demolition Work.
   1. Include coordination for shut-off, capping, and continuation of utility services.
   2. Indicate provisions for dust and noise control.
   3. Provide detailed sequence of demolition work to ensure uninterrupted progress of City's site operations.
   4. Coordinate with City's continuing occupation of portions of existing building and site with City's partial occupation of completed phases.
   5. Submit for review before commencing selective demolition.

B. Photographs - Submit photographs of existing conditions that might be misconstrued as damage related to selective demolition operations.

1.04 JOB CONDITIONS

A. Condition of Structures: City assumes no responsibility for actual condition of items or structures to be demolished.
   1. City will maintain conditions existing at time of inspection for bidding purposes insofar as practical. Minor variation within structure may occur by City's removal and salvage operations prior to start of selective demolition.

B. Damages: Repair damages caused to adjacent facilities by selective demolition work.

C. Traffic: Conduct selective demolition operations and debris removal to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.
   1. Do not close, block, or obstruct streets, walks, or other occupied or used facilities without prior written permission from authorities having jurisdiction. Provide alternate routes if required.

D. Flame Cutting: Do not use open flame in occupied spaces. Verify area is clear of flammable materials before flame cutting. Maintain portable fire extinguishers while flame cutting.

E. Utility Services: Maintain existing utilities indicated to remain and protect them against damage during demo operations.

1. Do not interrupt utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions.
2. Maintain fire protection services during selective demolition.

F. Environmental Controls: Limit dust and dirt migration.

PART 2 PRODUCTS NOT USED

PART 3 EXECUTION

3.01 PREPARATION

A. Protections: Provide temporary barricades and other forms of protection to protect City personnel and general public from injury due to selective demolition.
1. Provide measure to allow free and safe passage of City personnel and general public to occupied portion of the building.
2. Provide shoring, bracing, and temporary supports to prevent movement, settlement, or collapse of structure or element to be demolished and adjacent construction to remain.
3. Protect existing construction that is to remain from damage.
4. Erect temporary partitions to separate areas of noisy or dusty demolition.
5. Provide temporary weather protection during interval between selective demolition operations which exposes interior of building to weather or water and subsequent construction

B. Utilities: Locate, identify, stub off, and disconnect utility services that are not indicated to remain.

3.02 SELECTIVE DEMOLITION

A. Remove portions of the existing as shown on drawings in manner for the new work to be installed and protecting the existing to remain.

B. Recycle all materials removed in ascendance to City regulations.

3.03 DEMOLITION OF STRUCTURES where shown on drawings

A. General: Perform selective demolition work in systematic manner and approximately in reverse order of construction. Comply with demolition plan and governing regulations.
1. Demolish foundation walls to minimum 12 inches below ground surface. Demolish and remove below-grade wood or metal construction. Break up below grade concrete slabs.
2. Remove complete slab-on-grade in areas indicated for selective demolition.
3. Saw cut slab-on-grade as required to remove indicated utilities and for new construction.

3.04 MATERIALS

A. Salvage Items: Where indicated on drawings as “SALVAGE” carefully remove indicated items, clean, store, and turn over to City at location directed on-site.

B. All materials resulting from selective demolition operations except where indicated as salvaged shall become the property of the Contractor. Remove from site and dispose of legally. Burning of materials is not allowed.

3.05 CLEANUP AND REPAIR

A. General: Upon completion of demolition work, remove temporary facilities and all demolished materials. Leave interior spaces and site broom clean.

B. Repairs: Repair demolition performed in excess of that required or indicated. Return elements of construction and surfaces to remain to condition existing prior to start of operations.

END OF SECTION 02 4119

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SECTION 03 4900
GLASS-FIBER REINFORCED CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Architectural precast glass-fiber-reinforced concrete cornices and fabricated units.

B. Integral insulation where indciated on details.

C. Supports, anchors, and attachments.

1.02 RELATED REQUIREMENTS

A. Section 04 0101 - Repair and Cleaning of Existing Masonry.

B. Section 04 0511 - Masonry Mortaring and Grouting.

C. Section 04 2000 - Unit Masonry: Placement of anchors specified in this section.

D. Section 05 1200 - Structural Steel Framing: Placement of anchors specified in this section.

E. Section 05 5000 - Metal Fabrications: Supporting Steel Criteria.

F. Section 05 4000 - Cold-Formed Metal Framing: Structural stud members.

G. Section 06 1000 - Rough Carpentry: Placement of anchors specified in this section.

H. Section 07 2100 - Thermal Insulation: Integral insulation where indicated.

I. Section 07 6200 - Sheet Metal Flashing and Trim: Reglets recessed in units.

J. Section 07 9200 - Joint Sealants: Sealing perimeter and intermediate joints.

1.03 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.

C. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts 2021a.

D. ASTM A563M - Standard Specification for Carbon and Alloy Steel Nuts (Metric) 2021a.

E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2022.

F. ASTM C33/C33M - Standard Specification for Concrete Aggregates 2018.

G. ASTM C150/C150M - Standard Specification for Portland Cement 2022.

H. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete 2010a (Reapproved 2016).

I. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete 2019, with Editorial Revision (2022).

J. ASTM C618 - Standard Specification for Coal Ash and Raw or Calcined Natural Pozzolan for Use in Concrete 2023.

K. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete 2016.

L. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023.

M. ASTM F436/F436M - Standard Specification for Hardened Steel Washers Inch and Metric Dimensions 2019.

N. ASTM F959/F959M - Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners, Inch and Metric Series 2017a.

O. 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.

P. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification 2021.

Q. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2022).

R. IAS AC157 - Accreditation Criteria for Fabricator Inspection Programs for Reinforced and Precast/Prestressed Concrete 2017.

S. PCI MNL-117 - Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products 2013.

T. PCI MNL-128 - Recommended Practice for Glass Fiber Reinforced Concrete Panels 2001.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's information on accessory products, including pigments, admixtures, inserts, plates, etc.

C. Shop Drawings: Indicate locations, layout, fabrication details, reinforcement, metal framing details, connection details, dimensions, and relationship to adjacent materials. Provide erection drawings.

D. Samples: Submit two samples 6 inch by 6 inch in size illustrating surface color, finish and texture.

E. 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.

F. Manufacturer's Installation Instructions: Indicate surface cleaning instructions.

G. Designer's Qualification Statement.

H. Fabricator's Qualification Statement: Provide documentation showing precast concrete fabricator is accredited under IAS AC157.

I. Erector's Qualifications Statement.

1.06 QUALITY ASSURANCE

A. Designer Qualifications: Design units 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. Fabricator Qualifications: Company specializing in performing the work of this section with minimum 10 years of documented experience.

C. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years of documented experience.

1.07 MOCK-UP

A. Construct 2 panels, size to match existing feet long by 6'-0" nom feet wide, with surface finish applied, including supporting backup structure, attachments, fire, air and vapor seals applied and other items shown in typical details.

B. Locate where directed.

C. Mock-up may remain as part of the Work.

1.08 PROJECT CONDITIONS

A. Coordinate the Work with installation of backup supporting structure, existing masonry construction.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Handle units to position, consistent with their shape and design. Lift and support only from support points.

B. Lifting Device: Capable of maintaining unit shape during manufacture, storage, transportation, erection, and in position for fastening.

C. Blocking and Lateral Support During Transport and Storage: Clean, non-staining, without causing harm to exposed surfaces. Provide temporary lateral support to prevent bowing and warping. Place spacers in same location during transport and site storage.

D. Protect edges of units to prevent staining, chipping, or spalling of concrete.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Glass-Fiber-Reinforced Concrete:
1. Basis of Design: Product and Complete System by: www.strombergs.com

a. Stromberg Architectural Products, Inc: www.strombergarchitectural.com/#sle.
b. Contact: Billy Schuessler: billy@strombergs.com / 903-454-6997 phone and (0233) fax.

2. Subject to Requiremenst Equal by the following:
3. Advanced Architectural Stone: www.advancedarchitecturalstone.com/#sle.
4. Ceilings4U: www.ceilings4u.com/#sle.
5. Premier Stoneworks, LLC: www.premier-stoneworks.com/#sle.
6. Royal Corinthian; RoyalCrete™ GFRC: www.royalcorinthian.com/#sle.
7. Stromberg Architectural Products, Inc: www.strombergarchitectural.com/#sle.

2.02 GLASS-FIBER-REINFORCED CONCRETE UNITS

A. Glass-Fiber-Reinforced Concrete Units: Factory-fabricated, using rigid molds, constructed to maintain unit panel uniform in shape, size and finish.
1. Comply with PCI MNL-128.
2. Design and fabricate to comply with applicable codes.
3. Design to withstand dead loads, positive and negative wind loads, and erection forces.
4. Control deflection of units to maintain fit with adjacent construction and openings within their tolerances.
5. Design connections to accommodate building movement without damage to components, wracking of joint connections, breakage of seals, or moisture penetration.
6. Allow for adjustment of connections to accommodate misalignment of structure without permanent distortion.
7. Concrete Mix: Of strength to accommodate panel configuration, panel size and weight, and manufacturing criteria, air entrained.
8. Surface Burning Characteristics: Flame spread index of 5 or less; smoke developed index of 20 or less; when tested in accordance with ASTM E84.
9. Welding: Comply with AWS D1.1/D1.1M.
10. Appearance: Ensure exposed-to-view finish surfaces of units are uniform in color and appearance.
11. Finish of Exposed-to-View Precast Unit Surfaces: Match adjacent existing terracotta cornices.

2.03 CONCRETE MATERIALS

A. Cement: ASTM C150/C150M Portland Type I - Normal; white color.

B. Concrete Aggregates: ASTM C33/C33M.

C. Reinforcement: Alkali resistant chopped glass fiber rovings specifically formulated for use in concrete, with lengths varying from 1-1/2 to 2 inches.

D. Admixtures: Comply with ASTM C260/C260M, ASTM C494/C494M, and ASTM C618.

E. Color Additives: Pure, concentrated mineral pigments specifically intended for mixing into concrete and complying with ASTM C979/C979M.
1. Color(s): As indicated on drawings.

2.04 FRAMING MATERIALS

A. Metal Framing Members: Formed from hot-dipped galvanized steel sheet, ASTM A653/A653M, SS Grade 50 (340) Class 1, with G90/Z275 coating and G90 ASTM A1008/A1008M cold-rolled structural steel.

B. Misc. Galvanized Steel Tubes, Channels and Angels

2.05 SURFACE FINISH MATERIALS

A. Surface Finish Aggregate: Comply with sample available for inspection at office of Architect.

2.06 SUPPORT DEVICES

A. Connecting and Support Devices: ASTM A36/A36M steel; hot-dip galvanized in accordance with ASTM A153/A153M.

B. Bolts, Nuts, and Washers: ASTM F3125/F3125M heavy hex structural bolts, Type 1, with matching ASTM A563 (ASTM A563M) nuts, and washers as follows:
   1. Standard Washers: ASTM F436/F436M washers, in finish matching bolts.
   2. Compressible Direct Tension Indicators: ASTM F959/F959M, Type 325-1.

2.07 ACCESSORIES

A. Integral Insulation: Rigid extruded polystyrene type, as specified in Section 07 2100.

B. Reglets: Galvanized steel shaped and flanged to remain in place once cast; foam plastic filled to eliminate concrete intrusion.

2.08 FABRICATION

A. Spray-up concrete mix in multiple passes; maintain consistent quality during manufacture.

B. Place metal framing members in position in mold.

C. Embed anchors, inserts, plates, angles, and other cast-in items as indicated on shop drawings.

D. Fit integral insulation into units for continuous thermal protection of building interior.

E. Place and embed flashing reglets continuous and straight.

F. Fabricate connecting devices, items fit to framing members, fasteners and accessories necessary for proper installation.

G. Locate hoisting devices to permit device removal after erection.

H. Cure units to minimize appearance blemishes such as non-uniformity, staining or surface cracking.

I. Identify each unit with corresponding code on erection drawings, in location not visible in finish work.

J. Exposed Non-Galvanized Steel Components: Clean surfaces of rust, scale, grease, and foreign matter; prime paint in one coat, except surfaces in direct contact with concrete or requiring field welding.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that building structure, anchors, devices, and openings are ready to receive work of this section.

3.02 PREPARATION

A. Provide for erection procedures and induced loads during erection. Maintain temporary bracing in place until final support is provided.

3.03 INSTALLATION

A. Coordinate installation with structural supports, backup, and opening framing, if any.

B. Install units without damage to shape or finish. Replace or repair damaged panels.

C. Install units level and plumb within allowable tolerances.

D. Align and maintain uniform horizontal and vertical joints as erection progresses.

E. When units require adjustment beyond design or tolerance criteria, discontinue affected work and advise Architect.

F. Site cutting of panels not permitted.

G. Fasten units in place with mechanical connections.

H. Touch-up field welds and scratched or damaged primed painted surfaces.

3.04 TOLERANCES

A. Maximum Variation from Plane of Location: 1/4 inch in 10 feet and 3/8 inch in 100 feet, non-cumulative.

B. Maximum Offset from True Alignment Between Two Connecting Units: 1/4 inch.

C. Maximum Out of Square: 1/8 inch in 10 feet, non-cumulative.

D. Variation From Dimensions Indicated on Shop Drawings: Plus or minus 1/8 inch.

E. Maximum Misalignment of Anchors, Inserts, Openings: 1/8 inch.

F. Bowing of Units: Length of Unit/360.

G. Exposed Joint Dimension: 1/2 inch plus or minus 1/4 inch.

H. Location of Reglets: 1/4 inch from true position.

3.05 FIELD QUALITY CONTROL

A. Perform water absorption test in accordance with PCI MNL-117.

3.06 CLEANING

A. Clean units according to manufacturer's written instructions.
   1. Remove dirt, stains, and residue.
   2. Protect adjacent materials during cleaning.

3.07 PROTECTION

A. Protect installed units from damage.

END OF SECTION 03 4900

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SECTION 04 0101
REPAIR AND CLEANING OF EXISTING MASONRY

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Applicable provisions of Bidding Requirements, Contract Requirements in Division 0 and all applicable Division 01 sections.

B. Work of this section shall be governed by the Contract Documents. Provide materials, labor, equipment, and services necessary to furnish, deliver, and install all work of this section as shown on the drawings, as specified herein, and/or as required by job conditions.

1.02 SUMMARY

A. Section Includes:
   1. Cleaning, repointing and repair of existing masonry.
      a. Stain and dirt removal by chemicals from historic surfaces including limestone, unpolished granite, terra cotta, concrete and brick. Mock-ups will determine the most appropriate method.
      b. Visual Requirements to maintain aesthetic or historic qualities of Project by protecting Work designated to remain.
      c. Including paint removal on exterior brick, granite and limestone masonry as indicated on drawings.
      d. Cleaning, repointing and repair of exterior limestone masonry, granite and other stone masonry including Terra Cotta, as indicated on the Drawings.
      e. Cleaning, repointing and repair of the exterior brick masonry walls and other stone, as indicated on the Drawings.
      f. Terra Cotta repair, restoration and skyward waterpoofing for top of cornice as indicated on drawings.
      g. Replacement of Terra Cotta, stone masonry and brick units as indicated on drawings.
      h. Repointing for mortar joints in brick, Terra Cotta and stone masonry as indicated on drawings..
      i. Water cleaning of existing interior and exterior masonry surfaces as indicated on drawings.

B. Related Sections:
   1. Section 040511 Mortar and Masonry Grout - for items not defined in this section.
   2. Section 042000 Unit Masonry - for items not defined in this section.
   3. Section 079200 Joints Sealants - for items not defined in this section.
   4. Section 099000 Paints and Coatings - for items not defined in this section.

C. Scope of Cleaning Work: The scope of cleaning work of this Section shall include, but is not limited to, the following items:
   1. General cleaning for 100 percent cleaning of existing interior masonry and concrete floor as indciated on drawings.
   2. Paint removal as generally indicated on drawings with an allowance for 5% more than drawings show.
   3. Patching of masonry walls wherever small holes are encountered and as result of cleaning.

4. Cleaning of exterior limestone masonry walls, as designated on the Drawings, using the “water-misting” method.
5. Cleaning of the exterior brick masonry walls, as designated on the Drawings, using a restoration cleaner.
6. Cleaning of efflorescence on the exterior brick masonry walls, as designated on the Drawings, using a restoration cleaner.
7. Cleaning of exterior limestone masonry walls, as designated on the Drawings, using a low pressure water wash.
8. Cleaning of selected areas of limestone as designated on the Drawings, using a restoration cleaner or poultice.
9. Cleaning of the granite building base as designated on the Drawings, using a restoration cleaner.
10. Cleaning of adhesive residue from the granite building base as designated on the Drawings, using a restoration cleaner.
11. Cleaning of ferrous stains on the granite, limestone, terra cotta and brick as designated on the Drawings, using a restoration cleaner.
12. Cleaning of copper stained masonry at selected locations as designated on the Drawings, using a restoration poultice.
13. Terra Cotta Cleaning and select repairs as indicated on drawings.

D. Scope of Removal includes removing the following from existing masonry as indicated on drawings:
1. Dirt and soil.
2. Tar, asphalt, and bitumens.
3. Paint and coatings.
4. Graffiti and graffiti resistant coatings.
5. Rust and metallic stains.
6. Efflorescence and lime.
7. Carbon encrustation and soot.
8. Body oils, finger prints, hand prints, foot prints.
9. All other non-masonry substances, stains, and contamination.

E. Scope of masonry joint repointing and sealant replacement as follows:
1. Replacement of Terra Cotta, stone masonry and brick units as indicated on drawings.
2. Repointing for mortar joints in brick, Terra Cotta and stone masonry.
3. Repointing as scoped on drawings; the following is applicable if less than 100% repointing is required.
    a. Repointing required for the worse existing mortar joints for amount indicated on drawing and provide an additional allowance of repointing equal to 10% of all brick to remain.
4. Repair of damaged masonry for amount indicated on drawings and provide an additional allowance of repair of damaged masonry of 30 SF at 10 separate locations.

F. Scope of masonry repair as follows:
1. 100% re-pointing of granite, terra cotta, and limestone joints, as designated on the Drawings.
2. 100% re-pointing of brick joints, as designated on the Drawings.
3. Repairing vertical cracks in brick by sawcutting and sealing vertical control joints as designated on the Drawings.
4. Repairing cracks in masonry with cementitious injection grout as designated on the Drawings.
5. Shoring and repointing at special conditions as designated on the Drawings.
6. Exposing, cleaning, and painting of embedded steel, and replacement of masonry as designated on the Drawings.

7. Dutchman repairs to granite spalls as designated on the Drawings.
8. Mortar patching and pinning at masonry spalls as designated on the Drawings.
9. Replacement of damaged brick as designated on the Drawings.
10. Patching of masonry at removal of abandoned metal elements as designated on the Drawings.
11. Patching, pinning, and re-tooling of sugared limestone as designated on the Drawings.
12. Routing and sealing of spalled cold joint at concrete as designated on the Drawings.
13. Removal and resetting of selected granite step as designated on the Drawings.
14. Rubbing and tooling of delaminated and scaled granite as designated on the Drawings.

G. Additional Repointing Requirements
1. Comply with ASTM E 2260, Standard Guide for Repointing. (Tuckpointing) Historic Masonry.
2. Comply with the following for brick repointing:
a. https://masonryadvisorycouncil.org/wp-content/uploads/2019/05/Repointing-Masonry
b. https://www.gobrick.com/docs/default-source/read-research-documents/brick-briefs/repointing-brick-masonry

1.03 REFERENCE STANDARDS

A. Masonry Restoration shall conform to the Guidelines of the Secretary of the Interior for Historic Preservation. Techniques employed for masonry cleaning, pointing, and repair shall be as outlined in “Preservation Brief No, 1” (November 2000) as published by the National Park Service.

B. ACI 530.1/ASCE 6/TMS 602 – Specification for Masonry Structures; American Concrete Institute International; 2008. Contractor shall maintain at least one copy of ACI / ASCE 530.1-88 on site.

C. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures 2016.

1.04 SUBMITTALS:

A. Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit manufacturer’s specifications and installation instructions for products used including finishing materials and methods.

C. Submit manufacturer’s technical data sheet for product indicated including recommendations for their application and use.

D. Submit a work plan describing capture, storage, and disposal as required and/or governed by any and all local, state, and/or federal laws, codes, and regulations.

E. Samples: Provide sample installation of product. Locations per architect’s directions.

F. Product Data: Manufacturer’s data including instructions, recommendations, and restrictions.

G. Shop Drawings: Indicate setting details of stone. Detail shoring.

H. Product Data: Provide data on each type of product indicated.

I. Pre-Submittal Conference: Conduct coordination conference with attendance by representatives of Suppliers and Contractors to review proper methods and the procedures for cleaning masonry. No cleaning work shall begin until the Pre-Submittal Conference takes place.

J. Sequence of Operations: The Contractor shall submit his proposed schedule and sequence of cleaning operations for review by the Professional and the Using Agent prior to beginning work. No cleaning work shall begin until the sequence of operations is approved.

K. Product literature: The Contractor shall submit manufacturer's product literature for all cleaning products. Product literature shall include specification data, instructions for use and Material Safety Data Sheets.

1.05 SUBMITTALS FOR MASONRY REPAIR

A. Product Data: The Contractor shall submit product literature for all manufactured mortar and stone patching materials. Literature shall indicate compliance with the referenced material standards and these specifications shall include, where applicable, manufacturer's instructions for application and use. Include test data substantiating that products comply with requirements.

B. Qualification Data: For sub-contractor firms to demonstrate their capabilities and experience. Include list of completed projects with project names and addresses, names and addresses of architect's and owner's and other information specified.

C. Description of Methods of Protection: Prior to commencement of cleaning operations, the Contractor shall submit to the Professional in writing a description of methods of protection of the public and of components of the building which are not to be cleaned. Contractor is required to mask windows from water or material infiltration during cleaning and clean-up any water or material which might enter the building. Contractor is required to protect any plaques or signs attached to the building with 2 layers of plastic for the duration of the masonry cleaning and restoration. Contractor is required to protect all light fixtures. Contractor is required to protect all equipment, louvers, etc. during the cleaning process. The method for securing the plastic shall be reviewed with the Professional before installation. Any tape residue that is left on the building or on a sign /plaque after the plastic has been removed shall also be cleaned/removed by the contractor with a method reviewed and approved by the Professional before proceeding with the work.

D. Samples for verification:
   1. Each type of masonry unit to be used for replacing existing units. Include sets of samples as necessary to show the full range of shape, color, and texture to be expected. For brick, provide a range of up to 4 colors for review.
   2. Each type, color and texture of pointing mortar in the form of sample mortar strips, 6 inches (150 mm) long by ¼ inch (6mm) wide, set in aluminum or plastic channels. Include with each sample a list of ingredients with proportions of each. Identify sources, both supplier and quarry, of each type of sand and brand names of cementitious materials and pigments if any. Have each set contain a close color range of at least three samples of different mixes of colored sands and cements that produce a mortar that matches the cleaned stone when cured and dry.
      a. Limestone pointing mortar materials
      b. Granite base pointing materials
      c. Granite steps pointing materials
      d. Brick pointing materials
   3. Patching Compound: Submit sets of patching compound Samples in the form of plugs (patches in drilled holes) in sample units of stone representative of the range of stone colors on the building. Have each set contain a close color range of at least three samples of different mixes of patching compound that matches the variations in existing

stone when cured and dry.
   a. Limestone patching mortar materials
   b. Brick patching mortar materials
4. Each type of adhesive.
5. Accessories: Each type of anchor, accessory, and miscellaneous support.
6. Limestone Dutchman materials.
7. Granite Dutchman materials.

1.06 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week prior to commencing of each major part of the work of this section.
   1. Require attendance of parties directly affecting work of this section.
   2. Major part of the work of this section: Cleaning
      a. Cleaning
      b. Masonry repair and select replacement
      c. Repointing

B. Review conditions of installation, installation procedures, and coordination with related work.

C. Review methods and procedures related to stone restoration and cleaning including, but not limited to, the following:
   1. Construction Schedule: Verify availability of materials, Restoration Specialist's personnel, equipment, and facilities needed to make progress and avoid delays.
   2. Materials, material application, sequencing, tolerances, and required clearances.

1.07 QUALITY ASSURANCE - IN PLACE SAMPLES:

A. Comply with Section 014516.13 Contractor's Quality Control.

1.08 QUALITY CONTROL

A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.

B. Restorer: Company specializing in masonry restoration with minimum three years of documented experience.

C. The Contractor performing the work of this Section shall have a minimum of five years' experience in the cleaning of masonry materials similar to those required for this project and shall have successfully completed at least three projects of similar scope and size within the previous two years.

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

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

F. Consolidant Manufacturer Qualifications: A firm regularly engaged in producing stone consolidants that have been used for similar applications with successful results, and with

factory-trained representatives who are available for consultation and Project-site inspection and assistance at no additional cost.

G. Source Limitations: Obtain each type of material for stone repair (stone, cement, sand, etc.) from one source with resources to provide materials of consistent quality in appearance and physical properties.

H. Retain first subparagraph below if high-lime-content mortar is used.

I. Retain first paragraph below to control overall appearance from a distance.

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

1.09 QUALITY ASSURANCE - TEST PROCEDURES:

A. Testing: Before production cleaning, test cleaners, cleaner concentrations, and cleaning techniques on small test samples at inconspicuous locations pre-approved by Owner and Architect.
   1. Before production cleaning: test cleaners, cleaner concentrations, and cleaning techniques on small test samples at inconspicuous locations pre-approved by Owner and Architect.
      a. Repeat testing until successful cleaning is achieved, as judged by the Owner and Architect.
   2. Before production patching: test patching materials on small test samples at inconspicuous locations pre-approved by owner and Architect.
      a. Repeat testing until successful repair patch is achieved, as judged by the Owner and Architect.
      b. Test patch to include painted surface, applied to match surrounding color and sheen.

B. Written Records: Provide detailed written records for each cleaning test, each cleaning condition, each substrate, and each contamination type.
   1. Record cleaner used, cleaner concentration, cleaning techniques, cleaner dwell time on surface, tools used, water temperature, water pressure, water volume, and other relevant information.
   2. Record patching material used, including paint color and sheen, and other relevant information.
   3. Use the Written Record to reproduce successful cleaning.

C. Observation: Perform Quality Assurance Testing under direct observation of the Owner and Architect.

1.10 MOCK-UP

A. Restore and repoint an existing masonry wall area sized 8 feet long by 6 feet high; include in mock-up area instances of mortar, accessories, wall openings, and flashings.

B. Clean a 10 ft by 10 ft panel of wall to determine extent of cleaning.

C. Locate where directed.

D. Mock-up may remain as part of the Work.

1.11 TEST PANELS

A. The Contractor, at locations designated by the Professional, shall prepare the following test panels for each of the cleaning methods specified for approval prior to commencing cleaning operations.
   1. Water Misting – 10 feet by 10 feet panel of limestone wall panel.
   2. Low Pressure Washing – 10 feet by 10 feet panel of limestone wall panel.
   3. Chemical Cleaning (Brick) – 10 feet by 10 feet panel of brick wall panel.
   4. Execution of this test panel shall determine the required dwell time for the remainder of this type of cleaning.
   5. Chemical Cleaning (Limestone) – 4’-0” x 4’-0” section
   6. Chemical Cleaning (Granite) – 4’-0” x 4’-0” section
   7. Rust Removal/Cleaning – 4’-0” x 4’-0” section

1.12 DELIVERY, STORAGE, HANDLING:

A. Comply with Division 1 General Requirements and manufacturer's instructions and recommendations.

B. Deliver cleaning chemicals to the site in the manufacturer’s original containers with brand name and product identification information readily visible. Handle, store and protect all materials in such a manner as to prevent contamination and spillage thereof.

C. Deliver masonry neatly stacked and tied on pallets. Store clear of ground with adequate waterproof covering.

D. Store blast medium materials in manufacturer's packaging.

1.13 SITE/PROJECT CONDITIONS

A. Cold and Hot Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

B. Do not blast clean or use process creating dust, dirt, when wind is over 10 mph.

C. Weather Limitations: Proceed with the work only when existing and forecasted weather conditions permit masonry repair and masonry cleaning work to be performed according to manufacturer’s written instructions and specified requirements except where the requirements of this section are more restrictive.

D. The work of this Section shall be executed only when the air and surface temperatures are greater than 50 degrees F and rising or less than 90 degrees F and falling or within the ranges directed by the cleaning product manufacturer, where applicable. Minimum temperature for masonry cleaning shall be expected to remain above 50 degrees F for at least 2 hours after completion of the washing. In no case shall masonry cleaning be performed when freezing weather is expected within the 24 hours after completion.

E. Comply with the requirements of all relevant Federal, State, and City Legislation related to the transportation, handling, use, and disposal of all cleaning materials as required by the authorities having jurisdiction.

F. Contractor shall be responsible for controlling water flow from the cleaning and misting operations at the sidewalk level at all areas where there is public access. Daily cleanup of cleaning media and/or chemicals at building entrances and on portions of the sidewalk and

surrounding areas shall be provided.

G. The Contractor is responsible for protecting existing adjacent materials during the execution of the work. Provide all necessary protection and work procedures to avoid damage to existing material assemblies not a part of the work of this Section. At a minimum, the Contractor shall:
   1. The Contractor shall be responsible for the removal of effluent from cleaning operations, waste materials, packaging and other debris associated with the work of this Section in a manner conforming with federal, state and local environmental regulations.
   2. Protect passing pedestrians and vehicles from overspray and wind drift during cleaning operations. Erect barricades and install yellow caution tape and signage as required to restrict access to work area.
   3. Protect all metal, glass and painted surfaces adjacent to areas to receive chemical cleaning or water repellant using plastic, plywood, sealants or other materials as required to prevent penetration of cleaning chemicals. The Contractor shall be responsible for surface etching and other damage caused to adjacent materials.
   4. Protect the bottom course of limestone cladding during the cleaning of the granite base. The Contractor shall be responsible for rectifying any staining of bleaching of the limestone due to over splash from the granite cleaning chemicals.
   5. Protect the adjacent limestone cladding during the cleaning of the brick cleaning. The Contractor shall be responsible for rectifying any staining or bleaching of the limestone due to over splash from the brick cleaning chemicals.

H. The Contractor shall repair all damage to adjacent materials caused by the execution of the Work of this section at no expense to the Department. Damaged materials shall be repaired or replaced by mechanics experienced in the respective type of work, to the satisfaction of the Professional and Department.

I. Prevent grout or mortar used in repointing and repair work from staining face of surrounding masonry and other surfaces. Remove immediately grout and mortar in contact with exposed masonry and other surfaces. Protect sills, ledges and projections from mortar droppings.

1.14 COORDINATION

A. Coordinate stone restoration and cleaning with public circulation patterns at Project Site. Some work is near public circulation patterns. Public circulation patterns cannot be closed off entirely, and in places can only be temporarily redirected around small areas of work. Plan and execute the Work accordingly.

1.15 SEQUENCING AND SCHEDULING

A.

B. Perform stone repair work in the following sequence:
   1. Remove plant growth.
   2. Inspect for open mortar joints and repair before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
   3. Remove paint and clean rust stains.
   4. Clean stone surfaces. Direct run-off away from building surface.
   5. Retain first subparagraph below if water repellents are part of Project.
   6. Repair stonework, including replacing existing stone with new stone material (Dutchman).
   7. Install composite patch material at areas indicated on the documents.
   8. Rake out mortar from joints to be repointed.
   9. Point mortar and sealant joints.
   10. After repairs and repointing have been completed and cured, perform a final cleaning to remove residues from this work.

11. Coordinate the work of this section so repair work proceeds in a normal sequence and work does not interfere with work of other trades.

C. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in stone to comply with "Stone Patching" Article. Patch holes in mortar joints to comply with "Repointing Stonework" Article.

PART 2 - PRODUCTS

2.01 MASONRY MATERIALS

A. Granite stone: Provide natural building stone of variety, color, texture, grain, veining, finish, size, and shape to match existing stone and with physical properties
1. For existing stone that exhibits a range of colors, texture, grain, veining, finishes, sizes, or shapes, provide stone that proportionally matches that range rather than stone that matches an individual color, texture, grain, veining, finish, size, or shape within that range. Stone is to be standard grade free of cracks, seams, or starts which may impair integrity, appearance, or function and complying with the following ASTM performance standards:
2. Density – 160 pounds per cubic foot, minimum
3. Compressive Strength – 19,000 psi, minimum

B. Limestone: Indiana (oolitic) limestone complying with the requirements of ASTM C568, Category II (medium density). Obtain limestone consistent with the color and texture range of the existing material. Stones shall be sound and free from cracks, chips, and other defects which may affect strength or appearance.

C. Retain subparagraph below only if original quarry is known to have stone that meets appearance and other requirements. Often, original quarries cannot match historic stonework due to natural variations in the geologic deposit. See discussion in the Evaluations in Division 4 Section "Masonry Restoration and Cleaning."

D. Retain first two paragraphs below for stone having bedding planes, usually sedimentary stone such as limestone and sandstone. Retain option in second paragraph if there are arches. Revise second paragraph if bedding planes are used ornamentally or with fleuri cut.

E. Quarrying New Stone: Have quarry clearly label the direction of bedding planes when rough stone is quarried, to facilitate cutting stones so that natural bedding planes will be as required in "Cutting New Stone" Paragraph.

F. Cutting New Stone: Regardless of how existing stone was cut and set, cut each new stone so that, when it is set in final position, natural bedding planes are essentially horizontal.

G. Brick: Face brick shall be type FBS, Grade SW, in conformance with ASTM C216. New facing brick shall match existing brick in size, color, range, and texture of existing bricks.

2.02 MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type I, non-staining and without air entrapment. Gray and white Portland cement may be combined where required for color matching of exposed mortar.
1. Provide cement containing not more than 0.60 percent total alkali when tested according to ASTM C 114.

B. Hydrated Lime: ASTM C 207, Type S.

C. Mortar Sand: ASTM C 144 unless otherwise indicated.

1. Color: Provide natural sand of color necessary to produce required mortar color.
2. Retain first subparagraph below if required.
3. For pointing mortar, provide sand with rounded edges.
4. Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary to achieve suitable match.
5. Sand shall be free of silt, loam, soluble salts and organic matter. Sand shall be cleaned (properly washed) to not cause staining or streaking on the building face.

D. Mortar Pigments: Natural and synthetic iron oxides, compounded for mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortars. Mortar pigments, if required to match the existing mortar, shall be a standard product manufactured by Solomon Grind-Chem Service, Riverton Lime Co., Medusa, or other approved manufacturer.

E. Water: Potable, free from injurious amounts of oil, soluble salts, alkali, acids, organic impurities and other deleterious materials.

F. Admixtures: do no use admixtures of any kind in mortar, unless otherwise indicated and with Professional's approval.

G. Aggregate for Mortar: ASTM C144 unless otherwise indicated.
1. Color Mortar Aggregate: natural or manufactured sand to produce mortar color indicated to match size, texture and gradation of existing mortar as closely as possible.

H. Mortar mixes:
1. Mortar mix proportions for repointing granite:
   a. 1 part by volume white Portland cement.
   b. 1 part by volume hydrated lime.
   c. 3 parts sand.
2. Mortar mix proportions for repointing limestone:
   a. 1 part by volume white Portland cement.
   b. 1 part by volume hydrated lime.
   c. 6 parts sand.
3. Mortar mix proportions for repointing brick:
   a. 1 part by volume white Portland cement.
   b. 1 part by volume hydrated lime.
   c. 6 parts sand.
4. Mortars for setting Dutchman:
   a. Thin-set applications (joints less than 3/8" thick): Pointing mortar specified above, add Laticrete 4237 in accordance with manufacturer's instructions.

2.03 CEMENTITIOUS PATCHING MATERIALS AND MIXES

A. Stone Patching Compound: Factory-mixed cementitious product that is custom manufactured for patching stone. Provide custom colored composite repair patching materials.
1. Products: Subject to compliance with requirements, provide one of the following or equal as approved by the Professional:
   a. Cathedral Stone Products, Inc.; Jahn Restoration Mortars.
   b. Conproco Corporation; Mimic and/or Matrix.
   c. Edison Coatings, Inc.; Custom System 45.
2. Use formulation that is vapor and water permeable (equal to or more than the stone), exhibits low shrinkage, frost and salt resistant, has lower modulus of elasticity than the stone units being repaired, and develops high bond strength to all types of stone.
3. Use formulation having working qualities and retardation control to permit forming and sculpturing where necessary.

4. Formulate patching compound in colors, textures, and grain to match stone being patched. Provide five custom colors to enable matching each piece and type of stone.
5. Follow manufacturer recommended mixing ratios.

B. Cementitious Crack Filler: An ultrafine super plasticized grout that can be injected into cracks, is suitable for application to wet or dry cracks, exhibits low shrinkage, and develops high bond strength to all types of stone.
1. Products: Subject to compliance with requirements, provide the following or equal as approved by the Professional:
a. Cathedral Stone Products, Inc.; Jahn Injection Grout.
b. Conproco Corporation; Terra Cotta Finish.
c. Edison Coatings, Inc.; Pump-X 53-Series.

C. Stone-to-Stone Adhesive: Epoxy-resin stone adhesive with a 15-to 45-minute cure at 70 deg F or 1-part cementitious stone adhesive, recommended by adhesive manufacturer for type of stone repair indicated, and matching stone color.
1. Products: Subject to compliance with requirements, provide the following or equal as approved by the Professional:
a. Two-Part Polyester or Epoxy-Resin Stone Adhesive:
1) Akemi North America; Akepox
2) Bonstone Materials Corporation; Fast Set 41
3) Edison Coatings, Inc.; Flexi-Weld 520T
b. One-Part Cementitious Stone Adhesive:
1) Cathedral Stone Products, Inc.; Jahn Restoration Adhesive.

D. Stone Consolidation Treatment: Ready-to-use product designed for consolidation of stone that has deteriorated due to weathering and exposure to pollutants. Treatment shall be composed of silicic-ethyl esters, a neutral catalyst, and solvents.
1. Products: Subject to compliance with requirements, provide the following or equal as approved by the Professional:
a. Akemi North America; Stone Strengthener K.
b. Cohalan Company, Inc.; Keim Silex OH.
c. Diedrich Technologies Inc.; D50C.
d. HCT pretreatment in first subparagraph below is recommended by manufacturer for extremely deteriorated carbonate stones (marble and limestone). It forms a conversion layer, not film, on carbonate mineral grains, thereby increasing resistance to acid attack.
e. PROSOCO; Conservare OH100 Stone Strengthener with HCT pretreatment.

2.04 PAINT REMOVERS

A. Alkaline Paste Paint Remover: Manufacturer's standard alkaline paste formulation for removing paint coatings from masonry.
1. Products: Subject to compliance with requirements, provide one of the following or equal as approved by the Professional:
a. ABR Products, Inc.; 800 Brush Grade.
b. Diedrich Technologies Inc.; 606 Multi-Layer Paint Remover or 606X Extra Thick Multi-Layer Paint Remover.
c. Hydroclean, Hydrochemical Techniques, Inc.; Hydroclean HT-716 Heavy Duty Paint Remover.
d. PROSOCO; Sure Klean Heavy-Duty Paint Stripper.

B. Solvent-Type Paint Remover: Manufacturer's standard water-rinsable, solvent-type gel formulation for removing paint coatings from masonry.

1. Products: Subject to compliance with requirements, provide one of the following or equal as approved by the Professional:
    a. ABR Products, Inc.; Super Bio Strip Gel.
    b. Diedrich Technologies Inc.; 505 Special Coatings Stripper.
    c. Dumond Chemicals, Inc.; Peel Away 2.
    d. Hydroclean, Hydrochemical Techniques, Inc.; Hydroclean HT-300 Solvent Paint Remover.
    e. Price Research, Ltd.; Price Strip-All.
    f. PROSOCO; Sure Klean Fast Acting Stripper.

2.05 MIXING PROCEDURES

A. Pointing Mortar:
1. Mix mortar in accordance with ASTM C-270
2. Measure materials by volume or equivalent weight as indicated. Do not measure by shovel.
3. Mix ingredients in a clean mechanical batch mixer for 3 to 5 minutes.
4. Mortar shall stand for 20 minutes prior to use to allow for initial shrinkage. Place mortar in final position within two (2) hours of mixing. Do not retemper or use partially hardened mortar.

B. Patching Mortar
1. Mix patching mortar in accordance with the manufacturer's instructions. Add liquid to mortar material in a clean bucket and mix with trowel until all the dry material has been moistened. Do not mix more mortar than can be used in a 30 minute period.
2. Mortar is to be mixed to the proper consistency when a handful of material squeezed into a ball leaves little or no mortar residue on the hand.
3. All personnel to be involved in limestone patching work must complete certification coursework as required by the manufacturer.

2.06 ACCESSORY MATERIALS

A. Sealant Materials:
1. Provide manufacturer's standard chemically curing, elastomeric sealant(s) of base polymer and characteristics indicated below that comply with applicable requirements in Division 7 Section "Joint Sealants."
2. Colors: Provide colors of exposed sealants to match colors of stonework adjoining installed sealant unless otherwise indicated.

B. Joint-Sealant Backing:
1. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
2. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

C. Setting Buttons: Resilient plastic buttons, nonstaining to stone, sized to suit joint thicknesses and bed depths of stone units without intruding into required depths of pointing materials.

D. Masking Tape: Nonstaining, nonabsorbent material, compatible with pointing mortar, joint primers, sealants, and surfaces adjacent to joints; that will easily come off entirely, including adhesive.

E. Retain first paragraph below if retaining requirement in Part 3 for coating existing anchors within wall.

F. Antirust Coating: Fast-curing, lead- and chromate-free, self-curing, universal modified-alkyd primer complying with SSPC-Paint 20 or SSPC-Paint 29 zinc-rich coating.
   1. Use coating requiring no better than SSPC-SP 3, "Power Tool Cleaning" surface preparation according to manufacturer's literature or certified statement.
   2. Use coating with a VOC content of 420 g/L (3.5 lb/gal) or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

G. Miscellaneous Products: Select materials and methods of use based on the following, subject to approval of a mockup:
   1. Previous effectiveness in performing the work involved.
   2. Little possibility of damaging exposed surfaces.
   3. Consistency of each application.
   4. Uniformity of the resulting overall appearance.
   5. Do not use products or tools that could do the following:
      a. Remove, alter, or in any way harm the present condition or future preservation of existing surfaces, including surrounding surfaces not in contract.
      b. Leave a residue on surfaces

2.07 MANUFACTURERS:

A. Restoration and Cleaning Chemicals:
   1. Prosoco, Inc. www.prosoco.com/#sle.
   2. Aqua Mix
   3. Chemique, Inc.
   4. Diedrich Technologies, Inc: www.diedrichtechnologies.com/#sle.
   5. HMK Stone Care System: www.hmkstonecare.com/#sle.
   6. Paint removal basis of design:
      a. Prosoco, Inc. product Sure Klean Heavy Duty Paint Stripper Paint, Coating & Graffiti Removers

B. Patching:
   1. Basis of Design: 3M BONDO All Purpose Putty 3M Bondo
   2. Evercoat Polyester Glazing Putty, a division of Illinois Tool Works, Inc., Evercoat.
   3. Isopon Body Filler, manufactured by U-POL Ltd. U-POL

2.08 MASONRY CLEANING AND PATCHING MATERIALS GENERAL:

A. Cleaners: Provide cleaners specifically manufactured for each substrate and soiling condition.
   1. Cleaning basis of design for quarry tile: "Aqua Mix 1 & 2 Deep Clean", Aqua Mix
   2. General cleaning basis of design for glazed block: "Sure Klean Vana Trol" by Prosoco.
   3. Rust Remover Basis of Design: Prosoco “Sure Klean Ferrous Stain Remover”.

B. Water: Clean, drinkable, and free of deleterious materials.
   1. 180 Degrees F Hot Water: Required for removal of paint, tar, and asphalt.

C. Brushes: Soft bristle with fiber type recommended by cleaner manufacturer for each cleaner used.

D. Pressure Cleaning Equipment:
   1. Pressure: 1,000 psi.
   2. Spray Tip: 15 degree spread.

3. Water Flow Rate: 4 gallons per minute. https://www.3m.com/3M/en_US/bondo-us/

2.09 CLEANING MATERIALS

A. CSP Cleaners
1. CSP Bio-Cleaner should be used in their undiluted form. No acids, bases, caustics, solvents or other agents should be added. Products should be applied to limestone, sandstone, unpolished granite, terra cotta, concrete, brownstone, brick and other masonry surfaces. Acceptable products are available through Cathedral Stone Products. Tel: 410-782-9150; fax: 410-782-9155.
2. Miscellaneous Equipment
   a. Natural bristle brush
   b. Paint roller
   c. Airless sprayer
   d. Clean rags
   e. Latex gloves
   f. Eye and skin protection
   g. Garden hose with running water supply
   h. Pressure washer using 600 to 1200 psi
   i. Soft bristle scrub brush

B. Limestone – Water Cleaning: Water shall be potable, non-staining and free of soluble salts, oils, organic matter and other substances deleterious to the surfaces to be cleaned. No detergents or other agents shall be added to cleaning water unless specifically directed by the Professional.

C. Brick Cleaning – Light Duty Restoration Cleaner:
1. ProSoCo, Inc.: EnviroKlean Saf Restorer
2. Chemique: Artisan – No Pane Restoration Cleaner
3. Cathedral Stone: masonRE G
4. The product shall be used as packaged. Do not dilute or mix with other products.

D. Cleaning of Efflorescence from Brick – Light Duty Restoration Cleaner:
1. ProSoCo, Inc.: Sure Klean Hard Water Desposit Remover
2. Chemique: Artisan – Efflorescence Remover
3. Other Approved Equal
4. The product shall be used as packaged. Do not dilute or mix with other products.

E. Limestone, Granite and Concrete Cleaning – Light Duty Restoration Cleaner:
1. ProSoCo, Inc.: EnviroKlean Saf Restorer
2. Chemique: Artisan – Safer L/S Cleaner
3. Cathedral Stone: masonRE B
4. The product shall be used as packaged. Do not dilute or mix with other products.

F. Iron Stains on Limestone – Ferrous Stain Remover
1. ProSoCo, Inc.: SureKlean Ferrous Stain Remover
2. Chemique: Artisan – Heavy Duty Rust Remover
3. Cathedral Stone: masonRE Rust Remover
4. The product shall be used as packaged, do not mix with other products. Dilute based on manufacturers requirements listed on product data sheet.

G. Iron Stains on Granite – Ferrous Stain Remover: Cleaner as manufactured by:
1. ProSoCo, Inc.
2. Chemique: Artisan

3. Cathedral Stone: masonRE
4. The product shall be used as packaged, do not mix with other products. Dilute based on manufacturers requirements listed on product data sheet.

H. Copper Stain Cleaning:
1. ProSoCo, Inc.: T515 Copper Stain Remover
2. Other Approved Equal
3. The product shall be used as packaged, do not mix with other products. Dilute based on manufacturers requirements listed on product data sheet.

2.10 TERRA COTTA RESTORATION AND SKYWARD COATING

A. Terra Cotta restoration of terra cotta cornice and other masonry terra cotta

B. Basis of design products for Terra Cotta restoration Manufacturer
1. CONPROCO 17 Production Drive, Dover, NH 03820
2. 800.258.3500 FAX 603.743.5744 www.conproco.com
3. https://conproco.com/product-category/masonry-repair-restoration/terracotta/

C. Provide waterproof and breathable coating for 100% of skyward side of terracotta cornice using Elastideck by Conproco or equal approved products by Jahn or Cathedral Stone.

D. Conproco Products for the following Terra Cotta Repairs and Restoration:

E. Decorative protective coating for Parapet and as otherwise indicated on drawings:
1. ELASTIDECK

F. Repair and reconstruct natural and cast stone, terracotta and brick:
1. MATRIX

G. Repair and reconstruct natural and cast stone, terracotta and brick with smooth finish to match:
1. MATRIX Superfine

H. Thin, protective repairs to terracotta, limestone and other soft stones and concrete
1. MATRIX TR

I. Repair for Colored Glaze finishes for Terra Cotta and other glazed finishes
1. Terra-Color

J. Apply over Terra-Color to match surrounding undamaged terracotta
1. TERRACOTTA Finish

PART 3 - EXECUTION

3.01 GENERAL

A. EXAMINATION and PREPARATION
1. Verify that surfaces to be cleaned are ready for work of this section.
2. Protect surrounding elements from damage due to restoration procedures.
3. Carefully remove and store removable items located in areas to be restored, including fixtures, fittings, finish hardware, and accessories; reinstall upon completion.
4. Separate areas to be protected from restoration areas using means adequate to prevent damage.
5. Mask immediately adjacent surfaces with material that will withstand cleaning and restoration procedures.

B. The Contractor shall inspect the areas to be cleaned prior to commencing operations. All open joint, anchor penetrations and other openings shall be temporarily sealed using removable caulk to prevent penetration of water behind the stone cladding.

C. Based on testing, cleaning is to be done in the following order:
   1. Water-Misting Cleaning
   2. Low Pressure Washing
   3. Light Duty Chemical Cleaning as Documented, up to three (3) applications as required, with cold water, low-pressure rinse after each application
   4. Application of Ferrous Stain Removal as Documented

3.02 REPOINT EXISTING MASONRY

A. General: Repoint joints in granite, limestone, and brick as shown on the Drawings.
   1. Perform repointing prior to cleaning masonry surfaces.
   2. Cut out loose or disintegrated mortar in joints to minimum 1/2 inch depth or until sound mortar is reached.
   3. Use power tools only after test cuts determine no damage to masonry units will result.
   4. Do not damage masonry units.
   5. When cutting is complete, remove dust and loose material by brushing.
   6. Premoisten joint and apply mortar. Pack tightly in maximum 1/4 inch layers. Form a smooth, compact concave joint to match existing.
   7. Moist cure for 72 hours.
   8. Immediately remove stains, efflorescence, or other excess resulting from the work of this section.
   9. Remove excess mortar, smears, and droppings as work proceeds and upon completion.
   10. Clean surrounding surfaces.

B. Mortar: Mixing and Installation Procedures:
   1. In cold weather for exterior masonry, maintain the temperature of the mortar at time of use to above 50° F, but less than 85° F. Do not heat water.
   2. Measure cementitious and aggregate material in a dry condition by volume or equivalent weight. Do not measure by shovel, use known measure.
   3. Mix ingredients in clean mechanical batch mixer 3 to 5 minutes.
   4. Let setting mortar sit 20 minutes prior to use to allow for initial shrinkage.
   5. Repointing mortar shall be pre-hydrated to reduce shrinkage. Lime and sand shall be mixed with only enough water to produce an unworkable mix that will retain its shape.

3.03 MORTAR PATCHING – LIMESTONE CRACKS

A. All cracks must be filled as noted on the Drawings. Cracks with existing patches which show visible signs of failure shall be removed and replaced. Prepare crack by removing all previous patching material or foreign debris. If crack is less than 1/8 inch wide, open up crack with a dremel tool with rotar top to a minimum width of 1/8 inch wide.

B. Remove deteriorated material and remove adjacent material that has begun to deteriorate. Carefully remove additional material so patch will not have feathered edges but will have square or slightly undercut edges on areas to be patched and will be at least ¼ inch thick, but not less than recommended by patching compound manufacturer.

C. Thoroughly wet area to be patched to prevent suction of moisture from the patching material. Apply a slurry coat of mortar to the substrate.

D. Install injection mortar material in layers to fill the required depth of crack in accordance with the manufacturer's published instructions. Roughen surface of each layer to provide a key for next layer.
   1. Trowel, scrape, or carve surface of patch to match texture and surrounding surface plane or contour of the stone. Shape and finish surface before or after curing, as determined by testing, to best match existing stone.
   2. Build up ¼ inch above surrounding stone and carve surface to match adjoining stone after patching compound has hardened.

E. Keep the mortar patches damp for 72 hours using damp burlap, plastic sheeting, or other membrane as required.

F. Remove and replace patches with hairline cracks or that show separation from stone at edges, and those that do not match adjoining stone in color or texture.

3.04 DUTCHMAN PATCHING – LIMESTONE AND GRANITE

A. Remove damaged stone down to sound material and square up the edges of the area to be patched to form a neat rectangular opening. When patching granite, a core drill may be used to remove damaged material where the spalled area is small.

B. Where there is an existing corroded anchor, wire brush or otherwise remove corrosion down to sound metal. Coat anchors with zinc based primer and allow to cure prior to installing Dutchman patch.

C. Cut a piece of stone of a color and texture matching the original surface to fit the dimensions of the prepared area. A stone plug may be used for small granite patches only in lieu of a traditional Dutchman. Check the fit of the Dutchman prior to applying adhesive, making certain the contact surfaces of the repair stone fit tightly to minimize the appearance of the glue line. Where an entire stone is to be replaced, the Dutchman shall be sized to maintain the existing joint width and placement.

D. Where the required Dutchman exceeds 100 square inches in area, stainless steel anchor pins will be required. The Contractor shall consult the Professional regarding the number and placement of stainless steel anchors.

E. Apply adhesive carefully to the prepared opening, keeping adhesive away from exposed edges to minimize squeezing of the adhesive out of the joint and onto the stone surface. Insert the Dutchman into the prepared opening.

F. After adhesive has set, grind or sand any excess Dutchman material down to the level of the adjoining surface. Using a fine abrasive, complete the sanding until the Dutchman is flush with the surrounding stone.

G. Remove mortar from joints that abut area of stone removal to same depth as stone was removed. Remove loose mortar particles and other debris from surfaces to be bonded and surfaces of adjacent stone units that will receive mortar by cleaning with stiff-fiber brush.

H. Retain last option in first paragraph below for stone having bedding planes, usually sedimentary stone such as limestone and sandstone, unless this degree of control is considered unnecessary for dutchmen.

I. Cut and trim partial replacement to accurately fit area where material was removed from backing stone. Fabricate to size required to produce joints between partial replacement and backing stone of no more than 1/16 inch (1.6 mm) in width, and joints between partial replacement and other stones that match existing joints between stones.

J. Retain one of first two paragraphs below if large partial replacements that can accommodate pinning are required. Second paragraph might be required for noticeably patterned stones close to view, but is more difficult. Revise pin diameter, length, or spacing if required. Consider deleting third option in either paragraph and detailing pin layout on Drawings. If retaining either paragraph, verify that method is appropriate to type of stone used.

K. Pinning: Before applying adhesive, prepare for mechanical anchorage consisting of 1/4-inch- (6-mm-) diameter, threaded stainless-steel pins set into 1/4-inch- (6-mm-) diameter holes drilled at a 45-degree downward angle through face of partial replacement and into backing stone. Center and space pins between 3 and 5 inches (75 and 125 mm) apart and at least 2 inches (50 mm) from any edge. Insert pins at least 2 inches (50 mm) into backing stone and 2 inches (50 mm) into partial replacement with end countersunk at least 3/4 inch (19 mm) from exposed face of partial replacement.

L. Concealed Pinning: Before applying adhesive, prepare for concealed mechanical anchorage consisting of 1/4-inch- (6-mm-) diameter, threaded stainless-steel pins set into 1/4-inch- (6-mm-) diameter holes drilled into backing stone and into, but not through, the partial replacement. Center and space pins between 3 and 5 inches (75 and 125 mm) apart and at least 2 inches (50 mm) from any edge. Insert pins at least 2 inches (50 mm) into backing stone and 2 inches (50 mm) into partial replacement, but no closer than 3/4 inch (19 mm) from exposed face of partial replacement.

M. Apply stone-to-stone adhesive to comply with adhesive manufacturer's written instructions. Coat bonding surfaces of backing stone and partial replacement, completely filling all crevices and voids.

N. Apply partial replacement while adhesive is still tacky and hold securely in place until adhesive has cured. Use shims, clamps, wedges, or other devices as necessary to align face of partial replacement with face of backing stone.

O. Retain option in paragraph below if retaining "Pinning" Paragraph.

P. Clean adhesive residue from exposed surfaces and patch chipped areas and exposed drill holes.

3.05 GRANITE AND LIMESTONE REPOINTING

A. Areas of granite and limestone masonry to be pointed are designated M1on the Drawings. The extent of the work shall be reviewed with the Professional at the site before beginning operations.

B. Rake designated mortar material out of the joints:
   1. For limestone, use a chisel less than ¼ inch in width. Do not use power-operated grinders without the Professional’s written approval based upon approved quality-assurance program. Prying against the arrises of the building stones shall be avoided. Do not chip, spall, or cut into the edges of the stone with the chisel or the grinder. Clean all mortar from surfaces within the joint so that the new pointing bonds to the building stone rather than the old mortar.
   2. For granite, use a chisel less than ¼ inch in width or by mechanical grinding using a carborundum blade. For mechanical grinders, cut out center of mortar bed joints with carborundum blade and remove remaining mortar by hand with chisel and resilient mallet. Prying against the arrises of the building stones shall be avoided. Do not chip, spall, or cut into the edges of the stone with the chisel or the grinder. Clean all mortar from surfaces within the joint so that the new pointing bonds to the building stone rather than the old mortar.
   3. Do not spall edges or widen joints.

C. Notify the Professional of unforeseen detrimental conditions including voids in mortar joints, cracks, loose stone, rotted wood, rusted metal, and other deteriorated items.

D. If work is found to be unacceptable, all raking will cease without additional cost to the Department until deficiencies in tools, workmanship, or methodology have been corrected to the Professional's satisfaction.

E. Rake back a minimum of ½ inch to sound mortar. Brush, vacuum, or blow joints clean with compressed air to remove sediment and debris. Do not use water to remove sediment and debris from the mortar joint.

F. Apply new mortar in ¼ inch thick layers, allowing each layer to reach initial set/thumb-print hardness before applying succeeding layers. Work mortar into the full depth of the joint using a flexible tool.

G. When final layer of mortar is thumb-print hard, tool joint as required to match the existing profile. Avoid feather-edging of joints. Remove and dispose of excess mortar promptly before it can set or stain masonry.

H. Keep joints damp for 72 hours after repointing using damp burlap, plastic, or other waterproof membrane. Adjust curing methods to ensure that pointing mortar is damp throughout its depth without eroding surface mortar.

I. Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.

J. The Contractor shall leave the granite and limestone surface clean of mortar, grease, or other spots. Any compounds proposed for cleaning stains shall be approved by the Professional prior to use.

K. Pointing with Sealant – for use at the meeting of dissimilar materials and at wash joints:
   1. After raking out, keep joints dry and free of mortar and debris.
   2. Clean and prepare joint surfaces according to Division 7 Section "Joint Sealants." Prime joint surfaces unless sealant manufacturer recommends against priming. Do not allow primer to spill or migrate onto adjoining surfaces.
   3. Fill sealant joints with specified joint sealant according to Division 7 Section "Joint Sealants" and the following:
      a. Install cylindrical sealant backing beneath the sealant except where space is insufficient. There, install bond-breaker tape.
      b. Install sealant using only proven installation techniques that will ensure that sealant will be deposited in a uniform, continuous ribbon, without gaps or air pockets, and with complete wetting of the joint bond surfaces equally on both sides. Fill joint flush with surrounding stonework and matching the contour of adjoining mortar joints.
      c. Install sealant as recommended by sealant manufacturer but within the following general limitations, measured at the center (thin) section of the bead:
      d. Fill joints to a depth equal to joint width, but not more than 1/2 inch (13 mm) deep or less than 1/4 inch (6 mm) deep.
      e. Immediately after first tooling, apply ground-mortar aggregate to sealant, gently pushing aggregate into the surface of sealant. Retool sealant to form smooth, uniform beads, slightly concave. Remove excess sealant and aggregate from surfaces adjacent to joint.
      f. Do not allow sealant to overflow or spill onto adjoining surfaces, or to migrate into the voids of adjoining surfaces, particularly rough textures. Remove excess and spillage of sealant promptly as the work progresses. Clean adjoining surfaces by the means necessary to eliminate evidence of spillage, without damage to

adjoining surfaces or finishes, as demonstrated in an approved mockup.

4. Cure sealant according to Division 7 Section "Joint Sealants."

L. Where repointing work precedes cleaning of existing stone, allow mortar to harden at least 30 days before beginning cleaning work.

3.06 GRANITE TOOLING

A. Areas of deteriorated granite to be tooled are designated as M14 on the Drawings. The extent of the work shall be reviewed with the Professional at the site before beginning operations.

B. Rub all deteriorated granite with granite gneiss block with round edges (or stone material that is softer and more friable than granite). Remove all loose and friable material on the surface of the granite. Rub all rough edges to sound and smooth surface.

3.07 BRICK REPOINTING

A. Areas of brick masonry to be repointed are designates as M1, M5 on the Drawings. The extent of the work shall be reviewed with the Architect at the site before beginning operations.

B. Rake designated mortar material out of the joints using a chisel less than ¼ inch in width or by mechanical grinding using a carborundum blade. For mechanical grinders, cut out center of mortar bed joints with carborundum blade and remove remaining mortar by hand with chisel and resilient mallet. Prying against the arrises of the brick shall be avoided. Do not chip, spall, or cut into the edges of the brick. Clean all mortar from surfaces within the joint so that the new pointing bonds to the building stone rather than the old mortar.

C. If work is found to be unacceptable, all raking will cease without additional cost to the Department until deficiencies in tools, workmanship, or methodology have been corrected to the Professional’s satisfaction.

D. Rake back a minimum of ½ inch to sound mortar. Brush, vacuum, or blow joints clean with compressed air to remove sediment and debris. Do not use water to remove sediment and debris from the mortar joint.

E. Apply new mortar in ¼ inch thick layers, allowing each layer to reach initial set/thumb-print hardness before applying succeeding layers. Work mortar into the full depth of the joint using a flexible tool.

F. When final layer of mortar is thumb-print hard, tool joint as required to match the existing profile. Avoid feather-edging of joints. Remove and dispose of excess mortar promptly before it can set or stain masonry.

G. Keep joints damp for 72 hours after repointing using damp burlap, plastic, or other waterproof membrane.

H. The Contractor shall leave the brick surface clean of mortar, grease, or other spots. Any compounds proposed for cleaning stains shall be approved by the Professional prior to use.

I. Pointing with Sealant – for use at the meeting of dissimilar materials and at wash joints:

1. After raking out, keep joints dry and free of mortar and debris.
2. Clean and prepare joint surfaces according to Division 7 Section "Joint Sealants." Prime joint surfaces unless sealant manufacturer recommends against priming. Do not allow primer to spill or migrate onto adjoining surfaces.
3. Fill sealant joints with specified joint sealant according to Division 7 Section "Joint Sealants" and the following:

a. Install cylindrical sealant backing beneath the sealant except where space is insufficient. There, install bond-breaker tape.
b. Install sealant using only proven installation techniques that will ensure that sealant will be deposited in a uniform, continuous ribbon, without gaps or air pockets, and with complete wetting of the joint bond surfaces equally on both sides. Fill joint flush with surrounding stonework and matching the contour of adjoining mortar joints.
c. Install sealant as recommended by sealant manufacturer but within the following general limitations, measured at the center (thin) section of the bead:
1) Fill joints to a depth equal to joint width, but not more than 1/2 inch (13 mm) deep or less than 1/4 inch (6 mm) deep.
d. Immediately after first tooling, apply ground-mortar aggregate to sealant, gently pushing aggregate into the surface of sealant. Retool sealant to form smooth, uniform beads, slightly concave. Remove excess sealant and aggregate from surfaces adjacent to joint.
e. Do not allow sealant to overflow or spill onto adjoining surfaces, or to migrate into the voids of adjoining surfaces, particularly rough textures. Remove excess and spillage of sealant promptly as the work progresses. Clean adjoining surfaces by the means necessary to eliminate evidence of spillage, without damage to adjoining surfaces or finishes, as demonstrated in an approved mockup.

4. Cure sealant according to Division 7 Section "Joint Sealants."

J. Where repointing work precedes cleaning of existing brick, allow mortar to harden at least 30 days before beginning cleaning work.

3.08 BRICK REPAIR

A. Carefully dismantle selected areas of masonry where designated M7 on the Drawings. Dismantle adjacent assemblies as required for access to the designated masonry, salvaging components for reuse to the greatest extent possible.

B. Rake or grind mortar from joints to the greatest extent possible before attempted removal of brick. Avoid excessive prying against the arrises of the selected masonry units to avoid spalling and chipping.

C. Clean old mortar and sealants from masonry units to be reassembled.

D. Reset bricks to proper position, straight and plumb and true to line and level, with full mortar bed. Ensure that vertical joints are completely filled with mortar. Rake and point as described above except at coping head joints, which shall be pointed with flexible sealant.

E. Reinstall adjacent materials or patch in kind as required to complete this installation.

3.09 SELECTIVE MASONRY REMOVALS

A. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut at joints wherever possible and as required to accept new masonry openings as indicated.

B. Salvage masonry units being removed to the greatest extent possible for re-use as Dutchmen at other areas of the building.

3.10 PROTECTION

A. Protect persons, motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm resulting from stone restoration work.

1. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during course of restoration and cleaning work.

B. Prevent mortar from staining face of surrounding stone and other surfaces.
1. Cover sills, ledges, and projections to protect from mortar droppings.
2. Keep wall area wet below rebuilding and pointing work to discourage mortar from adhering.
3. Immediately remove mortar in contact with exposed stone and other surfaces.
4. Clean mortar splatters from scaffolding at end of each day.

3.11 UNUSED ANCHOR REMOVAL

A. Remove stone anchors, brackets, wood nailers, and other extraneous items no longer in use unless identified as historically significant or indicated to remain.
1. Remove items carefully to avoid spalling or cracking stone.
2. Where directed, if an item cannot be removed without damaging surrounding stone, do the following:
a. Cut or grind off item approximately 3/4 inch (20 mm) beneath surface and core drill a recess of same depth in surrounding stone as close around item as practical.
b. Immediately paint exposed end of item with two coats of antirust coating, following coating manufacturer's written instructions and without exceeding manufacturer's recommended dry film thickness per coat. Keep paint off sides of recess.
3. Patch the hole where each item was removed unless directed to remove and replace the stone unit.

3.12 STONE REMOVAL AND REPLACEMENT

A. At locations indicated, remove stone that has deteriorated or is damaged beyond repair. Carefully demolish or remove entire units from joint to joint, without damaging surrounding stone, in a manner that permits replacement with full-size units.

B. Support and protect remaining stonework that surrounds removal area. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition.

C. Notify Professional of unforeseen detrimental conditions including voids, cracks, bulges, and loose units in existing stone or unit masonry backup, rotted wood, rusted metal, and other deteriorated items.

D. Remove in an undamaged condition as many whole stone units as possible.
1. Remove mortar, loose particles, and soil from stone by cleaning with hand chisels, brushes, and water.
2. Remove sealants by cutting close to stone with utility knife and cleaning with solvents.
3. Store stone for reuse. Store off ground, on skids, and protected from weather.
4. Deliver cleaned stone not required for reuse to the Department unless otherwise indicated.

E. Clean stone surrounding removal areas by removing mortar, dust, and loose particles in preparation for replacement.

F. Replace removed damaged stone with other removed stone in good quality, where possible, or with new stone matching existing stone, including size. Do not use broken units unless they can be cut to usable size.

G. Do not allow face bedding of stone. Before setting, inspect to verify that each stone has been cut so that, when it is set in final position, natural bedding planes are essentially horizontal. Reject and replace stone with vertical bedding planes except as required for arches, lintels, and copings.

H. Install replacement stone into bonding and coursing pattern of existing stone. If cutting is required, use a motor-driven saw designed to cut stone with clean, sharp, un-chipped edges. Finish edges to blend with appearance of edges of existing stone.
   1. Maintain joint width for replacement stone to match existing joints.
   2. Use setting buttons or shims to set stone accurately spaced with uniform joints.

I. Set replacement stone with completely filled bed, head, and collar joints. Butter vertical joints for full width before setting and set units in full bed of mortar unless otherwise indicated. Replace existing anchors with new anchors of size and type indicated.
   1. Tool exposed mortar joints in repaired areas to match joints of surrounding existing stonework.
   2. Retain subparagraph above or first subparagraph below. Coordinate with mortar mixes in Part 2.
   3. Rake out mortar used for laying stone before mortar sets and point new mortar joints in repaired area to comply with requirements for repointing existing stone, and at same time as repointing of surrounding area.
   4. When mortar is sufficiently hard to support units, remove shims and other devices interfering with pointing of joints.

3.13 PAINTING STEEL UNCOVERED DURING THE WORK

A. Inspect steel exposed during stone removal. Where The Professional determines that it is structural, or for other reasons cannot be totally removed, prepare and paint it as follows:
   1. Remove paint, rust, and other contaminants as applicable to meet paint manufacturer's recommended preparation.
   2. Immediately paint exposed steel with two coats of antirust coating, following coating manufacturer's written instructions and without exceeding manufacturer's recommended rate of application (dry film thickness per coat).

B. If on inspection and rust removal, the cross section of a steel member is found to be reduced from rust by more than 1/16 inch (1.6 mm) notify The Professional before proceeding.

3.14 STONE PLUG REPAIR

A. Remove cylindrical piece of damaged stone by core-drilling perpendicular to stone surface.

B. Prepare a replacement plug by core-drilling replacement stone. Use a drill sized to produce a core that will fit into hole drilled in damaged stone with only minimum gap necessary for adhesive. Cut and install plug so that, when it is set in final position, natural bedding planes will match the orientation of bedding planes of the backing stone unless otherwise indicated.

C. Apply stone-to-stone adhesive to comply with adhesive manufacturer's written instructions. Coat bonding surfaces of existing stone and plug, completely filling all crevices and voids.

D. Apply plug while adhesive is still tacky and hold securely in place until adhesive has cured.

E. Clean adhesive residue from exposed surfaces.

3.15 STONE-FRAGMENT REPAIR

A. Carefully remove cracked or fallen stone fragment indicated to be repaired. Reuse only stone fragment that is in sound condition.

B. Remove soil, loose particles, mortar, and other debris or foreign material, from fragment surfaces to be bonded and from parent stone where fragment had broken off, by cleaning with stiff-fiber brush.

C. Pinning: Before applying adhesive, prepare for mechanical anchorage consisting of 1/4-inch- (6-mm-) diameter, threaded stainless-steel pins set into 1/4-inch- (6-mm-) diameter holes drilled at a 45-degree downward angle through face of fragment and into parent stone. Center and space pins between 3 and 5 inches (75 and 125 mm) apart and at least 2 inches (50 mm) from any edge. Insert pins at least 2 inches (50 mm) into parent stone and 2 inches (50 mm) into fragment with end countersunk at least 3/4 inch (19 mm) from exposed face of fragment.

D. Concealed Pinning: Before applying adhesive, prepare for concealed mechanical anchorage consisting of 1/4-inch- (6-mm-) diameter, threaded stainless-steel pins set into 1/4-inch- (6-mm-) diameter holes drilled into parent stone and into, but not through, the fragment. Center and space pins between 3 and 5 inches (75 and 125 mm) apart and at least 2 inches (50 mm) from any edge. Insert pins at least 2 inches (50 mm) into parent stone and 2 inches (50 mm) into fragment, but no closer than 3/4 inch (19 mm) from exposed face of fragment.

E. Apply stone-to-stone adhesive to comply with adhesive manufacturer's written instructions. Coat bonding surfaces of fragment and parent stone, completely filling all crevices and voids.

F. Fit stone fragment onto parent stone while adhesive is still tacky and hold fragment securely in place until adhesive has cured. Use shims, clamps, wedges, or other devices as necessary to align face of fragment with face of parent stone.

G. Clean adhesive residue from exposed surfaces and patch chipped areas and exposed drill holes.

3.16 CRACK INJECTION

A. General: Comply with cementitious crack-filler manufacturer's written instructions.

B. Drill 1/4-inch- (6-mm-) diameter injection holes as follows:
   1. Transverse Cracks Less Than 3/8 inch (9 mm) Wide: Drill holes through center of crack at 12 to 18 inches (300 to 500 mm) o.c.
   2. Transverse Cracks More Than 3/8 inch (9 mm) Wide: Drill holes through center of crack at 18 to 36 inches (500 to 900 mm) o.c.
   3. Delaminations: Drill holes at approximately 18 inches (500 mm) o.c. both vertically and horizontally.
   4. Drill holes 2 inches (50 mm) deep. Where possible drill holes in mortar joints.

C. Clean out drill holes and cracks with compressed air and water. Remove dirt and organic matter, loose material, sealants, and failed crack repair materials.

D. Place plastic injection ports in drilled holes and seal face of cracks between injection ports with clay or other non-staining, removable plugging material. Leave openings at upper ends of cracks for air release.

E. Inject cementitious crack filler through ports sequentially, beginning at one end of area and working to opposite end; where possible, begin at lower end of injection area and work upward. Inject filler until it extrudes from adjacent ports. After port has been injected, plug with clay or other suitable material and begin injecting filler at adjacent port, repeating process until all ports have been injected.

F. Clean cementitious crack filler from face of stone before it sets by scrubbing with water.

G. After cementitious crack filler has set, remove injection ports, plugging material, and excess filler. Patch injection holes and surface of cracks as specified in "Stone Patching" Article.

3.17 STONE CONSOLIDATION TREATMENT

A. Apply treatment to clean, dry surfaces according to manufacturer's written instructions. Remove areas of blind exfoliation, delamination, and flaking before applying.

B. Apply in cycles to small sections of stonework, not more than 100 sq. ft. (9 sq. m) in area. Each cycle shall consist of 3 successive saturating applications, applied at 5- to 15-minute intervals depending on drying conditions.

C. Apply by low-pressure spray to point of rejection in each application. Apply from bottom of section to top.

D. Apply 3 cycles, allowing treated surface to dry for 60 to 90 minutes between cycles.

E. Protect treated surfaces from rain for 48 hours after treatment.

F. Allow treated surfaces to dry for at least 21 days before repointing, patching, or applying water repellents or sealants.

3.18 CLEANING AFTER STONE REPAIR

A. After mortar has fully hardened, thoroughly clean exposed stone surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water spray applied at low (100 psi) pressure.
   1. Do not use metal scrapers or brushes.
   2. Do not use acidic or alkaline cleaners.

B. Coordinate final rinse with completion of masonry repair work.

C. Remove all protection erected as part of cleaning operations.

D. Clean all surfaces at grade level and below, including all areaways that may have been affected by the cleaning operation.

E. Paragraphs below are examples only; revise to suit Project.

F. Wash adjacent woodwork and other non-stone surfaces. Use detergent and soft brushes or cloths.

G. Clean mortar and debris from roof; remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.

H. Sweep and rake adjacent pavement and grounds to remove mortar and debris. Where necessary, pressure wash pavement surfaces to remove mortar, dust, dirt, and stains.

I. As the blocking and other related components associated with the scaffolding system are removed from the masonry surface, the exposed surfaces behind the component are to be cleaned with the low-pressure mild abrasive system.

3.19 MASONRY CLEANING:

A. Comply with cleaner manufacturer's instructions and recommendations.

B. Effectively protect glass and adjacent substrates from cleaning chemicals and cleaning processes.

C. Wet surfaces to be cleaned before application of cleaning solutions.

D. Mix cleaner with water as recommended by cleaner manufacturer.

E. Apply cleaning solution then work cleaner solution into surface by hand with soft brush.

F. Work cleaner into all cracks, crevices, and details.

G. Gently agitate the surface and lift contamination.

H. Allow cleaner to dwell on the surface for time period used for Quality Assurance Testing - Successful Cleaning. Follow the Written Record.

I. Do not allow cleaner to dry on the surface.

J. Rinse thoroughly and completely with water volumes, temperatures, and pressures used for Quality Assurance Testing. Follow the Written Record.

K. Gently agitate the surface with hand brushes while rinsing.

L. Keep pressure washer spray nozzle, if used, = 8 inches from the surface.

M. Repeat cleaning until acceptable cleaning is achieved.

N. Do not damage substrates.

O. Do not "bleach", streak, or change actual substrate colors.

P. Protect all work areas and adjacent areas from bleaching, streaking, soiling and staining.

Q. Do not damage masonry, mortar, or any surface with high pressure water.

R. Match approved In Place Samples.

3.20 GENERAL APPLICATION of CSP BIO-CLEANER

A. Follow instructions provided by the manufacturer (See Data Sheet).

B. Clearly mark or identify the time of application and dwell time.

C. Apply cleaner using a brush, roller, or airless sprayer to the desired thickness. Thicknesses of cleaner on test patches will determine appreciate thickness.

D. Leave cleaner on substrate only as long as determined acceptable in the mock-ups and approved by the architect.

E. If the approved dwell time has elapsed and a stain or blemish persists use a soft bristle scrub brush to agitate the area.

F. Apply a small amount of CSP Bio-Cleaner to the brush then scrub the area again to facilitate in the removal of the stain if necessary.

G. Follow instructions provided by the manufacturer (See Data Sheet).

H. Begin at the top of each section and pressure wash the cleaner and residue off the substrate. Use appropriate pressure as determined in the mock-up.

I. Pressure wash should be preformed at a pressure which will not damage the substrate yet provide adequate removal of cleaner and residue.

J. Be sure all of the cleaner and residue are washed off the substrate.

K. Exercise caution during cleaning operations to avoid wind drift of materials to adjacent properties, persons, or cars below. Schedule cleaning operations for times or days when risk to pedestrians or vehicles is at a minimum.

L. Use only methods and materials determined during testing phase and approved by architect. Clean surface to degree accepted by owner’s representative. Do not permit cleaning to continue if methods and materials employed results in any permanent damage to surfaces.

M. Contractor shall reclaim, characterize and dispose of all waste and residue used in conjunction with this project in accordance with applicable laws. Disposal sites shall be approved by the architect.

N. During the work, remove from the site discarded cleaning and coating materials, rubbish, cans and rags at the end of each workday.

O. Upon completion of work, remove all protective coverings and coatings, and clean window glass and other spattered surfaces. Remove spattered coatings by proper methods as recommended by manufacturer, using care not to damage adjacent surfaces.

3.21 GLAZE PATCHING

A. Comply with manufacturer's instructions and recommendations.

B. Always test patching and painted finish in an inconspicuous location prior to proceeding to ensure durability, compatibility and desired appearance.

C. Locally clean repair area with warm, soapy water or a surface cleaner to remove dirt, oil, dust or contaminants; let dry completely.

D. Thoroughly mix the two part system of putty and cream hardener in small amounts that can be used in 3-4 minutes.

E. Spread initial thin layer of mixed putty over repair area using firm pressure to ensure maximum adhesion. Apply additional layers until desired thickness is reached.

F. For repairs 1/2 inch or deeper, it is recommend to fill repairs making more than one application.

G. Allow the putty to dry 15 minutes at 77 degress F.

H. Sand and shape using 80 grit sandpaper; feather the edge using 180 grit until the surface is smooth.

I. Prime and paint the area per the manufacturer's recommendation.

J. Clean tools with acetone or lacquer thinner, per manufacturer's instructions.

3.22 WATER-MISTING CLEANING

A. The Contractor shall protect all building components against damage from weight of suspended cleaning apparatus and against scratching or abrasion damage from protruding parts.

B. Windows and window frames shall be protected using polyethylene and temporary sealants as required during water misting. The Contractor shall maintain at least one employee on the interior of the building to monitor window and wall conditions during cleaning. Water spray shall cease immediately if leakage is discovered inside the building and shall not resume until the cause is identified and corrected.

C. Water shall be supplied through nebulizing nozzles to produce a fine mist. The quantity of water delivered to each spray head shall not exceed 15 gallons per hour. The spacing of the spray heads shall be 12” on centers minimum.

D. Washing shall occur at intervals of one hour on and two hours off during daylight hours. No washing shall be permitted at night.

3.23 LOW PRESSURE WASHING

A. Pressure washing of designated areas shall proceed from the bottom of the area to the top.

B. Using a nozzle pressure of 800 psi or less (based on the results of the test panel) and a fan tipped spray nozzle, the water spray shall be directed at the stone surface from a distance of not less than 12 inches.

3.24 CHEMICAL CLEANING (BRICK, LIMESTONE, and GRANITE)

A. Chemical cleaning of designated areas shall proceed from the bottom of the area to the top. Wet surfaces to be cleaned thoroughly prior to application of cleaning chemicals to prevent excessive absorption into the stone.

B. Apply specified cleaning product in accordance with the manufacturer’s printed instructions. Do not exceed recommended solution concentrations or dwell times. Cleaning solutions shall be applied by hand using a fiber brush or sponge. Cleaning solutions may not be applied using pressure washing equipment.

C. Allow cleaner to dwell on the stone in accordance with the manufacturer’s printed instructions. Reapply and scrub stubborn stains.

D. Rinse all cleaned areas thoroughly to remove all traces of cleaner from cracks and corners. Rinse down adjacent materials to prevent discoloration or streaking from cleaning chemicals.

3.25 FERROUS STAIN REMOVAL

A. In a plastic bucket or container, combine poultice ingredients in accordance with manufacturer’s printed instructions. Stir continuously until the mixture forms a smooth, wet paste.

B. Apply a layer of poultice paste, 1/8” to ¼” in thickness, immediately to the stained surface. Surfaces to be cleaned should be dry and free of surface dirt and dust.

C. Cover with plastic. Leave poultice paste on the masonry for 24 hours or until completely dry.

D. Once the poultice is completed dried, scrape mixture from the surface using wood, plastic or rubber spatulas. Rinse the treated area thoroughly with water and a soft brush to remove remaining residue.

3.26 COPPER STAIN REMOVAL

A. In a plastic bucket or container, combine poultice ingredients in accordance with manufacturer's printed instructions. Stir continuously until the mixture forms a smooth, wet paste.

B. Apply a layer of poultice paste, 1/8" to ¼" in thickness, immediately to the stained surface. Surfaces to be cleaned should be dry and free of surface dirt and dust.

C. Cover with plastic. Leave poultice paste on the masonry for 24 hours or until completely dry.

D. Once the poultice is completed dried, scrape mixture from the surface using wood, plastic or rubber spatulas. Rinse the treated area thoroughly with water and a soft brush to remove remaining residue.

3.27 CLEAN-UP AND SITE RESTORATION

A. Excess materials shall be removed from the site. Do not dump excavation around building or on site.

B. Remove Temporary sealants around window and door openings.

C. Remove splatters from building immediately.

3.28 TERRA COTTA REPAIR AND PATCHING

A. Strictly follow manufacturer guidelines for the following but not limited to.

B. Surface Preparation, Mixing, Application, Curing, and Clean up.

END OF SECTION 04 0101

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SECTION 04 0511
MASONRY MORTARING AND GROUTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Mortar for masonry.

B. Grout for masonry.

1.02 RELATED REQUIREMENTS

A. Section 04 0101 - Repair and Cleaning of Existing Masonry: in general.

B. Section 04 2000 - Unit Masonry: Installation of mortar and grout.

1.03 REFERENCE STANDARDS

A. ASTM C91/C91M - Standard Specification for Masonry Cement 2023.

B. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete 2022a.

C. ASTM C270 - Standard Specification for Mortar for Unit Masonry 2019a, with Editorial Revision.

D. ASTM C387/C387M - Standard Specification for Packaged, Dry, Combined Materials for Concrete and High Strength Mortar 2017.

E. ASTM C476 - Standard Specification for Grout for Masonry 2023.

F. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry 2020.

G. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete 2016.

H. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures 2022.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Include design mix and indicate whether the Proportion or Property specification of ASTM C270 is to be used. Also include required environmental conditions and admixture limitations.

C. Samples: Submit two samples of mortar, illustrating mortar color and color range.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Manufacturer's Installation Instructions: Submit packaged dry mortar manufacturer's installation instructions.

1.05 QUALITY ASSURANCE

1.06 PRECONSTRUCTION TESTING

A. Testing will be conducted by an independent test agency, in accordance with provisions of Section 01 4000 - Quality Requirements.

B. Mortar Mixes: Test mortars prebatched by weight in accordance with ASTM C780 recommendations for preconstruction testing.
   1. Test results will be used to establish optimum mortar proportions and establish quality control values for construction testing.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.08 FIELD CONDITIONS

A. Cold and Hot Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

PART 2 PRODUCTS

2.01 MORTAR AND GROUT APPLICATIONS

A. Use only factory premixed packaged dry materials for mortar and grout, with addition of water only at project site.
   1. Exception: If a specified mix design is not available in a premixed dry package, provide equivalent mix design using standard non-premixed materials.

B. Mortar Color: As noted.

C. Mortar Mix Designs: ASTM C270, Property Specification.
   1. Historic Exterior Masonry Pointing Mortar: Type O; color to match existing.
   2. Masonry below grade and in contact with earth: Type S.
   3. Exterior, Loadbearing Masonry: Type N.
   4. Exterior, Non-loadbearing Masonry: Type N.
   5. Exterior Repointing Mortar: Type N.
   6. Interior, Loadbearing Masonry: Type N.
   7. Interior, Non-loadbearing Masonry: Type O.
   8. Pointing Mortar for Prefaced or Specially Faced Unit Masonry: One part Portland cement, 1/8 part hydrated lime, and two parts graded (80 mesh) aggregate, proportioned by volume. Add aluminum tristearate, calcium stearate, or ammonium stearate equal to 2 percent of Portland cement by weight.

D. Grout Mix Designs:
   1. Grout ASTM C476, 2000 psi.
   2. Engineered Masonry: 3,000 psi strength at 28 days; 8-10 inches slump; provide premixed type in accordance with ASTM C 94/C 94M.
      a. Fine grout for spaces with smallest horizontal dimension of 2 inches or less.
      b. Coarse grout for spaces with smallest horizontal dimension greater than 2 inches.

2.02 BRICK MASONRY REPOINTING

A. This project is subject to Historical Commission review and approval, brick repointing mortar mix must be approved by Historical Commission – it must match the original in color, composition and detailing. Because the original bricks used to construct the facade are softer then contemporary bricks, a compatible mortar must be used to allow for the same rate of thermal expansion in the mortar and the bricks. A hard cement mortar may cause cracking and spalling and eventual deterioration of the brickwork. The composition of the mortar must not contain, under any circumstances, more than 20% portland cement. An acceptable ratio is between six-nine parts sand, to two parts lime to one part portland cement. As the color of the aggregate gives much of the characteristic of the mortar, match the new sand with the color and size of the old. Laboratory analysis of the existing mortar is required for submittal for review with the proposed new mortar mix. At areas indicated on elevations, remove deteriorated brick and replace with salvaged matching brick in good condition. Contractor must arrange site visit with representative of Historical Commission to approve field sample of replacement area of existing brick wall using matching salvaged bricks, mortar, and mortar joints. Field sample must be approved before work can begin.

2.03 MATERIALS

A. Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C387/C387M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
   1. Type: Type N.
   2. Color: Mineral pigments added as required to produce approved color sample:
   3. Basis of Design Manufacturer:
      a. Cathedral Stone Products, Inc., https://www.cathedralstone.com/

B. Packaged Dry Material for Mortar for Repointing: Premixed Portland cement, graded sand, and chemical admixtures complying with ASTM C91/C91M with the addition of water only.
   1. Color: To match adjacent mortar color.
   2. Basis of Design Manufacturer:
      a. Cathedral Stone Products, Inc. https://www.cathedralstone.com/.

C. Packaged Dry Material for Mortar for Repointing: Premixed Portland cement, hydrated lime, and graded sand; capable of producing Type O mortar in accordance with ASTM C270 with the addition of water only.
   1. Color: Mineral pigments added as required to produce approved color sample.
   2. Manufacturers:
      a. Cathedral Stone Products, Inc.; https://www.cathedralstone.com/
      b. Limeworks; https://www.limeworks.us/

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.
   1. Type: Fine.

E. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979/C979M.
   1. Color(s): as indicated on drawings or as selected.
      a. Brownstone: match purple stone.
      b. Sandstone: match tan stone.
      c. Serpentine: match existing red mortar.
      d. Green precast stone: match existing red mortar.

e. Wissahicken Schist: match existing gray.

2. Manufacturers:
   a. Davis Colors: www.daviscolors.com/#sle.
   b. Lambert Corporation: www.lambertusa.com/#sle.
   c. Solomon Colors; Solomon Colors Concentrated A, H, and X Series: www.solomoncolors.com/#sle.

F. Water: Clean and potable.

2.04 MORTAR MIXING

A. Thoroughly mix mortar ingredients using mechanical batch mixer, in accordance with ASTM C270 and in quantities needed for immediate use.

B. Maintain sand uniformly damp immediately before the mixing process.

C. Do not use anti-freeze compounds to lower the freezing point of mortar.

D. If water is lost by evaporation, re-temper only within two hours of mixing.

2.05 GROUT MIXING

A. Mix grout in accordance with ASTM C94/C94M.

B. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C476 for fine and coarse grout.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install mortar to requirements of section(s) in which masonry is specified.

B. Work grout into masonry cores and cavities to eliminate voids.

C. Do not displace reinforcement while placing grout.

D. Remove excess mortar from grout spaces.

3.02 FIELD QUALITY CONTROL

A. Test and evaluate mortar in accordance with ASTM C780 procedures.

END OF SECTION 04 0511

SECTION 04 2000
UNIT MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. **BP#2:** New 2 hour fire rated elevator shaft enclosure with a clear hoistway of the dimensions shown on drawings and plumb to within 1".
   1. Provide solid filled and steel reinforced CMU unit in location required for elevator rail attachments.

B. Existing masonry replacement units and where indicated on drawings select existing masonry wall extensions for the following:

C. New brick and CMU infill in existing masonry openings as indicated on drawings.

D. Concrete block. ASTM C90, normal weight, Type I, concrete masonry units.

E. Clay Facing Brick.
   1. For select repairs to existing as shown on drawings.

F. Common Brick.
   1. For select repairs to existing as shown on drawings.

G. Mortar and grout.
   1. Mortar ASTM C270.
   2. Grout ASTM C476, 2000 psi.
   3. Defer to Section 04 0511 MASONRY MORTARING AND GROUTING

H. Reinforcement and anchorage.
   1. Reinforcing shall be galvanized, epoxy coated, or stainless steel (ASTM A615, Grade 60); submit for approval.

I. Flashings.
   1. Flexible stainless steel flashing with bituminous layer toward lintel to prevent galvanic reaction between galvanize steel lintel and stainless steel flashing.

J. Lintels.
   1. Galvanized Steel.

K. Accessories.
   1. Other items indicated on drawings, listed in this section and as required to have complete system.

1.02 RELATED REQUIREMENTS

A. Section 04 0101 -Repair and Cleaning of Existing Masonry.

B. Section 04 0511 - Masonry Mortaring and Grouting.

C. Section 05 5000 - Metal Fabrications: Loose steel lintels.

D. Section 07 6200 - Sheet Metal Flashing and Trim: Through-wall masonry flashings.

E. Section 07 8400 - Firestopping: Firestopping at penetrations of fire-rated masonry and at top of fire-rated walls.

F. Section 07 9200 - Joint Sealants: Sealing control and expansion joints.

1.03 REFERENCE STANDARDS

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.

B. ASTM A480/A480M - Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip 2022a.

C. ASTM A580/A580M - Standard Specification for Stainless Steel Wire 2018.

D. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2022.

E. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire 2019.

F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2022.

G. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2015.

H. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement 2022.

I. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete 2022.

J. ASTM C67/C67M - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile 2021.

K. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units 2022.

L. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units 2022.

M. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar 2018.

N. ASTM C150/C150M - Standard Specification for Portland Cement 2022.

O. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes 2018.

P. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale) 2022.

Q. ASTM C270 - Standard Specification for Mortar for Unit Masonry 2019a, with Editorial Revision.

R. ASTM C404 - Standard Specification for Aggregates for Masonry Grout 2018.

S. ASTM C476 - Standard Specification for Grout for Masonry 2023.

T. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry 2020.

U. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete 2016.

V. ASTM C1072 - Standard Test Methods for Measurement of Masonry Flexural Bond Strength 2022.

W. ASTM C1148 - Standard Test Method for Measuring the Drying Shrinkage of Masonry Mortar 1992a (Reapproved 2014).

X. ASTM E154/E154M - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover 2008a (Reapproved 2019).

Y. ASTM E514/E514M - Standard Test Method for Water Penetration and Leakage Through Masonry 2020.

Z. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures 2022.

AA. UL (FRD) - Fire Resistance Directory Current Edition.

1.04 ADMINISTRATIVE REQUIREMENTS

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

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.
   1. Confirmation masonry ties meet BIA standards for wide cavity exceeding 4", 5 3/8" and 6 3/8".

C. Shop drawings of 2 hour fire rated elevator CMU shaft enclosure with a clear hoistway of the dimensions as approved by elevator manufacturer/installer and showing location of solid filled and steel reinforced CMU unit in location required for elevator rail attachments for approval of approved by elevator manufacturer/installer.

D. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

E. Test Reports: Concrete masonry manufacturer's test reports for units with integral water repellent admixture.

1.06 QUALITY ASSURANCE

A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.

B. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

B. Handle and store pre-faced concrete block units in protective cartons or trays. Do not remove from protective packaging until ready for installation.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

A. Concrete Block: Comply with referenced standards and as follows:
   1. ASTM C90, normal weight, Type I, concrete masonry units.
   2. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depth of 8 inches.
   3. Special Shapes: Provide non-standard blocks configured for corners.
      a. Provide bullnose units for outside exposed corners.
   4. Load-Bearing Units: ASTM C90, normal weight.
      a. Hollow block, as indicated.
      b. Exposed Faces: Manufacturer's standard color and texture where indicated.
   5. Manufacturers:
      a. The Concrete Products Group; Spec-Brik: www.concreteproductsgroup.com/#sle.
   6. Non-Loadbearing Units: ASTM C129.
      a. Hollow block, as indicated.
      b. Normal weight.

2.02 BRICK UNITS

A. Manufacturers:
   1. Basis of Design products to match existing from: Diener Brick Company 856-858-2000
   2. Belden Brick; Belcrest: www.beldenbrick.com/#sle.
   3. Endicott Clay Products Co: www.endicott.com/#sle.
   4. General Shale Brick: www.generalshale.com/#sle.
   5. Meridian Brick LLC; Athens Architectural Series: www.meridianbrick.com/#sle.

B. Facing Brick: ASTM C216, Type FBS Smooth, Grade SW.
   1. Defer to Section 04 0101 REPAIR AND CLEANING OF EXISTING MASONRY
   2. Color and texture to match existing to be patched or as otherwise indicated for the following:
   3. Color and texture to match Architect's sample.
   4. Nominal size: As indicated on drawings.
   5. Special shapes: Molded units as required by conditions indicated, unless standard units can be sawn to produce equivalent effect.
   6. Compressive strength: As indicated on drawings, measured in accordance with ASTM C67/C67M.

2.03 MORTAR AND GROUT MATERIALS

A. Mortar and Grout: As specified in Section 04 0511.

B. Mortar ASTM C270.

C. Grout ASTM C476, 2000 psi.

D. Portland Cement: ASTM C150/C150M, Type I; color as required to produce approved color sample.

1. Not more than 0.60 percent alkali.

E. Hydrated Lime: ASTM C207, Type S.

F. Mortar Aggregate: ASTM C144.

G. Grout Aggregate: ASTM C404.

H. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979/C979M.
1. Color(s): As selected by Architect to match existing from manufacturer's full range.

I. Water: Clean and potable.

J. Accelerating Admixture: Nonchloride type for use in cold weather.

K. Moisture-Resistant Admixture: Water repellent compound designed to reduce capillarity.

L. 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.

2.04 REINFORCEMENT AND ANCHORAGE

A. Manufacturers:
1. Hohmann & Barnard, Inc; X-Seal Anchor: www.h-b.com/#sle.

B. Reinforcing shall be with approval galvanized, epoxy coated, or stainless steel (ASTM A615, Grade 60).

C. The more stringent of the following:

D. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi), deformed billet bars; galvanized.

E. Reinforcing Steel: ASTM A615, 60 ksi yield grade, detormed billet bars, galvanized finish.

F. Single Wythe Joint Reinforcement: ASTM A951/A951M.
1. Type: Truss or ladder.
2. Material: ASTM A1064/A1064M steel wire, mill galvanized to ASTM A641/A641M Class 3.
3. Size: 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not less than 5/8 inch of mortar coverage on each exposure.

G. Flexible Anchors: 2-piece anchors that permit differential movement between masonry and building frame, sized to provide not less than 5/8 inch of mortar coverage from masonry face.

H. Masonry Veneer Anchors: 2-piece anchors that permit differential movement between masonry veneer and structural backup, hot dip galvanized to ASTM A 153/A 153M, Class B.
1. Anchor plates: Not less than 0.075 inch thick, designed for fastening to structural backup through sheathing by two fasteners; provide design with legs that penetrate sheathing and insulation to provide positive anchorage.
2. Wire ties: Manufacturer's standard shape, 0.1875 inch thick. min or as required by the following:
a. See requirements for cavity width per BIA and ASTM A951/ A951M.
3. Vertical adjustment: Not less than 3-1/2 inches at anchor plates, 1” at pintels.

2.05 FLASHINGS

A. Metal Flashing Materials:
   1. Stainless Steel Flashing: ASTM A666, Type 304, soft temper; 26 gage, 0.0187 inch thick; finish 2B to 2D. Provide as basis of design H&B SS drip edge.

B. Combination Non-Asphaltic Flashing Materials - Stainless Steel:
   1. Stainless Steel/Polymer Fabric Flashing: ASTM A240/A240M; 2 mil type 304 stainless steel sheet bonded on one side to one sheet of polymer fabric.
      a. Manufacturers:
         1) Hohmann & Barnard, Inc; Mighty-Flash Stainless Flashing: www.h-b.com/#sle.
         2) WIRE-BOND: www.wirebond.com/#sle.
         3) York Manufacturing, Inc; Multi-Flash SS: www.yorkmfg.com/#sle.
   2. Stainless Steel/Polymer Fabric Flashing - Self-adhering: ASTM A240/A240M; 2 mil type 304 stainless steel sheet bonded on inward facing side to a sheet of polymer fabric that has a clear adhesive with a removable release liner.
      a. Manufacturers:
         1) Hohmann & Barnard, Inc: www.h-b.com/#sle.

2.06 ACCESSORIES

A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.
   1. Manufacturers:
      a. Hohmann & Barnard, Inc: www.h-b.com/#sle.

B. Joint Filler: Closed cell polyvinyl chloride; oversized 50 percent to joint width; self expanding; in maximum lengths available.
   1. Manufacturers:
      a. Hohmann & Barnard, Inc: www.h-b.com/#sle.

C. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

2.07 LINTELS

A. Galvanized Steel Lintels: as indicated and where applicable see structural drawings and provide installation details as required by BIA.

2.08 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 S.
   2. Exterior, loadbearing masonry: Type N.
   3. Exterior, non-loadbearing masonry: Type N.
   4. Interior, loadbearing masonry: Type N.
   5. Interior, non-loadbearing masonry: Type O.

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

C. New Mortar for Old Brick: Proportion by volume only; no more than 20 percent of the total volume of Portland cement and lime combined to be Portland cement.

D. 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.

E. Mixing: Use mechanical batch mixer and comply with referenced standards.

PART 3 EXECUTION

3.01 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.

3.02 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.

3.03 COLD AND HOT WEATHER REQUIREMENTS

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

3.04 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.

3.05 PLACING AND BONDING

A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

3.06 LINTELS

A. Install loose steel lintels over openings.

3.07 GROUTED COMPONENTS

A. Reinforce bond beams with 2, bars, 1 inch from bottom web.

B. Reinforce columns with , bars, placed .

C. Lap splices minimum 24 bar diameters.

D. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.

E. Place and consolidate grout fill without displacing reinforcing.

F. At bearing locations, fill masonry cores with grout for a minimum 12 inches either side of opening.

3.08 CONTROL AND EXPANSION JOINTS

A. Do not continue horizontal joint reinforcement through control or expansion joints.

B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.

3.09 BUILT-IN WORK

A. As work progresses, install built-in metal door frames and glazed frames 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 and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.
   1. Fill adjacent masonry cores with grout minimum 12 inches from framed and unframed openings; see details.

D. Do not build into masonry construction organic materials that are subject to deterioration.

3.10 TOLERANCES

A. Install masonry within the site tolerances found in TMS 402/602.

3.11 CUTTING AND FITTING

A. Cut and fit for chases. Coordinate with other sections of work to provide correct size, shape, and location.

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

C. Cutting and fitting of units are required under window sills, at sloping cap units for gym access ramp and other locations as indicated.

3.12 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.

3.13 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.

3.14 PROTECTION

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

3.15 SCHEDULES

A. Interior Partitions: Single wythe concrete block units.

END OF SECTION 04 2000

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SECTION 04 2130
CAST ARCHITECTURAL CEMENT-BASED UNITS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Cast architectural polymer-modified cement-based units (cast masonry) manufactured to simulate the following:
   1. Terra cotta.

1.02 ALLOWANCES

A. Remove and replace terra cotta as part of terra cotta removal and replacement allowance.

1.03 UNIT PRICES

A. Work of this Section is affected by unit prices specified in Division 01 Section "Unit Prices."

1.04 ACTION SUBMITTALS

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

B. Shop Drawings: For the following:
   1. Scaled drawings showing each distinct cast masonry unit.
   2. Locations of anchors and dimensions of holes and recesses in units required for anchors designed by others.

C. Shop Drawings: For the following:
   1. Setting number of each new cast masonry unit and its location on the structure in annotated plans and elevations.
   2. Provisions for expansion joints, mortar joints or sealant joints.
   3. Provisions for flashing, lighting fixtures, conduits, and weep holes as required.
   4. Replacement and repair anchors. Include details of anchors within individual units, with locations of anchors and dimensions of holes and recesses in units required for anchors.

D. Samples for Verification: For the following:
   1. Each type of cast masonry unit to be used for replacing existing units. Include sets of Samples as necessary to show the full range of shape, color, and texture to be expected.
      a. Patterns for cast masrony: Before manufacturing cast masrony units, submit the actual patterns from which molds will be made for casting new units. Package and ship to prevent loss or damage or make patterns available for inspection by Architect at fabrication plant.
      b. For cast masonry, after acceptance of patterns, provide one of each shape, color, and texture of unit, suitable and ready for installation.
   2. Sealant Materials: Refer to Division 07 Section "Joint Sealants."
   3. Mortar: Provide triplicate cured samples of custom-matched Spec Joint 46 produced with ICE -9 RL admixture, measuring 3/8”w x 4” L and labeled with factory color and sample batch numbers.
   4. Accessories: Each type of anchor, accessory, and miscellaneous support.

1.05 QUALITY ASSURANCE

A. Mockups: Prepare mockups of cast masonry installation to demonstrate aesthetic effects and set quality standards for materials and execution and for fabrication and installation.
   1. Replacement Units: Prepare sample areas not smaller than 48 inches (1200 mm) in least dimension. Erect sample areas in existing walls unless otherwise indicated, to demonstrate quality of materials, workmanship, and blending with existing work. Include a minimum of four cast masonry units.
      a. If sealant joints are required for project, include at least one sealant-filled joint in mockup.
   2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

B. Preinstallation Conference: Conduct conference at Project site .
   1. Review methods and procedures related to cast masonry installation including, but not limited to, the following:
      a. Construction schedule. Verify availability of materials, personnel, equipment, and facilities needed to make progress and avoid delays.
      b. Materials, material application, sequencing, tolerances, and required clearances.
      c. .

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver cast masonry components secured to shipping pallets and protected from damage and discoloration.

B. Protect corners from damage. Deliver each piece of cast masonry with code mark or setting number on unexposed face, corresponding to Shop Drawings, using nonstaining paint.

C. Deliver other materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.

D. Store cast masonry components and installation materials in accordance with manufacturer’s instructions.
   1. Store cast masonry components on pallets with non-staining, waterproof covers.
   2. Ventilate under cover to prevent condensation.
   3. Prevent contact with dirt.

E. Handling:
   1. Protect cast masonr components during handling and installation to prevent chipping, cracking, or other damage.

1.07 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit work to be performed according to manufacturers' written instructions and specified requirements.

PART 2 PRODUCTS

2.01 CAST MASONRY MATERIALS

A. Manufacturers:
1. Basis of Design: CastCotta produced by Works In Stone, Inc., 1643 Bridgeton Hill Road, Upper Black Eddy, PA 18972; Phone: 610-294-3026; utilizing Custom System 45 Type CC and Aquathane UA210E, AquaSpex 220 and/or Elastowall 351 coatings, manufactured by Edison Coatings, Inc., 3 Northwest Drive, Plainville, CT 06062; Contact: Patrick J. Morrissey, ConSpec Associates, 203-467-4426.
a. Provide new units to match existing deteriorated terra cotta units in physical properties, colors, color variation within units, surface texture, unit profile, and dimensions.
1) Cast Unit Physical Properties:
a) Compressive Strength: 6,500 psi average per ASTM C67 with minimum individual unit strength of 3500 psi.
b) Maximum Water Absorption, prior to glaze coating, after 1-hour boiling: 1 percent per ASTM C67.
c) Coefficient of Linear Expansion: Approx. 4 x 10-6 inch per inch per degree F.
2) Glaze Coating Properties:
a) Chemical Resistance: Unaffected by water (7 days), salt water (7 days), proprietary nonionic cleaning solution (2 hours - Edison Coatings E-Wash 30); Softens/recovers Isopropyl alcohol (1 hour); per ASTM D1308
b) Crazing and Cracking Resistance: Min. 100% elongation, min, 500 psi tensile strength, per ASTM D2370.
c) Bond Strength: Minimum 150 psi pull-off adhesion, per ASTM D4541.
d) Color Stability: dE <2.0, 1000 hours per ASTM G154

2.02 MORTAR MATERIALS

A. Prepackaged mortar shall be SPEC-JOINT 46 Type S (ALT: Type N) as manufactured by Edison Coatings, Inc., Plainville, CT (860) 747-2220. Mortar shall be custom-matched to original mortar unless otherwise specified, including matrix color, aggregate grading and color, and design mix proportions.
1. Portland cement: ASTM C150 Type I, grey or white as required to match original mortar. Fly ash, slag and pozzolans are not permitted as substitutes for Portland cement.
2. Hydrated Lime: ASTM C207 Type S, incorporated as a finely divided powder in uniform particle size, free of lumps, flakes or other inconsistencies.
3. Mortar Aggregate: ASTM C144 Natural sand blend, rounded to sub-angular in shape, washed, screened and dried. Aggregate to be selected to match the color and texture of the original mortar aggregates as closely as possible while remaining in compliance with ASTM C144 grading and soundness requirements.
4. Mortar Colors: Inorganic mineral oxides meeting the requirements of ASTM C797, at levels not to exceed 10% on cement weight, except for carbon black, which may not exceed 2% on cement weight.
5. Admixtures: NO admixtures shall be used without the express written consent of the Architect and the mortar manufacturer. Calcium chloride is not permitted.
6. Water: No water is to be used. All gaging liquid shall be ICE -9 RL admixture.
a. Mortar admixture shall be ICE -9 RL as manufactured by Edison Coatings, Inc., Plainville, CT (860) 747-2220.

B. All mortar shall be pre-blended, pre-colored and prepackaged under controlled factory conditions. All ingredients are to be batched within plus or minus 1% accuracy, except pigments which shall be weighed to a precision of 0.01%.

C. Mortar shall conform to the minimum property requirements for Type S mortar as given in Table II of ASTM C270, based on 28-day laboratory testing ONLY.

D. Do not add cement, lime, bonding agents, coloring admixtures, set accelerators, plasticizers, air entraining admixtures or other materials unless specifically authorized in writing.
   1. Use of ready-mix mortar (ASTM C1142) is PROHIBITED.

2.03 CLEANING MATERIALS

A. Final cleaning solution shall be E-WASH 30 manufactured by Edison Coatings, a non-ionic, non-toxic, non-corrosive building wash incorporating ingredients from US EPA’s Safer Choice program, or equal, as approvbed by manufacturer.

2.04 ACCESSORIES

A. Anchor pins and dowels should be stainless steel. Shelf angles and other similar structural items should be galvanized.

B. Cast masonry Anchors: Type and size indicated or, if not indicated, to match existing anchors in size and type. Fabricate anchors from [Type 304] [Type 316] stainless steel.

C. Joint Sealant and Backing: As specified in Division 07 Section "Joint Sealants."

2.05 FABRICATION

A. Shapes: Unless otherwise indicated on Drawings, provide the following:
   1. Suitable wash on exterior sills, copings, projecting courses, and components with exposed top surfaces.
   2. Drips on projecting components, wherever possible.
   3. Replicate exact profile an\d finish of stones submitted to manufacturer for duplication.

B. Tolerances: Fabricate cast masonry components within specified tolerances.
   1. All dimensions: Plus or minus 1/8 inch (3 mm).
   2. Maximum Bow, Camber, or Twist: Length/360.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 INSTALLATION

A. General: Install cast masonry components in conjunction with masonry complying with requirements of Division 04 Section "Unit Masonry."

B. Setting:
   1. Do not use equipment in a manner that could damage cast masonry components.

2. Fill dowel holes and anchor slots completely with mortar on non-shrink grout.
3. Point joints with pointing mortar except where sealant-filled joints are specified and indicated on Drawings.
4. Make all joints 3/8 inch (9.5 mm), except as otherwise detailed.
5. Avoid smearing mortar onto the face of the CastCotta units. Sponge face of each unit immediately, if necessary to remove excess setting materials. Do not allow mortar to dry on unit surfaces.
6. Tool joints to a slight concave profile.
7. Do not moist-cure mortar except as may be required under hot weather and low humidity conditions to avoid plastic shrinkage cracking. Do not moist-cure beyond 24 hours.

C. Sealant Joints:
1. Comply with requirements of Division 07 Section "Joint Sealants."
2. Prime ends of cast masonry components, insert properly sized foam backing rod, and install sealant using sealant gun.
3. Provide sealant joints at following locations and as otherwise detailed:
   a. cast masonry components with exposed tops.
   b. Joints at relieving angles.
   c. At control and expansion joints.
   d. Perimeters open to weather.

3.03 TOLERANCES

A. Installation Tolerances: Comply with manufacturers recommendations, unless otherwise specified.
1. Variation from Plumb: Do not exceed 1/8 inch in 10 feet (3 mm in 3 m) or 1/4 inch in 20 feet (6 mm in 6 m) or more.
2. Variation from Level: Do not exceed 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 3/8 inch (9 mm) maximum.
3. Variation in Joint Width: Do not vary joint thickness more than 1/8 inch in 36 inches (3 mm in 900 mm) or 1/4 of nominal joint width, whichever is less.
4. Variation in Plane Between Adjacent Surfaces (Lipping): Do not exceed 1/16-inch (1.5-mm) difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.

3.04 ADJUSTING

A. Surface Repair:
1. Repair chipping and other surface damage noticeable when viewed in direct daylight at 10 feet (3 m).
2. Repair with matching touch-up material provided by manufacturer and in accordance with manufacturer’s instructions.
3. Repair methods and results to be approved by Architect and noted on “as-built” drawings for future reference.

3.05 CLEANING

A. In-Progress and Final Cleaning:
1. Clean cast masonry before sealants are applied, if applicable, and after installed units have cured for a minimum of 10 days.
   a. Wet surfaces with water before applying cleaner.
   b. Apply cleaner to cast masonry in accordance with manufacturer’s instructions.
   c. Remove cleaner promptly by low-pressure rinsing thoroughly with clean water.

3.06 PROTECTION

A. Protect cast masonry components from splashing and other damage.

END OF SECTION 042130

END OF SECTION 04 2130

SECTION 05 4000
COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Cold formed metal framing steel as part of GFC cornice repair as required to support and and shown on drawings.
   1. Delegated design to confirm member sizes, framing centers and bracing.

B. Formed steel stud exterior wall and interior wall and other framing where indicated on drawings.
   1. Delegated design to confirm stud sizes, framing centers and bracing.

C. COLD-FORMED METAL STUD SYSTEM: “C” shaped load bearing steel studs (ASTM C 955) and furring strips shall be spaced 16 inches on center, maximum. Min Uncoated Steel Thickness: 0.0428 inch, Min Flange Width: 1 5/8”. Shop Drawings with calculations by a Pennsylvania registered structural engineer are required to be submitted for review and approval by the Architect/Engineer for exterior wall application. Wire tying of framing components is not permitted. Use qualified welders and comply with the American Welding Society (AWS).

1.02 RELATED REQUIREMENTS

A. Section 03 4900 - Fiber Reinforced Concrete: Structural building framing.

B. Section 04 2130 - CAST ARCHITECTURAL CEMENT-BASED UNITS

1.03 REFERENCE STANDARDS

A. AISI S100 - North American Specification for the Design of Cold-Formed Steel Structural Members 2016, with Supplement (2020).

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2022.

D. 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.

E. ASTM C955 - Standard Specification for Cold-Formed Steel Structural Framing Members 2018, with Editorial Revision.

F. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories 2020.

G. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing 2017.

H. ASTM C1396/C1396M - Standard Specification for Gypsum Board 2017.

I. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic) 2019.

1.04 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.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide manufacturer's data on factory-made framing connectors, showing compliance with requirements.

C. 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. Calculations for loadings and stresses of specially fabricated framing, signed and sealed by a professional structural engineer.

D. Delegated-Design Submittal: For cold-formed steel framing and connections indicated on Drawings to comply with design loads, include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

E. Manufacturer's Installation Instructions: Indicate special procedures, conditions requiring special attention .

1.06 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: Member of Steel Stud Manufacturers Association (SSMA): www.ssma.com/#sle.

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

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Metal Framing:
   1. CEMCO: www.cemcosteel.com/#sle.
   2. ClarkDietrich: www.clarkdietrich.com/#sle.
   3. Jaimes Industries: www.jaimesind.com/#sle.
   4. Marino: www.marinoware.com/#sle.

B. Framing Connectors and Accessories:
   1. Same manufacturer as metal framing.
   2. ClarkDietrich: www.clarkdietrich.com/#sle.

2.02 FRAMING SYSTEM

A. COLD-FORMED METAL STUD SYSTEM: “C” shaped load bearing steel studs (ASTM C 955) and furring strips shall be spaced 16 inches on center, maximum. Min Uncoated Steel Thickness: 0.0428 inch, Min Flange Width: 1 5/8”. Shop Drawings with calculations by a Pennsylvania registered structural engineer are required to be submitted for review and approval by the Architect/Engineer for exterior wall application. Wire tying of framing components is not permitted. Use qualified welders and comply with the American Welding Society (AWS).

B. Provide primary and secondary framing members, bridging, bracing, plates, gussets, clips, fittings, reinforcement, and fastenings as required to provide a complete framing system.

C. 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.
   2. Structural Performance: Design, engineer, fabricate, and erect to withstand specified design loads for project conditions within required limits.
   3. Design Loads: Actual dead and live loads and interior wind loading requirements as calculated by the contractor’s engineer and additional requirements from the project structural engineer.
   4. Design Loads: In accordance with applicable codes.
      a. Interior Non-Load-Bearing Framing: Horizontal deflection of 1/240 of the wall height under a horizontal load of 5 lbf/sq. ft.
      b. Interior Non-Load-Bearing Framing to Receive Tile Finish: Horizontal deflection of 1/360 of the wall height under a horizontal load of 5 lbf/sq. ft.
      c. Ceiling and Soffit: Vertical deflection of 1/240 of the span for live loads and 1/240 for total loads of the span
      d. Floor Live Loads:
         1) Minimum Uniformly Distributed: 50 psf.
         2) Minimum Concentrated: 1,000 lbs.
      e. Roof Live Loads:
         1) Minimum Uniformly Distributed: .
         2) Minimum Concentrated: .
      f. Wind Loads: positive and negative.
   5. Live load deflection meeting the following, unless otherwise indicated:
      a. Floors: Maximum vertical deflection under live load of 1/480 of span.
      b. Roofs: Maximum vertical deflection under live load of 1/240 of span.
      c. Exterior Walls: Maximum horizontal deflection under wind load of 1/180 of span.
      d. Design non-axial loadbearing framing to accommodate not less than 1/2 in vertical deflection.
   6. 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.
   7. Able to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

2.03 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 required to meet specified performance levels.
   2. Galvanized in accordance with ASTM A653/A653M, G90/Z275 coating.

3. Provide components fabricated from ASTM A1008/A1008M Designation SS (structural steel).
4. Products:
    a. CEMCO; ProX Header: www.cemcosteel.com/#sle.
    b. MBA Building Supplies; Structural Studs & Track: www.mbastuds.com/#sle.
    c. Super Stud Building Products, Inc; SuperMAXX Studs: www.buysuperstud.com/#sle.

B. Jamb Studs: Engineered, C-shaped with wide flanges, designed to replace conventional double-stud framing at openings.
1. Products:
    a. SCAFCO Corporation; Kwik-Jamb Studs: www.scafco.com/#sle.

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.
2. Cripple Stud Clips: Manufacturer's standard.
3. Products:
    a. SCAFCO Corporation; HD Header: www.scafco.com/#sle.

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.
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 1/2 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 1/2 inch.
    c. Products:
        1) ClarkDietrich; Drift FastClip Slide Clip D-FCSC: www.clarkdietrich.com/#sle.
        2) ClarkDietrich; FastClip Slide Clip FCSC: www.clarkdietrich.com/#sle.
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.
6. Products:
    a. ClarkDietrich; Spazzer 5400 Bridging Bar: www.clarkdietrich.com/#sle.
    b. ClarkDietrich; FastBridge Clip: www.clarkdietrich.com/#sle.

2.04 FASTENERS

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

B. Anchorage Devices: Powder actuated.

2.05 WALL SHEATHING

A. Only as indciated on drawings for select conditions.

2.06 ACCESSORIES

A. Fabricate steel-framing accessories from ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
   1. Supplementary framing.
   2. Bracing, bridging, and solid blocking.
   3. Web stiffeners.
   4. Anchor clips.
   5. End clips.
   6. Gusset plates.
   7. Stud kickers and knee braces.
   8. Joist hangers and end closures.
   9. Hole-reinforcing plates.
   10. Backer plates.

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

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

B. Verify field measurements and adjust installation as required.

3.02 INSTALLATION OF STUDS

A. Install components in accordance with manufacturers' instructions and ASTM C1007 requirements.

3.03 INSTALLATION OF WALL SHEATHING

A. Install wall sheathing with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using self-tapping screws.

END OF SECTION 05 4000

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SECTION 05 5000
METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Shop fabricated steel items.

B. Miscellaneous framing and supports for applications where framing and supports are not specified in other sections including but not limited to rough hardware, loose steel lintels, metal fabric enclosures, supports for building in architectural woodwork.

C. Miscellaneous framing and supports for applications where framing and support are not specified in other sections including Galvanized Steel Lintels for new masonry openings for doors through existing masonry walls.

1.02 RELATED REQUIREMENTS

A. Section 04 2000 - Unit Masonry: Placement of metal fabrications in masonry.

B. Section 05 5133 - Metal Ladders; exterior ladders with cages

C. Section 076200 - Sheet Metal Flashing and Trim

D. Section 09 9000 - Paints and Coatings: Exterior Paint finish.

1.03 REFERENCE STANDARDS

A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum 2020.

B. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix) 2022.

C. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix) 2022.

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 A276/A276M - Standard Specification for Stainless Steel Bars and Shapes 2017.

F. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.

G. ASTM A48/A48M - Standard Specification for Gray Iron Castings 2022.

H. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2022.

I. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.

J. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.

K. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications 2022b.

L. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates 2018.

M. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength 2021.

N. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes 2021a.

O. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing 2021.

P. ASTM A554 - Standard Specification for Welded Stainless Steel Mechanical Tubing 2021.

Q. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2022.

R. 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.

S. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2015.

T. ASTM B210/B210M - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes 2019a.

U. ASTM B211/B211M - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire 2019.

V. 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.

W. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination 2020.

X. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification 2021.

Y. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2022).

Z. AWS D1.2/D1.2M - Structural Welding Code - Aluminum 2014, with Errata (2020).

AA. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel AC172 2019.

BB. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer 2004.

CC. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic) 2019.

DD. SSPC-SP 2 - Hand Tool Cleaning 2018.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. 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.
   2. Design data: Submit drawings and supporting calculations, signed and sealed by a qualified professional structural engineer.
      a. Include the following, as applicable:
         1) Design criteria.
         2) Engineering analysis depicting stresses and deflections.
         3) Member sizes and gauges.
         4) Details of connections.
         5) Support reactions.
         6) Bracing requirements.

C. 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.

D. WELDER CERTIFICATION: The General Contractor is responsible for submitting for project record and retaining on construction site the welder certifications for any person performing on-site welded steel fabrication or erection. The certifications must be current and validated by welding logs or certification test(s) conducted with the last two (2) years.

E. Designer's Qualification Statement.

F. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.05 QUALITY ASSURANCE

A. Design connections 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.

D. LINTELS FOR PLUMBING, HVAC, AND ELECTRICAL INSTALLATIONS: furnish lintels for all openings through walls when openings are shown on the architectural or structural drawings. Note all such lintels and openings to require coordination of work and exact locations, by affected contractors. All such plumbing, HVAC, electrical, and sprinkler openings must be coordinated and shown on the General Contractor’s Systems’ Coordination Drawings which must be submitted for Architect/Engineer review and approval.

E. USE OF INK MARKING PENS ON SURFACES of any kind of materials is prohibited because such marks bleed through paint and other finishes.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

A. GALVANIZING REQUIREMENTS: All exterior ferrous metals shall be hot-dip galvanized after fabrication unless noted as Stainless Steel.

B. Steel Sections: ASTM A36/A36M.

C. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.

D. Plates: ASTM A283/A283M.

E. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

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

G. Galvanized Steel Lintels for new masonry openings for doors through existing masonry walls (and repair/replacement of existing lintels for existing window openings as indicated) to comply with building code and requirements here within and are required to have complete flashing; refer to Division 7 Sections.

2.02 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. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.03 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. Door Frames for Overhead Door Openings, Wall Openings, and windows: Channel sections; prime paint finish.

2.04 Dark Bronze metal picket security fence with vandal proof curved top

A. information to follow

2.05 FINISHES - STEEL

A. Prime paint steel items.

1. Exceptions: Galvanize items to be embedded in concrete, items to be embedded in masonry, and items specified for galvanized finish.

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.

F. Stainless Steel Finish: No. 4 Bright Polished finish.

2.06 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

3.01 EXAMINATION

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

3.02 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.

3.03 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. Obtain approval prior to site cutting or making adjustments not scheduled.

3.04 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 05 5000

SECTION 05 5808
SECURITY SCREENS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Applicable provisions of Bidding Requirements, Contract Requirements in Division 0 and all applicable Division 01 sections.

1.02 SUMMARY

A. Section Includes: Security Screens and attachments for complete installation for locations indicated on drawings.
   1. All windows on lowest level (basement / grade level) are to have screens and coordinate / modify screens as needed to accommodate mechanical louvers.
   2. Provide screens in other locations as shown on drawings.

B. Section Includes: The security screens shown on the plans and herein specified are the products of Kane Innovations, Erie, Pennsylvania. This manufacturer's name and products have been used to establish the standards of construction and quality of workmanship required for this project and per Rebuild standard. Manufacturers bidding on this project must be actively engaged in the fabrication of specified items for a minimum of five (5) years prior to the bid date. Manufacturers requesting approval to bid their products as equal must submit to the Architect full-size drawings, including details of construction, and a complete operating security screen sample, 10 days prior to the bid date. Provide LEVEL 5 Fixed Steel NarrowLine Security Screen Model: S-NR5-Z

C. Related Sections:
   1. Division 4 for masonry
   2. Division 5 for other metals
   3. 079200 "Joint Sealants" for joint sealants installed as part of the aluminum sliding door system
   4. 085113 "Aluminum Windows"
   5. 088100 "Glazing"

1.03 DEFINITIONS

A. Performance class designations according to AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS):
   1. AW: Architectural Window

B. Performance grade number according to AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS):
   1. Design pressure number in pounds force per square foot used to determine the structural test pressure and water test pressure.

C. Definitions: For fenestration industry standard terminology and definitions refer to American Architectural Manufactures Association (AAMA) - AAMA Glossary (AAMA AG).

1.04 PERFORMANCE REQUIREMENTS

A. General: Provide complete system including masonry anchors, special finishes and operating hardware for window cleaning as shown on drawings.

B. Structural Performance: Provide complete system including masonry anchors and setting adhesives in accordance with masonry sections and provisions on structural drawings.

1.05 SUBMITTALS

A. Product Data: Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions for each type of window guard indicated.
   1. Security Screens: Keyed cam lock to match existing keying, include key number on shop drawing submittal

B. Samples for Initial Selection: For units with factory-applied color finishes including samples of hardware and accessories involving color selection. Samples for Verification: For components required.

C. Product Schedule: Use same designations indicated on Drawings.

D. Shop Drawings: Manufacturer shall submit shop drawings, showing details of attachment to surround materials and elevations showing scope of the project and include plans, elevations, sections, details, hardware, attachments to other work, operational clearances and installation details.

E. Samples of materials may be requested without cost to owner: frame sections, infill sections, fasteners, corner section, etc.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: An installer which has had successful experiences with installation of the same or similar units required for this project and other projects of similar size and scope.

B. Manufacturer Qualifications: A manufacturer capable of fabricating Security Screens that meet or exceed performance requirements indicated and of documenting this performance by inclusion of test reports, and calculations.

C. Source Limitations: Obtain Security Screens through one source from a single manufacturer.

D. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum windows and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements." Do not modify size and dimensional requirements.

E. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.07 PROJECT CONDITIONS

A. Field Measurements: Verify Security Screens openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.08 WARRANTY

A. The operation of the security screen supplied by Kane Innovations on the designated project is warranted for one (1) year against any proven defective material or parts, as called for in the specifications and approved shop drawings. This warranty does not cover abuse by others.

B. Manufacturer’s Warranty: Submit, for Owner’s acceptance, manufacturer’s standard warranty.

1. Warranty Period: one (1) year from Date of Substantial Completion of the project provided however that the Limited Warranty shall begin in no event later than nine months from date of shipment by manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: Kane Level 5 (heavy vandalism) steel narrowline, operable side-hinged (SNR50) with16-gauge (63% open) perforated panel. Bonderized with thermoplastic, polyester powder-coat finish, AAMA 2603. Roto-lift emergency egress release. Keyed cam lock to match existing keying, include key number on shop drawing submittal.
   1. Kane Innovations, Erie, PA; (800) 773-2439

B. Or equal and Subject to compliance with requirements, provide a complete system of a comparable product by the following and only if basis of design products are not readily available.

2.02 MATERIALS

A. Aluminum Extrusions: Alloy and temper recommended by aluminum window manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.070” wall thickness at any location for the main frame and sash members.
   1. Recycled Content: Provide documentation indicating post-consumer recycled content plus one-half pre-consumer recycled content.

B. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum window members, trim, hardware, anchors, and other components.

C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.

D. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.

E. Sealant: For sealants required within fabricated windows, provide window manufacturer's standard, permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.

2.03 HARDWARE

A. General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, or other corrosion-resistant material compatible with aluminum; designed to smoothly operate, tightly close, and securely lock windows guards.

2.04 Security Screens for Rec Center PPR Standard

A. Basis of Design: Kane Level 5 (heavy vandalism) steel narrowline, operable side-hinged (SNR50) with16-gauge (63% open) perforated panel. Bonderized with thermoplastic, polyester powder-coat finish, AAMA 2603. Roto-lift emergency egress release. Keyed cam lock to match existing keying, include key number on shop drawing submittal.

B. Security Screens to be attached to masonry as indicated on drawings.
   1. Option to secure to window frames to be offered as available.

2.05 Main Frame

A. A. The main frame rails shall be not less than 16-gauge 1” [25.4mm] x 1” [25.4mm] seamless welded galvanized steel tubing with high strength die cast metal corners which are pneumatically inserted into the frame ends with an interference fit.

B. B. A removable face plate, extruded from 6063-T6 aluminum alloy, .062-inch thick, .212 lbs./ft., shall be attached to the sides of the main frame using tamper resistant screws.

2.06 FABRICATION

A. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
   1. Profiles that are sharp, straight, and free of defects or deformations.
   2. Accurately fit joints; make joints flush, hairline and weatherproof.
   3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior of masonry anchors.
   4. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

B. Fabricate windows guards in sizes indicated to be confirm by field measurement. Include a complete system for assembling components and windows guards.

2.07 Infill

A. Wire Cloth

B. Wire cloth shall be woven 12-mesh to the inch from .028 [0.71] inch diameter Type 304 stainless steel wire and double crimped.

C. Wire cloth shall be woven 10-mesh to the inch from .047 [1.19] inch diameter Type 304 stainless steel wire and double crimped.

D. Perforated Panel

E. 16-gauge mill-galvannealed with 63% open area

F. 14-gauge mill-galvannealed with 51% open area

G. 12-gauge mill-galvannealed with 51% open area

H. 18-gauge stainless steel with 63% open area

2.08 Infill Attachment

A. The perforated panel shall be attached to the main frame with hex-head Tek Screws.

B. Wire cloth shall be hemmed 180 degrees and retained by Hex-head Tek Screws. (for 12 mesh .028 wire cloth only)

C. Hex-head Tek screws shall penetrate the infill and main frame approximately 4” [101.6] on center.

2.09 ALUMINUM FINISHES

A. The aluminum faceplates shall be thoroughly cleaned in a 5-step bonderizing process. An electrostatically applied thermoplastic, polyester powder coating (2.5 mil min. thickness) shall be applied and baked to a hard mar-resistant finish in one of Kane's standard colors. Coating shall meet or exceed AAMA 2603.
   1. White
   2. Gray
   3. Black
   4. Beige
   5. Dark Bronze
   6. Custom colors are available at additional cost with submission of color sample
   7. 215 R1 Clear Anodized

B. The main and infill shall be thoroughly cleaned in a 5-step bonderizing process. An electrostatically applied black, thermoplastic, polyester powder coating (2.5 mil min. thickness) shall be applied and baked to a hard mar-resistant finish. Coating shall meet or exceed AAMA 2603.

C. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

D. Factory Finishing: per basis of design standard.

2.10 FINISH

A. Anodic Finish: All exposed areas of aluminum windows and components shall receive a two-step finish: clear anodize components, then color coat with electrostatically deposited finish UNO:
   1. Color: As noted in drawings otherwise:
   2. Color: To be selected by the Architect from the manufacturer's standard colors.

B. Paint Finish: Finish all exposed areas of aluminum windows and components with the following UNO:
   1. 70 percent Kynar in accordance with AA-M12-C42-R1X, AAMA 2605-98
   2. Color: As noted in drawings otherwise:
   3. Color: To be selected by the Architect from the manufacturer's standard colors.

PART 3 EXECUTION

3.01 EXAMINATION

A. Inspection: Verify that openings fit allowable tolerances, are plumb, level, provide a solid anchoring surface and comply with approved shop drawings

B. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weather tight window installation.
   1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.

2. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install in accordance with approved shop drawings and specifications.

B. Plumb and align faces in a single plane and erect screens square and true, adequately anchored to structure.

C. After completion of installation, screens shall be adjusted, in working order and cleaned.

D. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing windows, hardware, accessories, and other components.

E. Install aluminum framed storefront system level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.

F. Set sill members in bed of sealant or with gaskets, as indicated, for weather tight construction.

G. Install aluminum framed storefront system and components to drain condensation, water penetrating joints, and moisture migrating within sliding door to the exterior.

H. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.03 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.
1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.

B. Testing Services: Testing and inspecting of installed windows shall take place as follows:
1. Testing Methodology: Testing Standard shall be per AAMA 502 including reference to ASTM E 783 for Air Infiltration Test and ASTM E 1105 for Water Penetration Test.
   a. Air Infiltration Test: Conduct test in accordance with ASTM E 783 at a minimum uniform static test pressure of 1.57 psf (75 Pa) for CW or 6.24 psf (300 Pa) for AW. The maximum allowable rates of air leakage for field testing shall not exceed 1.5 times the project specifications.
   b. Water Infiltration Test: Water penetration resistance tests shall be conducted in accordance with ASTM E 1105 at a static test pressure equal to 2/3 the specified water test pressure.
2. Testing Extent: Architect shall select window units to be tested as soon as a representative portion of the project has been installed, glazed, perimeter caulked and cured. Conduct tests for air infiltration and water penetration with manufacturer’s representative present.
3. Test Reports: Shall be prepared according to AAMA 502.

3.04 ADJUSTING, CLEANING, AND PROTECTION

A. Adjust operating sashes, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weather tight closure. Lubricate hardware and

moving parts.

B. Clean aluminum surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

C. Clean glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.

D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

E. Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written recommendations.

3.05 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain window operating system. Refer to Section 017823 "Operating and Maintenance Manuals."

END OF SECTION 05 5808

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SECTION 06 1000
ROUGH CARPENTRY

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Applicable provisions of Bidding Requirements, Contract Requirements in Division 0 and all applicable Division 1 sections.

B. Section 05 5000-Metal Fabrications: Miscellaneous steel connectors and support angles for wood framing.

C. Section 07 6200-Sheet Metal Flashing and Trim: Sill flashings.

D. Section 07 7200-Roof Accessories: Prefabricated roof curbs.

1.02 SUMMARY

A. Section Includes:
1. Wood blocking and nailers.
2. Plywood backing panels and decking where indiciated on drawings.
3. Fire retardant treated wood materials.
4. Other misc wood framing and bracing.
5. **BP#1:** wood blocking used at window replacement and repair to be fire-retardant treated.
6. **BP#1:** wood blocking used at roof hatch to be fire-retardant treated.
7. **BP#1:** Roof Sheathing: 1/2" glass fiber sheathing for overlay of existing roof deck; APA min. standard securing sheathing to substrate existing rafters with break on rafterers.
   a. GWB Sheathing where indicated.
   b. Marine Grade Sheathing plywood where indicated.

1.03 REFERENCE STANDARDS

A. ANSI A208.1 - American National Standard for Particleboard; 2016.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.

D. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2019.

E. ASTM C208 - Standard Specification for Cellulosic Fiber Insulating Board; 2012, with Editorial Revision (2019).

F. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing; 2003 (Reapproved 2017).

G. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2019.

H. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2017.

I. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2021.

J. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.

K. ASTM D2898 - Standard Practice for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing; 2010 (Reapproved 2017).

L. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2016.

M. ASTM D3498 - Standard Specification for Adhesives for Field-Gluing Wood Structural Panels (Plywood or Oriented Strand Board) to Wood Based Floor System Framing; 2019a.

N. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials; 2021a.

O. ASTM E2357 - Standard Test Method for Determining Air Leakage of Air Barrier Assemblies; 2018.

P. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2021a.

Q. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2021.

R. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750°C; 2019a.

S. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015 (Reapproved 2021)e1.

T. AWC (WFCM) - Wood Frame Construction Manual for One- and Two-Family Dwellings; 2018, with Errata (2019).

U. AWPA U1 - Use Category System: User Specification for Treated Wood; 2021.

V. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

W. ICC (IECC) - International Energy Conservation Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

X. ICC-ES AC38 - Acceptance Criteria for Water-Resistive Barriers; 2016, with Editorial Revision (2019).

Y. ICC-ES AC310 - Acceptance Criteria for Water-resistive Membranes Factory-bonded to Wood-based Structural Sheathing, Used as Water-Resistive Barriers; 2008, with Editorial Revision (2015).

Z. ICC-ES AC380 - Acceptance Criteria for Termite Physical Barrier Systems; 2014, with Editorial Revision (2017).

AA. NELMA (SGR) - Standard Grading Rules for Northeastern Lumber; 2021.

BB. PS 1 - Structural Plywood; 2009 (Revised 2019).

CC. PS 2 - Performance Standard for Wood Structural Panels; 2018.

DD. PS 20 - American Softwood Lumber Standard; 2020.

EE. RIS (GR) - Standard Specifications for Grades of California Redwood Lumber; 2019.

FF. SPIB (GR) - Grading Rules; 2014.

GG. WCLIB (GR) - Standard Grading Rules for West Coast Lumber No. 17; 2018.

HH. WWPA G-5 - Western Lumber Grading Rules; 2021.

1.04 PRODUCT HANDLING

A. Stack lumber and plywood; place spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.01 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review.
   1. Factory mark each piece of lumber with grade stamp of grading agency.
   2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
   3. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.

B. Plywood Panels:
   1. Plywood: DOC PS 1.
   2. Thickness: As needed to comply with requirements specified but not less than thickness indicated.
   3. Factory mark panels according to indicated standard.

2.02 ROOF SHEATHING and select masonry opening infill Cavity Wall Sheathing.

A. Plywood Sheathing: Marine Grade Plywood Exposure 1 sheathing; where indicated on drawings.
   1. Nominal Thickness: Not less than 15/32 inch
      a. Roof Cover Board:
   2. Basis of Design: Marine Grade Plywood
   3. For marine grade plywood, high temperature self-adhering underlayment at days end.

B. Fiberglass Mat Gypsum Roof Cover Board; where indicated on drawings.
   1. Fiberglass Faced, Polyisocyanurate-Foam Sheathing: ASTM C1289, Type I or Type II, Class 2, rigid, cellular, polyisocyanurate thermal insulation. Foam-plastic core and facings shall have a flame-spread index of 25 or less when tested individually.
   2. Basis of Design: DensDeck, Georgia-Pacific
   3. Manufacturers: Subject to compliance with requirements, provide products by one of the following: As indicated and:
   4. Thickness: 1/2 inch Or As otherwise indicated at special conditions.
   5. Flame Propagation Test: Materials and construction shall be as tested according to NFPA 285.

C. Oriented-Strand-Board Sheathing: DOC PS 2, sheathing:
   1. Nominal Thickness: **1/2 inch**.
   2. Provide 5/8" glass fiber Cavity Wall Sheathing at existing masonry opening infill as shown on drawings.

2.03 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.

B. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.

C. 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 AWPA standards.

D. Exterior Type: AWPA 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.
   1. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
   2. Treat exterior rough carpentry items.
   3. Treat exposed exterior rough carpentry items, including stairways, balconies, and covered walkways
   4. Do not use treated wood in direct contact with the ground.

E. Interior side of exterior application: Type A: AWPA U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, 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.
   1. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
   2. Interior rough carpentry items are to be fire retardant treated.
   3. Treat rough carpentry items as indicated .
   4. Do not use treated wood in applications exposed to weather or where the wood may become wet.

2.04 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA UC2 (lumber) and AWPA UC3 (plywood).
   1. Preservative Chemical: Ammoniacal, or amine, copper quat (ACQ).
   2. Do not use chemicals containing chromium or arsenic.

B. Kiln-dry material after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark each treated item with the treatment quality mark of an inspection agency approved by the American Lumber Standards Committee Board of Review.

D. Application: Treat items indicated on Drawings, and the following:
   1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
   2. Wood sills, sleepers, blocking, stripping, and similar concealed members in contact with masonry or concrete.

2.05 DIMENSION LUMBER

A. General: Provide dimension lumber of grades indicated according to the American Lumber Standards Committee National Grading Rule provisions of the grading agency indicated.

B. Miscellaneous Lumber: Provide lumber for support or attachment of other construction, including blocking and nailers.

C. For items of dimension lumber size, provide Construction, Stud, or No. 2 grade lumber with 19 percent maximum moisture content and any of the following species:
   1. Mixed southern pine; SPIB.
   2. Hem-fir or Hem-fir (north); NLGA, WCLIB, or WWPA.
   3. Spruce-pine-fir (south) or Spruce-pine-fir; NELMA, NLGA, WCLIB, or WWPA.
   4. Eastern softwoods; NELMA.
   5. Northern species; NLGA.
   6. Western woods; WCLIB or WWPA.

2.06 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
   1. Where miscellaneous carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
   2. Where miscellaneous carpentry is preservative-treated, provide fasteners of Type 304 or Type 316 stainless steel.

B. Nails: FS FF-N-105.

C. Power-Driven Fasteners: CABO NER-272.

D. Wood Screws: ASME B18.6.1.

E. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

F. Roof Sheathing Fasteners: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
   1. For roof parapet and wall sheathing, provide fasteners with **hot-dip zinc coating complying with ASTM A153/A153M an where indicated of Type 304 stainless steel**.
   2. For **roof parapet and wall** sheathing, provide fasteners with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B117.
   3. Nails, Brads, and Staples: ASTM F1667.
   4. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

G. Expansion Anchors: (not permitted in exterior masonry unless needed and only with written approval) Anchor bolt and sleeve assembly of material indicated below with capability to

sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. Discard units of material with defects that impair quality of carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.

B. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.

C. Securely attach carpentry work as indicated and according to applicable codes and recognized standards.

D. Use fasteners of appropriate type and length. Predrill members when necessary to avoid splitting wood.

E. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

F. Cut sheathing panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

G. Securely attach sheathing panels to substrate by fastening as indicated, complying with the following:
   1. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.
   2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in the ICC's International Residential Code for One- and Two-Family Dwellings.
   3. ICC-ES evaluation report for fastener.

H. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.

I. Coordinate roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

J. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

K. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.02 WOOD STRUCTURAL PANEL INSTALLATION

A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.

B. Fastening Methods: Fasten panels as indicated below:
   1. Roof Sheathing:
      a. Nail to wood framing
      b. Screw to cold-formed metal framing.
      c. Space panels 1/8 inch apart at edges and ends.

3.03 WOOD BLOCKING AND NAILER INSTALLATION

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.

3.04 PLYWOOD PANEL INSTALLATION

A. Plywood Panels: Comply with applicable recommendations contained in APA Form No. E30K, "APA Design/Construction Guide: Residential & Commercial," for types of structural-use panels and applications indicated.

END OF SECTION 06 1000

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SECTION 07 0150.19
PREPARATION FOR RE-ROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Removal of existing steep slope roofing system and built-in gutters in preparation for entire new gutter and roofing system.

B. Removal of existing flashing and non-built-in counterflashings.

C. Temporary roofing protection.

1.02 SUMMARY OF ROOFING WORK

A. The Work of Project is defined by the Contract Documents and consists of the following:
   1. Steep Slope with integral roof edge roofing membrane gutter to drain to scuppers and scupper boxes.
      a. Items a-c inclusive apply to steep slope roof where specially indicated.
      b. Provide ½" marine grade plywood covering gutter and upslope 24".
      c. Provide SPF blocking at eaves, hips, and ridge locations.
      d. Tear off and removal of all existing roofing insulation, flashing and related materials from gutter areas upslope 30" from parapet.
      e. Remove and replace deteriorated wood decking.
      f. Re-nail existing 1x6 T&G wood deck to rafters and related (gutter) framing.
      g. Saw cutting of reglets.
      h. Entire sloped roof areas above removed portion; Tear off and removal of all existing roofing insulation, flashing and related materials down to existing sheathing above rigid insulation.
      i. Remove and replace damaged insulation and overlay entire steep roof with ½" sheathing.
      j. Provide wood blocking as shown on roof detail drawings.
      k. Overlay entire steep slope roof and insulation with ½" roof sheathing.
      l. Remove and replace in kind all existing roof scuppers and scupper boxes, collection boxes, and pipe downspouts.
      m. Secure marine grade plywood and sheathing, through insulation, into rafters in compliance with APA publications.
      n. Cover entire gutter and upslope 24" with self-adhering underlayment.
      o. Provide multiply SBS gutter liner up to 24" from transition to steep roof at R-2 Roof Areas.
      p. Provide asphalt fiberglass shingle roofing system in accordance with roofing manufacturer's requirements.
         1) Minimum 6 nails per shingle.
         2) Minimum 1" from shingle edges.
      q. Installation of insulation, tapered insulation and insulation cover board set in urethane adhesive at low slope roof areas.
      r. Installation of SBS roofing and flashing system.
      s. Provide sheet metal flashings.
      t. Removal of all debris and project related tools and materials.
      u. Cover entire gutter and upslope 24" with high-temperature self-adhering underlayment.

v. Provide 20-gauge galvanized steel gutter liner as dimensioned at Roof R-2 gutter area.
w. Prepare metal and apply fully reinforced PMMA resin flashing system from reglet continuous to a point 2” above coping high point, at Roof Area R-2 gutters.
x. Provide new roof scuttle.
y. Provide continuous shingle underlayment.
z. Roofing curbs and blocking to be fire retardant treated wood.
aa. Fabrication and installation of sheet metal flashing.
bb. Installation of SBS and PMMA gutters, asphalt shingle roofing and sheet metal flashing system.
cc. Removal of all debris and project related items and materials.

2. Test all and clear first 10 LF of clogs from all RWC boots at grade; report to architect test results indicating blockages deeper than 10' in stormwater drain line. Test and clear lines to industry and trade standards.
3. All existing built-in flashings to remain. If damaged or removed during construction, contractor to replace at no cost to Owner.

1.03 RELATED REQUIREMENTS

A. Section 061000 – Rough Carpentry – Blocking, sheathing and built-in gutter underlayment.

B. Section 07 5200 - Modified Bituminous Membrane Roofing.

C. Section 07 6200 - Sheet Metal Flashing and Trim: Replacement of flashing and counterflashings.

D. Section 07 3113 – Asphalt Shingles

E. Section 07 7200 – Roof Accessories

1.04 REFERENCE STANDARDS

A. ASTM D2178/D2178M - Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing 2015a (Reapproved 2021).

B. ASTM D41/D41M - Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing 2011 (Reapproved 2016).

C. ASTM D3462/D3462M – Standard Specification for Asphalt Fiberglass Shingles Used in Roofing.

D. ASTM D7379 –Standard Specification for Modified Bituminous Roofing Base Ply Materials (Gutter Liner).

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with affected mechanical and electrical work associated with roof penetrations.

B. Preinstallation Meeting: Convene one week before starting work of this section.
1. Attendees:
a. Architect.
b. Contractor.
c. Owner.
d. Architect/Consultant
e. Installer.

2. Meeting Agenda: Provide agenda to participants prior to meeting in preparation for discussions on the following:
    a. Removal and installation schedule.
    b. Necessary preparatory work.
    c. All adjacent masonry and sealing work to be completed prior to roof removal.
    d. Protection before, during, and after roofing system installation.
    e. Removal of existing asphalt shingle roofing systems, galvanized steel coated with reinforced PMMA and SBS gutter system and underlayments.
    f. Temporary roofing and daily terminations.
    g. Installation of new 1.5” polyisocyanurate insulation over entire roof deck .
    h. Installation of new ½” sheathing covering new insulation at existing insulation and coverboard.
        1) Secure sheathing and insulation penetrating the existing T&G deck not less than ½”
        2) Secure sheathing and insulation in accordance with APA fastening requirements.
    i. Installation of self-adhering underlayments and asphalt shingle roofing system.
    j. Installation and maintenance of temporary roof drain/scupper and related rain water conductors.

C. Schedule work to coincide with commencement of installation of new roofing system.

1.06 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Submit for each type of material.

C. Shop Drawings: Indicate size, configuration, and installation details.

D. Materials Removal Company Qualification Statement.

1.07 QUALITY ASSURANCE

A. Materials Removal Company Qualifications: Company specializing in performing work of type specified with at least three five years of documented experience projects of similar size, scope, and historic nature.
    1. Comply with EPA notification regulations prior to start of roofing removal work.
    2. Comply with removal and disposal regulations of local authorities having jurisdiction (AHJ).

1.08 DELIVERY, STORAGE, AND HANDLING

A. Ensure storage and staging of materials does not exceed static and dynamic load-bearing capacities of roof decking.

B. Protect all roofing materials from weather with plastic sheathing and/or tarpaulins.

1.09 FIELD CONDITIONS

A. Existing Roof Deck Assembly at Steep Slope Roofs.
    1. Original 1x6 T&G wood roof deck
    2. Underlayment
    3. 1.5” rigid insulation

4. ½” sheathing
5. Underlayment
6. Dimensional asphalt fiberglass shingles

B. New Roof Assembly
1. Original 1x6 T&G wood roof deck
2. Underlayment
3. Rigid insulation (Existing)
4. 1.5” rigid insulation
5. ½” Sheathing
6. Underlayment
7. Asphalt fiberglass shingles
8. Asphalt saturated felt underlayment
9. SBS and reinforced PMMA coated sheet metal gutter liners
10. ½” Sheathing.
11. Breathable Underlayment
12. SBS gutters
13. Asphalt shingles

PART 2 PRODUCTS

2.01 COMPONENTS

A. Refer to following sections for additional information on components relating to this work:
1. Replacement and removal of existing roofing system in preparation for entire new roofing system, see Section 07 5100 SBS? And Section 073110 Asphalt Shingles.
2. All existing counterflashings to remain in place for reuse.
3. Remove existing insert and reglet flashings and counterflashings in preparation for replacement of these materials as part of this work, see Section 07 6200 for material requirements.
a. Do not remove built-in counterflashings unless noted on drawings.

2.02 MATERIALS

A. Temporary Roofing Protection Materials:
1. Contractor's responsibility to select appropriate materials for temporary protection of roofing areas as determined necessary for this work.
2. Provide minimum self-adhering underlayment materials at all gutter locations.
3. Provide additional materials, sealants, and necessary means to provide a watertight guttering system.
4. Provide and maintain a watertight gutter and scupper drainage system throughout the construction period.

2.03 ACCESSORIES

A. Fasteners: Type and size as required and compatible with existing and new roofing system to resist local wind uplift.

B. Base Sheet: Non-perforated, asphalt-coated glass fiber base sheet, Type II in accordance with ASTM D4601/D4601M.

C. Asphalt Primer: Masonry walls to receive SBS flashings at chimney, parapet, and rising wall conditions, Type II in accordance with ASTM D41/D41M.

D. Temporary through wall scupper; refer to Section 07 6200 Sheet Metal Flashing and Trim for permanent scuppers

E. Additional sheet metal flashings and terminations as required to maintain a water tight roof.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing roof surface has been cleared of materials being removed from existing roofing system and ready for next phase of work as required, including setting all existing nail heads.

B. Remove items identified to be removed and replaced including roof drains and provide temporary flashings.

3.02 PREPARATION

A. Sweep roof surface clean of loose matter.

B. Remove loose refuse and dispose of properly off-site.

C. Protect PMMA gutter liner. Repair damages with additional PMMA flashing system.

3.03 MATERIAL REMOVAL

A. Remove only existing roofing materials that can be replaced with new and/or long term temporary materials the same day.

B. All existing built-in flashings to remain. If damaged or removed during construction, contractor to replace at no cost to Owner.

C. Remove all non built-in sheet metal counter flashings unless otherwise noted on drawings.

D. Remove loose and/or damaged vapor retarder, sheathing paper, underlay, and existing roof drains gypsum board.

E. Remove and replace deteriorated (T&G) wood deck surface in kind to provide smooth working surface for new roof system.

3.04 INSTALLATION

A. Coordinate scope of this work with requirements for installation of new roofing system, see Section 07 5200 for additional requirements.

B. Install sheathing over insulation

C. Installation of underlayment and temporary roofing.

3.05 FIELD QUALITY CONTROL

A. Manufacturer standard inspections

3.06 PROTECTION

A. Provide temporary protective sheeting over uncovered deck surfaces.

B. Turn sheeting up and Under built-in counterflashings

C. Provide for surface drainage from sheeting to existing drainage/scuppers facilities.

D. Do not allow debris to enter subgrade drainage system.

E. Do not permit traffic over unprotected or repaired deck surface.

3.07 SCHEDULES

A. Entire Roofing Area: Remove existing gutter flashings, shingles, and related underlayments.

B. Entire Low Slope Roofing Area: SBS Roofing

END OF SECTION 07 0150.19

SECTION 07 2100
THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

B. Additional criteria for Board insulation and integral vapor retarder over roof deck called out in the roof membrane sections and in roof details.

C. Roof Insulation below and above deck and above the attic rafters and existing fiberglass insulation after Architects approval of “post-construction insulation condition” and other insulation as shown on drawings

D. R value performance requirements as follows:
   1. Ploy-iso to meet min of R6.5 per 1 inch.
   2. Mineral Batt to meet min of R3.15 per 1 inch.

E. Additional criteria for Board insulation and integral vapor retarder over roof deck called out in the roof membrane sections and in roof details.

F. Roof Insulation below and above deck and other insulation as shown on drawings and as required in roofing specifications.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Installation requirements for board insulation over steep slope roof sheathing or roof structure.

B. Section 07 5200 - Modified Bituminous Membrane Roofing: Installation requirements for board insulation over low slope roof deck specified in this section.

C. Section 08 5113 - Aluminum Windows: for instalation in window panning.

1.03 REFERENCE STANDARDS

A. ASTM C240 - Standard Test Methods for Testing Cellular Glass Insulation Block 2021.

B. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method 2022.

C. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation 2022.

D. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications 2013 (Reapproved 2019).

E. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation 2022.

F. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation 2014 (Reapproved 2019).

G. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing 2017.

H. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board 2022a.

I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023.

J. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022a, with Editorial Revision (2023).

K. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 °C 2022.

L. ASTM E1414/E1414M - Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum 2021a.

M. ASTM E2357 - Standard Test Method for Determining Air Leakage Rate of Air Barrier Assemblies 2018.

N. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components 2023.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

1.05 QUALITY ASSURANCE

A. Air Barrier Association of America (ABAA) Quality Assurance Program (QAP); www.airbarrier.org/#sle:

1.06 FIELD CONDITIONS

A. Do not remove roofing when precipitation probabilities and/or weather conditions are detrimental to successful installation.

B. Do not expose insulation to precipitation, prior to, during, and/or after application. Cover insulation immediately after installation with sheathing and weather proof covering.

C. Do not install insulation when weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.01 APPLICATIONS

A. Insulation in Wood and Metal Framed Walls: Sound attenuation Batt insulation with no vapor retarder.

B. Insulation Over Roof Deck: Extruded polystyrene (XPS), Expanded Polystyrene (EPS) board and or as otherwise indicated on drawings and in roofing sections.

C. Miscellaneous Insulation indicated on drawings.

2.02 FOAM BOARD INSULATION MATERIALS

A. Extruded Polystyrene (XPS) Board Insulation: Complies 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) per 1 inch thickness at 75 degrees F mean temperature.
   5. Complies with fire resistance requirements indicated on drawings as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.
   6. Board Edges: Square.
   7. Type and Water Absorption: Type IV, 0.3 percent by volume, maximum, by total immersion.
   8. Products:
      a. DuPont de Nemours, Inc; Styrofoam Brand as recommended : building.dupont.com/#sle.
      b. Kingspan Insulation LLC; GreenGuard XPS Type IV, 25 psi: www.kingspan.com/#sle.

B. Polyisocyanurate (ISO) Board Insulation: Rigid cellular foam, complying with ASTM C1289.
   1. Classifications:
      a. Type II: Faced with either organic felt facers or glass fiber mat facers on both major surfaces of the core foam.
         1) Class 1 - Faced with glass fiber reinforced cellulosic felt facers on both major surfaces of core foam.
         2) Compressive Strength: Classes 1-2-3, Grade 1 - 16 psi (110 kPa), minimum.
         3) Thermal Resistance, R-value: At 1-1/2 inch thick; Class 1, Grades 1-2-3 - 8.4 (1.48) at 75 degrees F.
   2. Board Size: 48 inch by 96 inch.
   3. Board Thickness: 1.5 inch and 1” at Built In Gutter ONLY.
   4. Products:
      a. Atlas Roofing Corporation; ACFoam-II Polyiso Roof Insulation: www.atlasroofing.com/#sle.
      b. Atlas Roofing Corporation; EnergyShield CGF PRO: www.atlasroofing.com/#sle.
      c. Carlisle Coatings & Waterproofing, Inc; R2+ Matte: www.carlisleccw.com/#sle.
      d. GAF; EnergyGuard Polyiso Insulation: www.gaf.com/#sle.
      e. GAF; EnergyGuard Perlite Roof Insulation: www.gaf.com/#sle.
      f. GAF; EnergyGuard HD PLUS Polyiso Insulation: www.gaf.com/#sle.
      g. Hunter Panels; Xci Foil (Class A): www.hunterpanels.com/#sle.

2.03 FIBERBOARD INSULATION MATERIALS

A. Where fiberboard insulation is indicated, either rock, slag, or glass mineral fiberboard insulation may be used, at Contractor's option.

B. Mineral Fiberboard Insulation: Rigid mineral fiber, in accordance with ASTM C612.
   1. Facing: None, unfaced.
   2. Flame Spread Index: 25 or less, when tested with facing, if any, in accordance with ASTM E84.
   3. Smoke Developed Index: 50 or less, when tested with facing, if any, in accordance with ASTM E84.
   4. Board Size: 48 by 48 inch.
   5. Board Thickness: 1 inch.

C. Mineral Fiberboard Insulation: Rigid or semi-rigid mineral fiber, ASTM C612 or ASTM C553; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.
   1. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.

2.04 BATT INSULATION MATERIALS

A. Where batt insulation is indicated, mineral fiber batt insulation may be used, at Contractor's option meeting designed R-Value.

B. Only as shown on drawings and only with approval: Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.
   1. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.

C. Mineral Fiber Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.
   1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
   2. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.
   3. Provide foil facing on one side, at locations indicated on drawings.
   4. Thermal Resistance: R-value of R3 per inch.
   5. Products:
      a. Johns Manville; MinWool Sound Attenuation Fire Batts: www.jm.com/#sle.
      b. Knauf Insulation; EcoBatt Insulation: www.knaufinsulation.com/#sle.
      c. ROCKWOOL (ROXUL, Inc); COMFORTBATT: www.rockwool.com/#sle.
      d. ROCKWOOL (ROXUL, Inc); AFB: www.rockwool.com/#sle.
      e. ROCKWOOL (ROXUL, Inc); AFB evo™: www.rockwool.com/#sle.
      f. Thermafiber, Inc; SAFB: www.thermafiber.com/#sle.
      g. Thermafiber, Inc; SAFB FF: www.thermafiber.com/#sle.

2.05 LOOSE FILL BLOWN IN INSULATION

A. Mineral Fiber Loose Fill Insulation: For use in Basketball Gymnasium above beaded board ceiling between rafters.

B. Loose fill blown in insulation complying with ASTM C665; friction fit; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.
   1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
   2. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.
   3. Thermal Resistance: R-value of R3 per inch.
   4. Products:
      a. Johns Manville; MinWool Sound Attenuation Fire Batts: www.jm.com/#sle.
      b. Knauf Insulation; EcoBatt Insulation: www.knaufinsulation.com/#sle.
      c. ROCKWOOL (ROXUL, Inc); COMFORTBATT: www.rockwool.com/#sle.

d. ROCKWOOL (ROXUL, Inc); AFB: www.rockwool.com/#sle.
e. ROCKWOOL (ROXUL, Inc); AFB evo™: www.rockwool.com/#sle.
f. Thermafiber, Inc; SAFB: www.thermafiber.com/#sle.
g. Thermafiber, Inc; SAFB FF: www.thermafiber.com/#sle.

2.06 ACCESSORIES

A. Sheet Vapor Retarder: See Section 07 2500.

B. Sheet Vapor Retarder: Black polyethylene film for above grade application, 10 mil, 0.010 inch thick.

C. Interior Vapor Retarder: Modified polyethylene/polyacrylate (PE/PA) film reinforced with polyethylene terephthalate (PET) fibers, 12 mils, 0.012 inch thick.

D. Tape: Reinforced polyethylene film with acrylic pressure sensitive adhesive.
1. Application: Sealing of interior circular penetrations, such as pipes or cables.
2. Width: Are required for application.
3. Temperature Resistance: Minus 40 degrees F to 212 degrees F

E. Flashing Tape: Special reinforced film with high performance adhesive.
1. Application: Window and door opening flashing tape.
2. Width: As required for application.

F. Nails or Staples: Steel wire; electroplated or galvanized; type and size to suit application.

PART 3 EXECUTION

3.01 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.

3.02 BOARD INSTALLATION OVER LOW SLOPE ROOF DECK

A. Board Installation Over Roof Deck, General:
1. See applicable roofing specification section for specific board installation requirements.
2. Ensure vapor retarder is clean and dry, continuous, and ready for application of roofing system.
3. Fasten insulation to deck in accordance with roofing manufacturer's written instructions and applicable Factory Mutual requirements.
4. Do not apply more insulation than can be covered with roofing on the same day.

3.03 UNFACED BATT INSTALLATION

A. Install insulation in accordance with manufacturer's instructions.

B. Install in exterior wall and roof spaces without gaps or voids. Do not compress insulation.

C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

E. Place batts covering existing insulation in a perpendicular direction to the existing insulation covering ceiling joists to create a continuous blanket.

F. At Basketball Gymnasium below baffles (see below), place batts between rafters, baffles masonry and wall.

3.04 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements for additional requirements.

B. Coordination of Air Barrier Association of America (ABAA) Tests and Inspections:
1. Provide testing and inspection required by ABAA Quality Assurance Program (QAP).
2. Notify ABAA in writing of schedule for air barrier work, and allow adequate time for testing and inspection.
3. Cooperate with ABAA testing agency.
4. Allow access to air barrier work areas and staging.
5. Do not cover air barrier work until tested, inspected, and accepted.

3.05 Schedule

A. Thermal Insulation shall conform to the following minimum standard: IECC 2015 (adopted by Philadelphia as of October 2018) OR greater as indicated on drawings; exceptions per IEBC:
1. ALL Insulation panel joints to be sealed; air sealing required.

3.06 PROTECTION

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

END OF SECTION 07 2100

SECTION 07 2126
BLOWN INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Exterior Walls: Blown insulation pneumatically placed into wall spaces through access holes as there is an existing opening to interior space prior to wall patching.

B. Ceiling and Attic: Blown insulation pneumatically placed into joist spaces through access holes where batt isulation can not be installed correctly.

1.02 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 C739 - Standard Specification for Cellulosic Fiber Loose-Fill Thermal Insulation 2021a.

C. ASTM C764 - Standard Specification for Mineral Fiber Loose-Fill Thermal Insulation 2019.

D. ASTM C1015 - Standard Practice for Installation of Cellulosic and Mineral Fiber Loose-Fill Thermal Insulation 2017.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on product characteristics, performance criteria, and limitations.

C. Certificates: Certify that products of this section meet or exceed specified requirements.

D. Manufacturer's Installation Instructions: Indicate procedure for preparation and installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Blown Insulation:
   1. CertainTeed Corporation: www.certainteed.com/#sle.
   2. GreenFiber: www.greenfiber.com/#sle.
   3. Johns Manville: www.jm.com/#sle.
   4. Thermafiber, Inc: www.thermafiber.com/#sle.

2.02 MATERIALS

A. Applications: Provide blown insulation in attic, exterior walls, and ceiling as indicated on drawings and where not possible to install batt / board insulation.

B. Provide blown insulation in accordance with requirements of Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

C. Blown Insulation: ASTM C764, fiberglass type, nodulated for pour and bulk for pneumatic placement.
   1. Thermal Transmittance (U-value): 0.27 BTU/hr sq ft deg F, maximum.
   2. Thermal Resistance (R-value: 11.0 sq ft hr deg F/BTU inch, minimum.

2.03 Accessories

A. Roof Ventilation Baffles: Prefabricated ventilation channels for placement under roof sheathing with baffles to prevent wind-washing.
   1. Material: Polyvinyl chloride (PVC).
   2. Roof Joist/Truss Spacing: 16 inch on center, nominal.
   3. Manufacturers:
      a. Brentwood Industries, Inc; AccuVent Original: www.brentwoodindustries.com/#sle.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate and adjacent materials are dry and ready to receive insulation.

B. Verify that light fixtures have thermal cut-out device to restrict over-heating in soffit or ceiling spaces.

C. Verify spaces are unobstructed to allow for proper placement of insulation.

3.02 INSTALLATION

A. Install insulation and ventilation baffle in accordance with ASTM C1015 and manufacturer's instructions.

B. Drill 2 inch diameter insulation access ports in fascia boards to permit equipment access.

C. Place insulation pneumatically to completely fill stud, joist, and rafter spaces.

D. Pour insulation to completely fill stud, joist, and rafter spaces.

E. Place insulation against baffles, and do not impede natural attic ventilation to soffit.

F. Place against and behind mechanical and electrical services within the plane of insulation.

G. Completely fill intended spaces leaving no gaps or voids.

H. Repair and reseal insulation access ports, and refinish to match adjacent work.

3.03 CLEANING

A. Remove loose insulation residue.

3.04 SCHEDULES

A. Existing Exterior Walls: Pneumatically placed into wall stud spaces through open holes at exterior wall boards.

B. Attic Spaces: Pour insulation between ceiling joists to achieve an R-value of 19.

END OF SECTION 07 2126

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SECTION 07 3113
ASPHALT SHINGLES

PART 1 GENERAL

1.01 DESCRIPTION

A. The scope of work of this Section shall include, but not limited to the following items:
   1. This section makes provisions for the installation for asphalt shingles high slope roofs.

1.02 RELATED SECTIONS

A. Division 1 General Requirements

B. Section 061000 – Rough Carpentry

C. Section 061000 – Rough Carpentry – Sheathing and built-in gutter underlayment.

D. Section 076000 – Sheet Metal Flashing and Trim

E. Section 077200 – Roof Accessories

1.03 SUBMITTALS

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

B. Samples for Initial Selection: For each type of asphalt shingle, ridge and hip cap shingles indicated.
   1. Include similar Samples of trim and accessories involving color selection.

C. Samples for Verification: For the following products, of sizes indicated, to verify color selected.
   1. Asphalt Shingle: Full-size asphalt shingle strip.
   2. Ridge and Hip Cap Shingles: Full-size ridge and hip cap asphalt shingle.
   3. Self-Adhering Underlayment: 12 inches square.

D. Qualification Data: For Installer, including certificate signed by asphalt shingle manufacturer stating that Installer is approved, authorized, or licensed to install roofing system indicated.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for asphalt shingles.

F. Research/Evaluation Reports: For asphalt shingles.

G. Maintenance Data: For asphalt shingles to include in maintenance manuals.

H. Warranties: Special warranties specified in this Section.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: A firm or individual that is approved, authorized, or licensed by asphalt shingle roofing system manufacturer to install roofing system indicated.

B. Source Limitations: Obtain ridge and hip cap shingles ridge vents felt underlayment and self-adhering sheet underlayment through one source from a single asphalt shingle manufacturer.

C. Fire-Test-Response Characteristics: Provide asphalt shingle and related roofing materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
   1. Exterior Fire-Test Exposure: Class A; ASTM E 108 or UL 790, for application and roof slopes indicated.

1.05 DEFINITIONS

A. Roofing Terminology: Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store roofing materials in a dry, well-ventilated, weathertight location according to asphalt shingle manufacturer's written instructions. Store underlayment rolls on end on pallets or other raised surfaces. Do not double-stack rolls.
   1. Handle, store, and place roofing materials in a manner to avoid significant or permanent damage to roof deck or structural supporting members.

B. Protect unused underlayment from weather, sunlight, and moisture when left overnight or when roofing work is not in progress.

1.07 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit asphalt shingle roofing to be performed according to manufacturer's written instructions and warranty requirements.
   1. Install self-adhering sheet underlayment within the range of ambient and substrate temperatures recommended by manufacturer.

1.08 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace asphalt shingles that fail in materials or workmanship within specified warranty period. Materials failures include manufacturing defects and failure of asphalt shingles to self-seal after a reasonable time.
   1. Material Warranty Period: lifetime from date of Substantial Completion, nonprorated.
   2. Wind-Speed Warranty Period: Asphalt shingles will resist blow-off or damage caused by wind speeds up to 100 mph lifetime from date of Substantial Completion.
   3. Algae-Discoloration Warranty Period: Asphalt shingles will not discolor 10 years from date of Substantial Completion.
   4. Workmanship Warranty Period: 10 years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
   1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.

2.02 WOOD DECK COVERING UNDERLAYMENT

A. Felts: ASTM D 226, Type I, asphalt-saturated organic felts, nonperforated
   1. 30 lb. 200 square feet per roll.

2.03 INSULATION

A. Rigid Insulation: 1.5 Inch Polyisocyanurate insulation with glass fiber facer only where indicated on drawings.

2.04 ROOF SHEATHING

A. Insulation Cover Overlay Sheathing
   1. APA Rated ½” roof sheathing covering insulation.

2.05 GLASS-FIBER-REINFORCED ASPHALT SHINGLES

A. Three-Tab-Strip, SBS-Modified Asphalt Shingles: ASTM D 3462, glass-fiber reinforced, mineral-granule surfaced, and self-sealing; complying with UL 2218, Class IV.
   1. Available Products:
      a. Basis of Design - Certainteed Corporation; Grand Manor
      b. Or Equal of the following subject to compliance with requirements:
      c. GAF Materials Corporation; Weather Watch.
      d. Johns Manville International, Inc.; Roof Defender.
      e. Owens Corning; WeatherLock G.
   2. Strip Size: [Manufacturer's standard] 18” x 36”
   3. Color and Blends: As selected by Architect from manufacturer's full range.

B. Hip and Ridge Shingles: Manufacturer's standard units to match asphalt shingles.

2.06 UNDERLAYMENT MATERIALS

A. Self-Adhering Sheet Underlayment, Granular Surfaced: ASTM D 1970, minimum of 55-mil-thick sheet; glass-fiber-mat-reinforced, SBS-modified asphalt; mineral-granule surfaced; with release paper backing; cold applied.
   1. Products:
      a. Basis of Design - Certain Teed Corporation;WinterGuard.
      b. Or Equal of the following subject to compliance with requirements:
      c. GAF Material Corporation; Weather Watch.
      d. Owens Corning; WeatherLock G.

2.07 ACCESSORIES

A. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.

B. Roofing Nails: ASTM F 1667; stainless-steel, copper, shingle nails, minimum 0.120-inch-diameter, barbed shank, sharp-pointed, with a minimum 3/8-inch- diameter flat head and of sufficient length to penetrate 3/4 inch into solid wood decking or extend at least 1/8 inch through OSB or plywood sheathing.
   1. Where nails are in contact with metal flashing, use nails made from same metal as flashing.

C. Felt Underlayment Nails: Aluminum, stainless-steel, or hot-dip galvanized steel wire with low profile capped heads or disc caps, 1-inch minimum diameter.

2.08 METAL FLASHING AND TRIM

A. Sheet Metal Flashing and Trim: Comply with requirements in Division 7 Section "Sheet Metal Flashing and Trim."

B. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
   1. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.
   2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored; and that provision has been made for flashings and penetrations through asphalt shingles.
   3. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 UNDERLAYMENT INSTALLATION

A. Double-Layer Felt Underlayment: Install double layer of felt underlayment on roof deck perpendicular to roof slope in parallel courses. Lap sides a minimum of 2 inches over underlying course. Lap ends a minimum of 4 inches. Stagger end laps between succeeding courses at least 72 inches Fasten with roofing nails.
   1. Install felt underlayment on roof deck not covered by self-adhering sheet underlayment. Lap sides of felt over self-adhering sheet underlayment not less than over self-adhering sheet underlayment.

B. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free, on roof deck. Comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Install at locations indicated on Drawings, lapped in direction to shed water. Lap sides not less than 3-1/2 inches. Lap ends not less than 6 inches staggered 24 inches between

courses. Roll laps with roller. Cover underlayment within seven days.

1. Prime masonry surfaces to receive self-adhering sheet underlayment.
2. Valleys: Extend from lowest to highest point 18 inches on each side.
3. Hips: Extend 18 inches on each side.
4. Ridges: Extend 36 inches on each side without obstructing continuous ridge vent slot.
5. Sidewalls: Extend beyond sidewall 18 inches and return vertically against sidewall not less than 4 inches.
6. Dormers, Cheek Walls, Chimneys, and other Roof-Penetrating Elements: Extend beyond penetrating element 18 inches and return vertically against penetrating element not less than 4 inches.

C. Metal-Flashed Open Valley Underlayment: Install two layers of 36-inch- wide felt underlayment centered in valley. Stagger end laps between layers at least 72 inches. Lap ends of each layer at least 12 inches in direction to shed water, and seal with asphalt roofing cement. Fasten each layer to roof deck with roofing nails.

1. Lap roof deck felt underlayment over first layer of valley felt underlayment at least 6 inches.

3.03 METAL FLASHING INSTALLATION

A. General: Install metal flashings and other sheet metal to comply with requirements in Division 7 Section "Sheet Metal Flashing and Trim."

1. Install metal flashings according to recommendations in ARMA's "Residential Asphalt Roofing Manual" and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."

3.04 ASPHALT SHINGLE INSTALLATION

A. Install asphalt shingles according to manufacturer's written instructions, recommendations in ARMA's "Residential Asphalt Roofing Manual," and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."

B. Install starter strip along lowest roof edge, consisting of an asphalt shingle strip with tabs removed at least 11 inches wide with self-sealing strip face up at roof edge.

1. Extend asphalt shingles 3/4 inch over fascia at eaves and rakes.

C. Install first and remaining courses of asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.

D. Fasten asphalt shingle strips with a minimum of six roofing nails located according to manufacturer's written instructions.

1. When ambient temperature during installation is below 50 deg F, seal asphalt shingles with asphalt roofing cement spots.

E. Open Valleys: Cut and fit asphalt shingles at open valleys, trimming upper concealed corners of shingle strips. Maintain uniform width of exposed open valley 1/8 inch in 12 inches from highest to lowest point.

1. Set valley edge of asphalt shingles in a 3-inch- wide bed of asphalt roofing cement.

F. Ridge and Hip Cap Shingles: Maintain same exposure of cap shingles as roofing shingle exposure. Lap cap shingles at ridges to shed water away from direction of prevailing winds. Fasten with roofing nails of sufficient length to penetrate sheathing.

1. Fasten ridge cap asphalt shingles to cover ridge vent without obstructing airflow.

END OF SECTION 07 3113

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SECTION 07 5200
SBS MODIFIED BITUMINOUS MEMBRANE ROOFING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings, Specifications and general provisions of the Contract, including “General Provisions for Construction Contracts” (General Provisions) and Supplementary General Provisions and all documents included within this Contract apply to this Section.

B. Submittal requirements shall be coordinated with Division 01.

1.02 SECTION INCLUDES

A. Modified Bituminous Membrane Roofing System in Built-in Gutter at roof edges.

B. Modified bituminous roofing membrane and PMMA reinforced fluid applied membrane.
   1. Type 1 – Uninsulated: Steep slope roof built-in gutter liner.

C. Marine Grade Plywood: For use as Built-in Gutter Liner.
   1. ½” nominal.

D. Vapor retarders.

E. Base flashings.

F. Roofing cant strips and accessories as indicated on drawing details.

1.03 RELATED REQUIREMENTS

A. Drawings, Specifications and general provisions of the Contract.

B. Section 04 2000 - Unit Masonry: Metal flashings embedded in masonry.

C. Section 06 1000 - Rough Carpentry: Wood nailers for sheet metal work.

D. Section 06 1000 - Rough Carpentry: Field fabricated roof step.

E. Section 07 7200 - Roof Accessories: Manufactured metal roof curbs and scuttle.

F. Section 07 9200 - Joint Sealants: Sealing non-lap joints between sheet metal fabrications and adjacent construction.

1.04 REFERENCE STANDARDS

A. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.

B. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.

C. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.

D. ASTM D41/D41M - Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.

E. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free.

F. ASTM D4601/D4601M - Standard Specification for Asphalt-Coated Glass Fiber Base Sheet Used in Roofing.

G. ASTM D6162/D6162M - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements.

H. ASTM E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.

I. FM DS 1-28 - Wind Design; Factory Mutual Research Corporation; ANSI-SPRI ES-1.

J. NRCA ML104 - The NRCA Roofing and Waterproofing Manual; National Roofing Contractors Association.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Preconstruction Meeting: Convene not later than one week before starting work of this section.
   1. Review preparation and installation procedures and coordinating and scheduling required with related work.

1.06 SUBMITTALS

A. Product Data: Provide manufacturer's catalog data for membrane and bitumen materials, base flashing materials, insulation, vapor retarder, surfacing, and all other components of the roofing system.
   1. Sustainable Design Submittal: Include testing documentation of solar reflectance index.

B. Shop Drawings: Indicate joint or termination detail conditions, conditions of interface with other materials, setting plan for tapered insulation, and mechanical fastener layout.

C. Manufacturer's Qualification Statement.

D. Installer's Qualification Statement.

E. Manufacturer's Installation Instructions: Indicate special procedures.

F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

G. Manufacturer's Field Reports: Indicate procedures followed.

H. Warranty: Submit manufacturer warranty and ensure forms have been completed in City of Philadelphia Department of Parks and Recreation name and registered with manufacturer.
   1. Installer’s Workmanship Guarantee

1.07 QUALITY ASSURANCE

A. Perform work in accordance with NRCA Roofing and Waterproofing Manual and manufacturer's instructions.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum five (5) years documented experience, and approved by manufacturer.

C. Comply with all published OHA / OSHA standards and regulations.

D. Manufacturer's representative to provide field services – four (4) field visits – representative to attend commencement of installation of roofing materials and insulation materials, one progress visit, and inspect completed installation. Manufacturer's representative to provide field reports for each visit.

E. Provide Infrared survey of completed roof system confirming that there are no subsurface moisture conditions if any leaks are reported during construction.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact.

B. Store products in weather protected environment, clear of ground and moisture, protected from weather.

C. Protect foam insulation from direct exposure to sunlight. Provide tarpaulin cover

1.09 FIELD CONDITIONS

A. Do not apply roofing membrane when environmental conditions are outside the ranges recommended by manufacturer.

B. Do not apply roofing membrane during unsuitable weather.

C. Do not apply roofing membrane when ambient temperature is below 40 degrees F.

D. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.

E. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

F. Saw-cut reglets 1 ½" deep and ½" wide where shown on drawings. Notify Architect after removal of roof membrane for evaluation for placement of reglet.

1.10 WARRANTY

A. See Section 01 78 00 Div 01- Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a two (2) year period after Date of Substantial Completion.

C. Provide twenty (20) year manufacturer's material and labor warranty to cover failure to prevent penetration of water.

D. Provide two (2) year installer warranty and twenty (20) year warranty for system including Cap Membrane, Roofing Membrane, Base Ply, Flashing Membrane and Roof Insulation with Prefabricated Control Joint Flashing – 24 gauge stainless steel sheet.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Membrane Materials:
   1. Siplast: www.siplast.com.
   2. Garland: GAF: www.gaf.com/sle.
   3. Siplast: www.siplast.com.
   4. Tremco: Tamko Roofing Products, Inc.: www.tamko.com.

B. Insulation (polyisocyanurate):
   1. Hunter:
   2. Dow Chemical Company: www.dow.com.
   3. GAF: www.gaf.com/sle.
   4. Owens Corning Corporation: www.owenscorning.com.

2.02 ROOFING

A. Modified Bituminous Roofing: Two-ply membrane, over nailed fiberglass base sheet at built-in roofing gutters at base of all steep slope roofs.

B. Self-Adhering Vapor Retarder

C. Acceptable Insulation Types - Constant Thickness Application: Any of the types specified.
   1. Minimum 2 layers of polyisocyanurate board.
   2. Bottom layer 2” of polyisocyanurate board mechanically secured to roof deck.
   3. Top layer 2” of polyisocyanurate board set in urethane adhesive.

D. Insulation cover board – High Density Gypsum Board ½” set in urethane adhesive.

E. Acceptable Insulation Types - Tapered Application: Any of the types specified.
   1. Tapered polyisocyanurate board for gussets.
   2. Uniform Thickness polyisocyanurate board.
      a. Two layers 2” stagger joints.

2.03 MEMBRANE AND SHEET MATERIALS

A. Membrane: Polymer modified asphalt, reinforced with non-woven fabric; granule surfaced; with the following characteristics:
   1. Minimum Quality: ASTM 6163G/6163S Type II; styrene-butadiene-styrene (SBS) modified, glass fiber and polyester reinforced.
   2. Thermal Emissivity: 0.80, minimum, initial, and 0.85, minimum, 3-year, certified by Cool Roof Rating Council.
   3. Color: BlackWhite.
      a. White

B. Base Sheet: ASTM D4601/D4601M Type I; asphalt-coated glass fiber; unperforated.

C. Fire ResistantSelf-adhering Vapor Retarder: foil and Fibrous mesh laminate complying with requirements of fire rating classification; compatible with roofing and insulation materials.
   1. Siplast - SA Vapor Retarder
   2. Garland – Hydroshell SA
   3. Tremco – AVC Membrane

D. Flexible Flashing Material: Flexible PMAA flashing. Same material as membr
   1. Siplast – ParaPro
   2. Garland – Liquitec
   3. Tremco – AlphaGuard PUMA Thix

2.04 BITUMINOUS MATERIALS

A. Primer: ASTM D41/D41M, asphalt type.

B. Roof Cement: ASTM D4586/D4586M, Type II.

2.05 DECK SHEATHING AND COVER BOARDS

A. Deck Sheathing: Glass mat faced gypsum panels, ASTM C1177/C1177M, fire resistant type, 1/2” inch thick.
   1. Manufacturers:
      a. Georgia-Pacific DensDeck Prime: www.densdeck.com.

2.06 INSULATION

A. As indicated on drawings as a minimum required standard and Section 07 2100 Thermal Insulation and generally as follows:

B. Polyisocyanurate Board Insulation: Rigid cellular foam, complying with ASTM C1289, Type II; Class 1, non-reinforced foam core, and with the following characteristics:
   1. Fiberglass both faces
   2. Meet min of R6.5 per 1 inch and Mineral Batt to meet min of R3.15 per 1 inch.
   3. Compressive Strength: 20 psi.
   4. Board Size: 48 by 48 inch.
   5. Board Edges: Square.
   6. Manufacturers:
      a. Hunter Panels, LLC: H Shield: www.hpanels.com
      b. Dow Chemical Co.: www.dow.com.
      c. GAF; EnergyGuard PolyIso Insulation: www.gaf.com/sle.
      d. Hunter Panels, LLC; H-Shield: www.hpanels.com.

2.07 ACCESSORIES

A. Cant Strips:
   1. Pressure preservative treated Spruce, Pine, Fir Wood with approval and per manufacturer's recommendations and requirements OR the following:
   2. Roof system perlite acceptable with approval and per manufacturer's recommendations and requirements.

B. Insulation Fasteners: Appropriate for purpose intended and approved by roofing manufacturer.
   1. Length as required for thickness of insulation material and penetration of deck substrate, with metal platewashers.
   2. One fastener per 1.5 SF of roof area.

C. Sealants: As recommended by membrane manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces and site conditions are ready to receive work.

B. Verify that roof openings, curbs, and penetrations through roof are solidly set, and cant strips are in place.

3.02 WOOD DECK PREPARATION

A. Verify deck is supported and secure.

B. Verify all existing fasteners are fully seated.

C. For steep slope roof gutter provide marine grade plywood overlay and secured to rafters.

D. Provide dimensional wood blocking as required and as follows:
   1. Provide step and scuttle blocking at roof scuttle.

E. Verify deck is clean and smooth, flat, free of depressions, waves, or projections, or fasteners properly sloped and suitable for installation of roof system.

F. Conventional Application: Apply fire resistant vapor retarder with fire-retardant adhesive.

3.03 VAPOR RETARDER INSTALLATION - CONVENTIONAL APPLICATION

A. Thoroughly clean deck. Broom surface to remove demolition debris. Use magnet to extricate nails.

B. Fire-retardant Vapor Retarder: Apply toplace on clean, nail-free deck surface and remove peel sheet (with adhesive) in accordance with roofing and vapor retarder manufacturers' instructions. Roll VR with steel roller to assure adhesion.

C. Extend vapor retarder to cover under cant strips and blocking.Turn up vertical surfaces and secure.

D. Install flexible flashing from vapor retarder to air seal material of wall construction, lap and seal to provide continuity of the air barrier plane.

3.04 BUILT-IN GUTTER (GUTTER for STEEP SLOPED ROOF AREAS) WITH MGP SELF-ADHERING UNDERLAYMENT

A. High-Temperature Self-Adhering Underlayment (HT-SAU): place on deck surface and remove peel sheet in accordance with roofing and HT-SAU manufacturers' instructions. Roll HT-SAU with steel roller to assure adhesion.

B. Install High-Temperature Self-Adhering Underlayment to cover all marine grade plywood sheathing.

C. Install High-Temperature Self-Adhering Underlayment to cover entire low slope roof areas.

D. See Section 06 10 00 “Sheathing” for plywood underlayment of gutters, tie off rail and 24” up slope overlay.

1. Secure sheathing in accordance with APA requirements.
2. Secure to existing rafters through insulation.

3.05 MEMBRANE APPLICATION

A. Apply membrane in accordance with manufacturer's instructions.

B. Apply membrane; lap and seal edges and ends permanently waterproof.

C. Apply smooth, free from air pockets, wrinkles, fish-mouths, or tears. Ensure full bond of membrane to substrate.

D. At end of day's operation, install waterproof cut-off. Remove cut-off before resuming roofing.

E. At intersections with vertical surfaces:
1. Extend membrane over cant strips and up a minimum of 8 inches onto vertical surfaces.
2. Apply flexible flashing over membrane.

F. Extend membrane and base sheet under counterflashing. Turn down over blocking and nail for temporary protection.

G. Around roof penetrations, and seal flanges and flashings with flexible flashing.

H. Coordinate installation of roof drains, scuppers, and sumps and related flashings.

3.06 FIELD QUALITY CONTROL

A. Require site attendance of roofing and insulation material manufacturers at Pre-Roofing meeting, Punch List and Final Completion of roofing during installation of the Work.

3.07 CLEANING

A. Remove bituminous markings from finished surfaces.

B. In areas where finished surfaces are soiled by bitumen or other source of soiling caused by work of this section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.

C. Repair or replace defaced or damaged finishes caused by work of this section.

3.08 PROTECTION

A. Protect installed roofing and flashings from construction operations.

B. Where traffic must continue over finished roof membrane, protect surfaces using durable materials.

END OF SECTION 07 5200

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SECTION 07 6200
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricated sheet metal items, including flashings, counterflashings, downspouts, sheet metal roofing, exterior penetrations, formed metal scuppers, and closures, and other items indicated in Schedule or the drawings.
   1. And other items indicated on drawings and as follows.

B. 20- gauge galvanized steel built-in gutter liner.

C. Prefinished Aluminum Formed Metal Copings.

D. Prefinished Aluminum Formed Sheet Metal Cladding for Roof Domer Siding Panel and Trim.

E. Prefinished Aluminum Formed Sheet Metal Scupper Box and Through Wall Scupper and Flashing.

F. Sealants for joints within sheet metal fabrications.

G. Sheet Metal: 302 Stainless Steel.

H. Sheet Metal Flashing and Trim shall conform to the following minimum Owner's standards:
   1. Two-piece Counter Flashing, Overflow Scupper Flashing, Through Wall Flashing: Stainless Steel ASTM A167, Type 302, 26 gauge UNO.
   2. Fascias, clips, and coping: Stainless steel; ASTM A167, Type 302, Shop formed, 0.0375 inch thick minimum (19 to 20 gauge); finish No. 2d (dull cold rolled mill finish).
   3. Turn masonry flashings up a minimum of 8 inches and bed into mortar joint of masonry. Lap end joints min. 6 inches and seal watertight.

I. Aluminum Panels (at dormers)

1.02 RELATED REQUIREMENTS

A. Section 04 2000 - Unit Masonry: Metal flashings embedded in masonry.

B. Section 06 1000 - Rough Carpentry: Wood nailers for sheet metal work.

C. Section 06 1000 - Rough Carpentry: Wood blocking for batten seams.

D. Section 06 1000 - Rough Carpentry: Field fabricated roof curbs.

E. Section 07 3113 - Asphalt Shingles: Non-metallic flashings associated with shingle roofing.

F. Section 07 7100 - Roof Specialties: Manufactured copings, flashings, and expansion joint covers.

G. Section 07 7200 - Roof Accessories: Manufactured metal roof curbs.

H. Section 07 9200 - Joint Sealants: Sealing non-lap joints between sheet metal fabrications and adjacent construction.

1.03 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 2022.

B. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2015.

C. ASTM B32 - Standard Specification for Solder Metal 2020.

D. ASTM B370 - Standard Specification for Copper Sheet and Strip for Building Construction 2022.

E. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.

F. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing 2017 (Reapproved 2023).

G. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free 2007 (Reapproved 2018).

H. CDA A4050 - Copper in Architecture - Handbook current edition.

I. SMACNA (ASMM) - Architectural Sheet Metal Manual 2012.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.

B. Provide a 20 year extended warranty.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Sustainable Design Submittals: For products containing recycled content, include documentation indicating the percentages of recycled content by weight, of postconsumer plus one-half of the pre consumer recycled content.

C. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details. Submit for review and approval shop drawings indicating material profile and installation details of copings, fascias, hanging gutters, downspouts, scuppers, panels, and siding.

D. Samples: Submit two samples, 6 by 6 inch in size illustrating material: 20- gauge galvanized steel built-in gutter liner

E. Samples: Submit two samples, 6 by 6 inch in size illustrating material of typical standing seam.

F. Samples: Submit two samples 6 by 6 inch in size illustrating metal finish color.

G. Submit for review and approval shop drawings indicating material profile and installation details of copings, fascias, hanging gutters, downspouts, scuppers, panels, and siding.

1.06 Warranty

A. Provide a 20 year extended warranty.

1. For manufactured copings

1.07 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.

B. Maintain one copy of each document on site.

C. Fabricator and Installer Qualifications: Company specializing in sheet metal work with 5 years of documented experience.

1.08 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.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Sheet Metal Gutter Liner: 20-gauge galvanized steel. Fabricate to design shape at reglet. Fabricate to form gutter maintaining slope to drain.
1. Extend gutter liner up to and under shingle starter course.

B. Sheet Metal Flashing and Trim Manufacturers; Member of SMACNA or other industry association required:
1. Member of SMACNA or other industry association.

C. Exterior Penetration Flashing Panel Manufacturers; Member of SMACNA or other industry association required:
1. Quickflash Weatherproofing Products, Inc: www.quickflashproducts.com/#sle.
2. Member of SMACNA or other industry association.

2.02 SHEET MATERIALS

A. Pre-Finished Aluminum: ASTM B209 (ASTM B209M); 20 gauge, 0.032 inch thick; plain finish shop pre-coated with modified silicone coating.
1. Modified Silicone Polyester Coating: Pigmented Organic Coating System, AAMA 2603; baked enamel finish system.
2. Fluoropolymer Coating: High Performance Organic Finish, AAMA 2604; multiple coat, thermally cured fluoropolymer finish system.
3. Color: As indicated on drawings.

B. Stainless Steel: ASTM A666, Type 304 alloy, soft temper, 28 gauge, (0.0156 inch) thick; smooth No. 4 - Brushed finish.

C. Terne Coated Steel: 28 gauge, 0.0149 inch thick copper bearing carbon steel core material with 0.092 lb/sq ft terne alloy coating on both sides of core metal.

D. ZT coated Copper: cold-rolled copper sheet, not less than 16 oz./sq. ft., both sides coated unless otherwise indicated.

E. Galvanized steel sheet metal gutter liner: Fabricate to fit snug and maintain slope to drain.
   1. Secure to sheathing with HD galvanized roofing nails. Set nails staggered 1", 4-inches.
   2. Secure parapet side with threaded masonry screws (Tapcon) through stainless steel washers. Set fasteners into mortar between brick masonry units +/- 8" o.c.

F. Secure gutter liner to the wood deck as the shingle starter location.

G. Provide reinforced PMMA flashing completely covering the sky facing side of the sheet metal, and the portion coming in contact with the copper counter flashing.

H. Clean debris and remove oil and foreign material from gutter line according to manufacturer's directions.

I. Apply reinforced PMMA resin flashing covering entire gutter liner according to manufacturer's directions.

J. Complete reinforced PMMA to provide a waterproof gutter.

K. Provide contractor's guaranty to remain waterproof for a period not less than five (5) years.

L. COPPER: ASTM B 370; temper H00, cold rolled except where temper 060 is required for forming; not less than 16 oz/sq. ft., (24 gauge) (0.0216 inch thick); natural finish, unless otherwise indicated.
   1. For use in forming corners at built-in copper flashings.
   2. For use to replace copper built-in flashings.

2.03 MISCELLANEOUS MATERIALS AND ACCESSORIES

A. Solder: ASTM B 32, Grade Sn50, used with rosin flux.

B. Termination Bars: 1/8 x 1-inch copper bars pre-punched at 6-inches on center.

C. Fasteners: Same metal as sheet metal flashing or other non-corrosive metal as recommended by sheet metal manufacturer. Match finish of exposed heads with material being fastened.

D. Nails: Copper nails

E. Rivets: Copper rivets with brass mandrel

F. Screws: 300 series stainless steel self tapping screws with 14 threads per inch.

G. Sheet Metal Screws: Brass self-tapping pan head sheet metal screws.
   1. For use at sheet metal to sheet metal applications where rivets are not acceptable.

2.04 FABRICATION

A. Two-piece Cap Flashing, Overflow Scupper Flashing, Through Wall and Window Flashing: Stainless Steel ASTM A167, Type 302, 26 gauge UNO.

B. Fascias, clips, and coping: Stainless steel; ASTM A167, Type 302, Shop formed, 0.0375 inch thick minimum (19 to 20 gauge); finish No. 2d (dull cold rolled mill finish).

C. Turn masonry flashings up a minimum of 8 inches and bed into mortar joint of masonry. Lap end joints min. 6 inches and seal watertight.

D. Form sections true to shape, accurate in size, square, and free from distortion or defects.

E. Form pieces in longest possible lengths.

F. Hem exposed edges on underside 1/2 inch; miter and seam corners.

G. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

H. Tin edges of copper sheet to be soldered; solder shop formed metal joints, and after soldering, remove flux, wipe and wash solder joints clean; provide weathertight joints.

I. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.

J. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

K. When dissimilar metals come into contact with each other, back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 30 mils.

2.05 SCUPPER AND DOWNSPOUT FABRICATION

A. Downspouts: Round profile.

B. Miscellaneous metal flashing and scupper connection to integral roofing gutter to meet SMACNA standards; refer to drawings.

C. Scupper Drains: Fabricate to match existing profile.

D. Downspouts: Size for rainfall intensity determined by a storm occurrence of 1 in 10 years in accordance with SMACNA (ASMM) but not less than 4” diameter. Match existing size RWC system and see Section 077200,

E. Accessories: Profiled to suit gutters and downspouts.
1. Anchorage Devices: In accordance with SMACNA (ASMM) requirements.
2. Downspout Supports: Brackets.

F. Splash Pans and cornice wash: Same metal type as scupper, formed to size; rolled sides of high for inverted pan placement.

G. Downspout Boots: Cast Iron.

H. Downspout Extenders: Same material and finish as downspouts.

I. Seal metal joints.

2.06 EXTERIOR PENETRATION FLASHING PANELS

A. Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for conduits and facade materials to be installed.

2.07 ACCESSORIES

A. Fasteners: Stainless steel / EPDM washers.
1. no expansion fasters allowed (without written approval and where only is absolutely needed).

B. Underlayment: ASTM D226/D226M, organic roofing felt, Type I (No. 15).

C. Underlayment: Polyethylene, 6 mils thick.

D. Primer: Zinc chromate type.

E. Concealed Sealants: Non-curing butyl sealant.

F. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.
   1. Manufacturers:
      a. Franklin International, Inc; Titebond WeatherMaster Metal Roof Sealant: www.titebond.com/#sle.

G. Plastic Cement: ASTM D4586/D4586M, Type I.

H. Reglets: Shop formed to insert into sawcut reglet.

I. Solder: ASTM B32; Sn50 (50/50) type.

J. Two-piece Cap Flashing, Scupper Flashing, Insert flashing, receiver flashing Flashing: Stainless Steel ASTM A167, Type 302, 26 gauge UNO at Recreation Center and copper at Library.

K. Scuppers, and overflows, clips, and coping: Stainless steel; ASTM A167, Type 302, Shop formed, 0.0375 inch thick minimum (19 to 20 gauge); finish No. 2d (dull cold rolled mill finish).

PART 3 EXECUTION

3.01 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.

3.02 PREPARATION

A. Install starter and edge strips, and cleats before starting installation.

B. Install surface mounted reglets true to lines and levels, and seal top of reglets with sealant.

C. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

3.03 INSTALLATION

A. Comply with drawing details as minimum and the following as the standard:
   1. SMACNA (ASMM), Details.

B. Insert flashings into reglets to form tight fit; secure in place with lead wedges; pack remaining spaces with lead wool; seal flashings into reglets with sealant.

C. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..

D. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.

E. Turn masonry flashings up a minimum of 8 inches and bed into mortar joint of masonry. Lap end joints min. 6 inches and seal watertight.

F. Solder metal joints for full metal surface contact, and after soldering wash metal clean with neutralizing solution and rinse with water.

G. Secure downspouts in place with concealed fasteners.

H. Connect downspouts to downspout boots, and grout connection watertight.

3.04 FIELD QUALITY CONTROL

A. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

3.05 SCHEDULE

A. Through-Wall Flashing in Masonry:
   1. Material: Stainless Steel where indciated on drawings and repairs to existing masonry.

B. Scuppers and Downspouts:

C. Coping, Cap, Parapet, Sill and Ledge Flashings:

D. Flashings Associated with Shingle Roofing, including Valley, Hip, Ridge, Eave, Gutter Edge, Gable Edge, Chimney:

E. Counterflashings at Roofing Terminations (over roofing base flashings):

F. Counterflashings at Curb-Mounted Roof Items, including HVAC Equipment curbs and roof hatches:

G. Roofing Penetration Flashings, for Pipes, and Equipment Supports:

END OF SECTION 07 6200

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SECTION 07 7200
ROOF ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Roof Edge Safety Anchor System

B. Equipment rails and Equipment supports – 14 gauge galvanized steel, 3 ½ inches wide by height as needed.

C. Roof penetrations mounting curbs.

D. Roof hatches with access ladders.

E. Roof Scuttles to be provided for roof access – Aluminum curb frame and lid with insulation, provide additional aluminum liner on outside face of curb installation.

F. Provide at dissimilar metals protective backing paint.

G. Replace in kind existing metal pipe RWC downspouts; match existing diameter and pipe thickness for new RWC. Note all steel pipe is required to be fully galvanized unless noted to be stainless steel.

1.02 RELATED REQUIREMENTS

A. Section 07 3113 - Asphalt Shingles.

B. Section 07 6200 - Sheet Metal Flashing and Trim: Roof accessory items fabricated from sheet metal.

1.03 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. 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.

C. Warranty Documentation:
   1. Submit manufacturer warranty.
   2. Ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

C. Provide five year manufacturer warranty for all items listed..

PART 2 PRODUCTS

2.01 ROOF HATCHES AND VENTS

A. Roof Hatch Manufacturers:
   1. Subject to compliance with requirements established by basis of design and preformance requirements for complete system of roof hatch with integral roof curb, guard rail and ladder:
   2. Basis of Design by Bilco Company: www.bilco.com/#sle.
      a. 30 x 54 NB-50TB BILCO high slope roof hatch
   3. Subject to compliance with requirements Approved Equal by the following:
   4. Activar Construction Products Group, Inc. - JL Industries: www.activarcpg.com/#sle.
   5. Acudor Products Inc; Galvanized Steel Roof Hatch: www.acudor.com/#sle.
   6. Babcock-Davis; ThermalMAX: www.babcockdavis.com/#sle.
   7. Best Access Doors; Series BA-GRH - Ladder Access Roof Hatch, Galvanized: www.bestaccessdoors.com/#sle.
   8. Dur-Red Products: www.dur-red.com/#sle.
   9. Elmdor Stoneman: www.elmdorstoneman.com/#sle.
   10. FAKRO America LLC; Flat Roof Access Hatch DRL: www.fakrousa.com/#sle.
   11. LMCurbs; Roof Hatch: www.lmcurbs.com/#sle.
   12. Milcor, Inc: www.milcorinc.com/#sle.
   13. Nystrom, Inc: www.nystrom.com/#sle.
   14. Precision Ladders, LLC; Model PH-A: www.precisionladders.com/#sle.

B. Roof Access Hatches with Ladder: Factory-assembled roof hatch with frame and flat cover and metal access ladder, complete with operating and release hardware.
   1. Provide Basis of Design Product: Furnish and install where indicated on plans metal roof hatch Type L-50TB, size width: 30" (762mm) x length: 96" (2438mm). Length denotes hinge side. The roof hatch shall be single leaf. The roof hatch shall be pre-assembled from the manufacturer.
      a. Basis-of-Design Manufacturer: Type L-50TB Roof Hatch by The BILCO Company, P.O. Box 1203, New Haven, CT 06505, 1-800-366-6530, Fax: 1-203-535-1582, Web: www.BILCO.com
         1) L-50TB: 30” x 96” high slope
         2) Custom high slope performance requirements
   2. Mounting: Provide frames and curbs suitable for mounting conditions as indicated on drawings.
   3. Thermally Broken Hatches: Provide insulation within hatch frame and cover.
   4. Folding Ladder Access: Triple section ladder, upper roof hatch door with PVC frame and lower insulated door with wood box to enclose and support ladder; 23-1/2 by 47 inches rough opening.
      a. Ladder Room Height Range: 91-3/4 to 110-1/4 inches, nominal.

C. Frames and Curbs: One-piece curb and frame with integral cap flashing to receive roof flashings; extended bottom flange to suit mounting.

1. Insulation: Manufacturer's standard; 1 inch rigid glass fiber, located on outside face of curb.
2. Curb Height: 12 inches from finished surface of roof, minimum.

D. 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.

2.02 ROOF HATCH Performance characteristics

A. General:
1. Costum High Slope Roof Hatch
2. Cover shall be reinforced to support a minimum live load of 40 psf (195kg/m^2) with a maximum deflection of 1/150th of the span or 20 psf (97kg/m^2) wind uplift.
3. Operation of the cover shall be smooth and easy with controlled operation throughout the entire arc of opening and closing.
4. Operation of the cover shall not be affected by temperature.
5. Entire hatch shall be weather tight with fully welded corner joints on cover and curb.

B. Cover: Shall be [select: 14 gauge (1.9mm) paint bond G-90 galvanized steel or 11 gauge (2.3mm) aluminum] with a 3” (76mm) beaded flange with formed reinforcing members. Cover shall have a heavy extruded EPDM rubber gasket that is bonded to the cover interior to assure a continuous seal when compressed to the top surface of the curb.

C. Cover insulation: Shall be fiberglass of 1” (25mm) thickness, fully covered and protected by a metal liner 22 gauge (.8mm) paint bond G-90 galvanized steel or 18 gauge (1mm) aluminum.

D. Curb: Shall be 12” (305mm) in height and of [select: 14 gauge (1.9mm) paint bond G-90 galvanized steel or 11 gauge (2.3mm) aluminum]. The curb shall be formed with a 3-1/2” (89mm) flange with 7/16” (11mm) holes provided for securing to the roof deck. The curb shall be equipped with an integral metal capflashing of the same gauge and material as the curb, fully welded at the corners, that features the Bil-Clip® flashing system, including stamped tabs, 6” (153mm) on center, to be bent inward to hold single ply roofing membrane securely in place.

E. Curb insulation: Shall be rigid, high-density fiberboard of 1” (25mm) thickness on outside of curb.

F. Lifting mechanisms: Manufacturer shall provide compression spring operators enclosed in telescopic tubes to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and closing. The upper tube shall be the outer tube to prevent accumulation of moisture, grit, and debris inside the lower tube assembly. The lower tube shall interlock with a flanged support shoe [for aluminum construction: welded to the curb assembly; for steel construction: through bolted to the curb assembly.

G. Hardware
1. Heavy pintle hinges shall be provided
2. Cover shall be equipped with a spring latch with interior and exterior turn handles
3. Roof hatch shall be equipped with interior and exterior padlock hasps.
4. The latch strike shall be a stamped component bolted to the curb assembly.

5. Cover shall automatically lock in the open position with a rigid hold open arm equipped with a 1” (25mm) diameter red vinyl grip handle to permit easy release for closing.
6. All hardware shall be zinc plated and chromate sealed. [For installation in highly corrosive environments or when prolonged exposure to hot water or steam is anticipated, specify Type 316 stainless steel hardware.
7. Cover hardware shall be bolted into heavy gauge channel reinforcing welded to the underside of the cover and concealed within the insulation space.

H. Finishes: Factory finish shall be [select: alkyd based red oxide primed steel or mill finish aluminum.

2.03 MISC. ITEMS

A. Where dissimilar metals come into contact with each other, back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 30 mils.

B. Continuous metal gravity ridge and fascia ventilators as shown on drawings.

C. Equipment supports – 14 gauge galvanized steel, 3 ½ inches wide by height.

2.04 NON-PENETRATING ROOFTOP SUPPORTS/ASSEMBLIES

A. Non-Penetrating Rooftop Support/Assemblies: Manufacturer-engineered and factory-fabricated, with pedestal bases that rest on top of roofing membrane, and not requiring any attachment to roof structure and not penetrating roofing assembly.
1. Design Loadings and Configurations: As required by applicable codes.
2. Support Spacing and Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
3. Steel Components: Stainless steel, or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.
4. Hardware, Bolts, Nuts, and Washers: Stainless steel, or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A153/A153M.

2.05 Roof Edge Safety Systems

A. Roof Edge Safety Anchor and Rail System
1. Basis of Design: 3M 8MM Permanent Cable Anchor System by ROOFSAFE for use at bottom of pitched roof area.

B. Provide complete system; see drawings for location of anchors.
1. Install per manufacturer’s instructions and recommendations.
2. Provide (2) sets of accessories as recommended by manufacturer for the system(s), including Delta Harness and Webbing Lanyard and Self-Lock Twist Carabiner.

PART 3 EXECUTION

3.01 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.

3.02 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.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions, in manner that maintains roofing system weather-tight integrity.

B. When dissimilar metals come into contact with each other, back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 30 mils.

3.04 CLEANING

A. Clean installed work to like-new condition.

3.05 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 07 7200

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SECTION 07 9200
JOINT SEALANTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Applicable provisions of Bidding Requirements, Contract Requirements in Division 0 and all applicable Division 1 sections.

1.02 SECTION INCLUDES:

A. Furnish and Install: Joint sealants.

B. Extent: As shown and additionally:
   1. All joints between dissimilar materials.
   2. All joints between similar materials.
   3. Exterior control joints.
   4. Vertical concave inside corner masonry to masonry joints.
   5. Visible perimeters of door frames, other frames, and trims
   6. Perimeters of all exterior penetrations.
   7. Provide sealant at all condition of:
      a. change in material
      b. change in plane

1.03 RELATED SECTIONS:

A. Section 070150.19 PREPARATION FOR RE-ROOFING.

B. Section 075200 Modified Bituminous Membrane Roofing.

C. Section 085113 ALUMINUM WINDOWS.

D. Section 099000 Paints and Coatings

1.04 SUBMITTALS:

A. Product Data: Manufacturer’s data including instructions, recommendations, and restrictions.
   1. Primers: Submit information on primer to be used for each sealant and substrate.

B. Initial Selection Samples: 2 inches long.

1.05 DELIVERY, STORAGE, HANDLING:

A. Comply with Division 01 General Requirements and manufacturer’s instructions and recommendations.

1.06 WARRANTY:

A. Manufacturer's standard warranty.

B. Manufacturers’ Warranty Period for Exterior Sealants: 20 years.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

A. Bostik, Inc., www.bostik.com

B. DAP, Inc., www.dap.com.

C. Dow Corning Corporation, www.dowcorning.com

D. Emseal Joint Systems, Ltd, www.emseal.com

E. Franklin Adhesives, www.franklinadhesives.com

F. GE Sealants, www.geadvancedmaterials.com, Momentive Performance Materials, Inc.

G. Henkel Corporation, www.osiproseries.com

H. Pecora Corporation, www.pecora.com

I. Sika Corporation, www.sikaconstruction.com

J. Sonneborn, BASF Chemical Company, www.buildingsystems.basf.com

K. Tremco, Inc. [and Vulkem], RPM Company, www.tremcosealants.com.

L. USG Corporation, www.usg.com.

2.02 JOINT SEALANT TYPE 1: Low modulus, one part, silicone sealant.

A. Basis of Design: “790 Silicone Building Sealant”, Dow Corning,
1. Do Not Use For: Structural sealant, water immersion, confined space atmospheric cures.

B. Movement Capability: Plus 100 percent expansion, minus 50 percent compression

C. Colors: Selected by Architect from manufacturer’s range of 11 standard colors.

D. VOC Content: 50 g/l

E. Primer - Porous Substrates, Masonry, Cast Stone, Mortar: None.

F. Primer - Non Porous Substrates, Painted Aluminum: “1200” or “1593”, Dow Corning.

G. Backer Rod: Closed cell, expanded polyethylene.
1. Standard: ASTM C1330 Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.

H. Bond Breaker Tape: “CRL Bond Breaker Tape”, C. R. Laurence Company, www.crlaurence.com

2.03 JOINT SEALANT TYPE 2: Paintable interior sealant.

A. Basis of Design: “Tremflex 834”, Tremco, Inc.Tremco, Inc. www.tremcosealants.com

B. Movement Capability: ±12 percent.

C. Colors: Selected by Architect from manufacturer's complete range of standard colors.

D. VOC Content: =25 g/l

E. Primers: Not required for most substrates. Comply with sealant manufacturer's instructions.

F. Backer Rod: Closed cell polyethylene.
   1. Standard: ASTM C1330 Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.

G. Bond Breaker Tape: "CRL Bond Breaker Tape", C. R. Laurence Company, www.crlaurence.com

2.04 JOINT SEALANT TYPE 4: Multi part polyurethane, traffic bearing sealant.

A. Basis of Design: "THC900/901", Tremco, Inc. www.tremcosealants.com
   1. Use Restriction: Not for water immersion.

B. Movement Capability: ±25 percent.

C. Colors: Selected by Architect from manufacturer's complete range of tintable base colors.

D. VOC Content: =250 g/l

E. Primer - Porous Substrates: "Deckline Primer", Tremco, Inc. www.tremcosealants.com

F. Primer - Non Porous Substrates: "TremPrime", Tremco, Inc.www.tremcosealants.com

G. Backer Rod: Closed cell or reticulated polyethylene.
   1. Standard: ASTM C1330 Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.

H. Bond Breaker Tape: "CRL Bond Breaker Tape", C. R. Laurence Company, www.crlaurence.com

PART 3 - EXECUTION

3.01 JOINT SEALANT INSTALLATION:

A. Comply with manufacturer's instructions and recommendations including, without limitation, environmental limits, substrate temperature, substrate moisture, substrate preparation.

B. Standard: ASTM C1193 Standard Guide for Use of Joint Sealants.

C. Joint Sealant Width and Depth: Comply with sealant manufacturer's recommendations:
   1. Joint Width: =4 times expected joint movement and =0.25 inch.
   2. Joint Depth: One half of joint width and =0.375 inch.

D. Preparation:
   1. Clean and prepare substrates and sealant contact surfaces.
   2. Roughen surfaces to which sealant is adhered to improve bond.
   3. Remove loose and friable substrate materials down to sound materials.
   4. Remove laitance, soil, grease, oil, and all contamination.

E. Masking: Mask adjacent surfaces to control liquid sealant and primer spillage.

F. Primer: Comply with manufacturer's instructions and recommendations.
   1. Do not over prime.
   2. Allow primer to dry.
   3. Apply sealant immediately after primer is sufficiently dry.

G. Backer Rod:
   1. Install backer rods wherever possible, but not for pre-compressed sealant tape.
   2. Sealant cross section shall be "hour glass" shape with wide adhesion and thin center.
   3. Control depth of backer rod to control sealant shape and sealant depth thickness.
   4. Control depth of backer rod so compressed sealant does not protrude from joint.
   5. Install backer rods without twisting or distortion.
   6. Do not puncture or damage closed cell back rods to prevent outgassing and sealant bubbles.

H. Bond Breaker Tape: Where joint depth cannot accommodate backer rod, provide bond breaker tape at back of joint to prevent three side adhesion.

I. Liquid Joint Sealant Installation:
   1. Provide uniform, continuous sealant without air gaps and voids.
   2. Force sealant into joints. Do not drag sealant into joints.
   3. Tool visible sealants to provide smooth, uniform, continuous, slightly concave sealant surfaces.
   4. Do not tool with water, soap solutions, alcohol, or solvents.
   5. Control and manage curing of sealants.
   6. Remove masking and temporary protection.
   7. Remove spilled and excess sealant.

J. Precompressed Sealant Tape Installation:
   1. Remove release agent from silicone facing with sealant tape manufacturer's recommended solvent and clean wipes.
   2. Apply sealant to end of silicone facing.
   3. Remove adhesive release paper and install sealant tape into joint from bottom up.
   4. Do not pull, stretch, or twist sealant tape.
   5. Provide uniform appearance, tape tension, face plane, and face depth.
   6. Form and seal joints as directed by manufacturer.
   7. After sealant tape is fully expanded into joint, provide continuous, tooled, sealant "corner beads" at both edges of sealant tape.
   8. Visually match approved samples.

K. Weep Holes: Do not seal over weep holes. Do not seal over, then reopen weep holes.

3.02 INCOMPATIBLE SEALANTS: Where incompatible sealants intersect:

A. Provide 0.032 inch thick aluminum septum between the incompatible sealants.

B. Adhere both sealants to the aluminum septum.

C. Conceal the aluminum septum in the sealant joint.

3.03 ADDITIONAL REQUIREMENTS FOR SEALANTS IN CONTACT WITH AIR BARRIERS:

A. Comply with air barrier manufacturer's Section 072500 Weather Barriers and joint sealant manufacturer's compatibility recommendations and curing recommendations.

END OF SECTION 07 9200

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SECTION 08 1119
STAINLESS-STEEL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Stainless-steel hollow metal doors and frames.
   1. Non-fire-rated doors and frames for exterior.
   2. Stainless-steel doors, frames and glazed transoms.
   3. Thermally insulated doors with frames.
   4. Sound-rated doors and frames as required by code for new work.
   5. Refer to door schedule for shop painting with high performance coating.

1.02 RELATED REQUIREMENTS

A. Section 08 1113 - Hollow Metal Doors and Frames.

B. Section 08 7100 - Door Hardware.

C. Section 08 8000 - Glazing: Glass for doors and transoms lites as indicated on drawings.

1.03 ABBREVIATIONS AND ACRONYMS

A. ANSI: American National Standards Institute.

B. ASTM International.

C. HMMA: Hollow Metal Manufacturers Association.

D. ICC: International Code Council.

E. NAAMM: National Association of Architectural Metal Manufacturers.

F. NFPA: National Fire Protection Association.

G. SDI: Steel Door Institute.

H. UL: Underwriters Laboratories.

1.04 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design 2010.

B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors 2022.

C. ASTM A480/A480M - Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip 2022a.

D. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2015.

E. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation 2022.

F. ASTM C591 - Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation 2022.

G. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board 2022a.

H. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements 2009 (Reapproved 2016).

I. ASTM E413 - Classification for Rating Sound Insulation 2022.

J. ASTM E1332 - Standard Classification for Rating Outdoor-Indoor Sound Attenuation 2022.

K. BHMA A156.115 - Hardware Preparation in Steel Doors and Steel Frames 2016.

L. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames 2002.

M. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames 2011.

N. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames 2017.

O. NAAMM HMMA 862 - Guide Specifications for Forced Entry/Bullet Resistant (FE/BR) Security Hollow Metal Doors and Frames 2021.

P. NAAMM HMMA 865 - Guide Specifications for Sound Control Hollow Metal Door and Frame Assemblies 2013.

Q. NAAMM HMMA 866 - Guide Specifications for Stainless Steel Hollow Metal Doors and Frames 2012 (Reapproved 2018).

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. 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.

C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.

D. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

E. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than ten years documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

C. Maintain at project site copies of reference standards relating to installation of specified products.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Comply with NAAMM HMMA 840 in accordance with specified requirements.

B. Protect with resilient packaging; avoid humidity build-up under coverings by allowing for air circulation; prevent corrosion and adverse effects on stainless-steel finish.

C. Do not remove wraps or covers from stainless-steel doors and frame material until ready for installation.

D. Store door and frame material in up-right vertical position, with wood blocking to raise above floor level and to provide separation between units.

E. Doors and Frames are to be shop matched and cut for hardware, wrapped and ship with each frame together with its door. Ship wrapped item to the painting shop for doors and frames to be shop prepped, primed and painted.

1.08 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

C. Provide manufacturer warranty for doors and frames to be free from material or workmanship defects and within commercial tolerances within a two year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design - Stainless-Steel Doors and Frames Manufacturer:
1. Assa Abloy “Curries,”
2. Assa Abloy “Pioneer,” and Allegion “Steelcraft.
3. Allegion “Steelcraft.

B. Subject to Compliance with Requirements, Comparability to the Basis of Design Products, Availability and Approval; the following full list:

C. Other Acceptable Stainless-Steel Doors and Frames Manufacturers:
1. AMBICO; Stainless Steel Doors and Frames: www.ambico.com/#sle.
2. ASI Doors Inc; Stainless Steel Cleanroom Doors: www.asidoors.com/#sle.
3. Megamet Industries, Inc; MegaDoor Stainless Steel Doors: www.megametusa.com/#sle.
4. Next Door Company; Stainless-Steel Doors and Frames: www.nextdoorco.com/#sle.
5. Steelcraft, an Allegion brand: www.allegion.com/#sle.
6. Titan Metal Products, Inc; Stainless Steel Doors and Frames: www.titanmetalproducts.com/#sle.

2.02 STAINLESS-STEEL DOORS AND FRAMES

A. Stainless-Steel Exterior Doors and Frames:
1. Based on NAAMM HMMA Custom Guidelines: Comply with guidelines of NAAMM HMMA 866 for stainless-steel hollow metal doors and frames.

a. Physical Endurance - Level A (1,000,000 cycles), in accordance with ANSI/SDI A250.4 for Swing Test.
b. Applications: Comply with designated application in accordance with NAAMM HMMA 866 guidelines.
c. Door Face Sheets: Stainless-steel, Type 304 alloy.
1) Sheet Thickness: 18 gauge, 0.042 inch, minimum.
2) Door Finish: No.4 - Brushed satin finish in accordance with ASTM A480/A480M.
d. Frames: Stainless-steel, knock-down type in compliance with NAAMM HMMA 866, with Type 304 alloy in compliance with ASTM A666.
1) Sheet Thickness: 16 gauge, 0.053 inch, minimum.

2. Door Thickness: 1-3/4 inch.
3. Vertical Door Edge: Seamless, fully and continuously welded and finished to match No.4 finish of door face.
4. Weatherstripping: Refer to Section 08 7100.

B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with most stringent.

2.03 PERFORMANCE REQUIREMENTS

A. Thermally Rated Door Assemblies: Provide door assemblies with U-factor of not more than 0.70 deg Btu/F x h x sq. ft. to 10,000 SF min. Provide in accordance with IECC standard than IECC 2009 and tested accordingASTM C 518.

B. Type exterior , Sound-Rated Doors and Frames: Face sheets of stainless-steel.
1. Sound-Rated Testing: Comply with sound-rated door assembly guidelines in accordance with NAAMM HMMA 865.
2. Sound Transmission Class (STC) Rating of Door and Frame Assembly: STC of 39, calculated in accordance with ASTM E413, and tested in accordance with ASTM E90.
3. Core Material: Manufacturer's standard construction as required to meet acoustic and thermal requirements indicated.

2.04 FRAME ANCHORS

A. Jamb Anchors: Masonry Type:
1. Frames for installation in new masonry walls shall be provided with adjustable jamb anchors of the same material as the frame. Acceptable jamb anchors shall be TEE-strap or strap and stirrup type no less than 0.075" thickness, or wire type no less than 0.185" in diameter. Straps shall be no less than 2" x 10" in size, corrugated and/or perforated. All frames in new masonry shall be filled with grout. The number of anchors provided on each jamb shall be as follows:
a. Frames up to 60" ..., 2 anchors.
b. Frames greater than 60" up to 90" ..., 3 anchors.
c. Frames greater than 90" up to 96" ..., 4 anchors
d. Frames greater than 96", 4 anchors plus 1 for each 24" or fraction thereof over 96" spaced at 24" maximum between anchors (U.L. fire ratings may require additional anchors. Verify building and local code requirements, the most stringent will apply).

B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.

1. Floor anchors with two holes for fasteners shall be fastened inside jambs with at least four (4) spot welded per anchor.
2. Where so scheduled for finish floor underlayment thickness, adjustable floor anchors, providing no less than 2" height adjustment, shall be fastened in place with at least four (4) spot welds per anchor. Terminate bottom of frames at top of underlayment.
3. Floor anchors shall be of the same material as the frame, with a minimum of 0.078" thickness.

C. Material: stainless steel sheet – same type as door face.

2.05 MATERIALS

A. Stainless-Steel, Type 304: Complying with ASTM A666.

B. Expanded Polystyrene (EPS) Insulation: Rigid board, with minimum density of 1.0 lb/cu ft, in accordance with ASTM C578.

C. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent

D. Stainless Steel Sheet: ASTM A 240/A 240M, austenitic stainless-steel, Type 316.

E. Steel Sheet: ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, commercial steel, Type B.

F. Metallic-Coated Steel Sheet: ASTM A653/A 653M, commercial steel, with minimum G60 (Z180) or A60 (ZF180) metallic coating.

G. Foam-Plastic Insulation: Manufacturer's standard polystyrene board insulation with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM 84. Enclose insulation completely within door.

H. Mineral-Fiber Insulation: Insulation made of rock-wool fibers, slag-wool fibers, or glass fibers.

I. Inserts, Bolts, and Fasteners: Stainless Steel where noted, otherwise, Hot-dip galvanized according to ASTM A 153/A 153M.

J. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

K. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

L. Glazing: Comply with requirements in Section 088000 "Glazing."

M. Grout: Comply with ASTM C 476, with a slump of not more than 4 inches (102) as measured according to ASTM C 143/C 143M.

2.06 ASSEMBLY / FABRICATION

A. Door Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch (19 mm) beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.

B. Stainless Steel Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.
   1. Sidelite and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by welding
   2. Provide stainless steel countersunk sheet metal screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (51 mm) o.c. from each corner.for exposed fasteners unless otherwise indicated.
   3. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
      a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
      b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
   4. Terminated Stops: Terminate stops [6 inches (152 mm)] above finish floor with a [45] [90]-degree angle cut, and close open end of stop with steel sheet closure. Cover opening in extension of frame with welded-steel filler plate, with welds ground smooth and flush with frame.
   5. Frames for installation in masonry wall openings more than 4' - 0" in width shall have an angle or channel stiffener made from the same material as the frame that shall be factory welded into the head when the head is to be grouted. Such stiffener shall not be used as lintel or load bearing member, shall not be longer than the opening width but not shorter than 1" and they shall not be less than 0.105" in thickness.
   6. Plaster guards shall be provided and welded in place at all hardware mortises on frames to be set in masonry or concrete openings. They shall be made from the same material as the frame with not less than 0.019" thickness.
   7. Where specified or scheduled, Stainless Steel Infill Panels will be secured flush to the outside of exterior frames or flush to the secure side of interior frames. The Infill Panels will be anchored to the frame sections with loose stops and moldings on inside or non-secure side of Stainless Steel frames. Provide stops for installation with stainless steel countersunk sheet metal screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (51 mm) o.c. from each corner.

C. Glazing Frames: Construction and face dimensions to match door frames, and provide layout as indicated on drawings.

D. Glazing: As specified in Section 08 8000.

E. Door Hardware: As specified in Section 08 7100
   1. Hardware Reinforcements and Preparations: Comply with specified requirements in accordance with NAAMM HMMA 866 and BHMA A156.115.

F. Hardware locations: The location of hardware on doors and frames shall be coordinated with the locations indicated in Specification Section 087100 Door Hardware.

G. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
   1. 1. Comply with BHMA A156.115 for preparing stainless steel doors and frames for hardware.
   2. 2. Where nontemplated, mortised, and surface-mounted door hardware is to be applied, reinforce doors and frames, with all drilling and tapping done in the field, to receive:
      a. Minimum thickness for hardware reinforcements in doors as follows:
         1) Full mortise hinges and pivots, 0.180".
         2) Reinforcements for lock fronts, concealed holders, or surface mounted closer, 0.105".

3) Internal reinforcements for all other surface applied hardware 0.075".

b. Minimum thickness for hardware reinforcements in frames as follows:
1) Hinge and pivot reinforcements ..., 0.195" x 1¼" >10" in length.
2) Strike reinforcements ..., 0.105"
3) Closer reinforcements ..., 0.105"
4) Flush bolt reinforcements ..., 0.105"
5) Reinforcements for surface applied hardware ..., 0.105"
6) Reinforcements for hold open arms ..., 0.105"
7) Reinforcements for surface panic devices ..., 0.105"

3. In cases where electrically operated hardware is required, and indicated on architectural door schedule, conduit, hardware enclosures and/or junction boxes within the door shall be provided. Access plates where required shall be the same thickness as the door and fastened with a minimum of (4) #8-32 Stainless Steel machine screws or #6 Stainless Steel metal screws, not to exceed 12" o.c.

H. Glazed Lites: Provide stops and moldings around glazed lites where indicated, made of the same material and material thickness as the door or frame. Form corners of stops and moldings with butted hairline joints.
1. Provide stops and moldings flush with face of door, and with square stops unless otherwise indicated, to secure glazing coordinated in accordance with the glass sizes and thicknesses specified.
2. Multiple Glazed Lites: Provide welded, fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
3. Provide fixed frame stops and moldings on outside of exterior and on secure side of interior doors and frames. Fixed glass stops and molding shall be welded to the secure side. Provide loose stops and moldings on inside of hollow-metal doors and frames.
4. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.
5. Provide stops for installation with stainless steel countersunk sheet metal screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (51 mm) o.c. from each corner.
6. Fire rated doors shall be prepared for listed glazing as required in accordance with the door manufacturer’s fire rating procedure.

I. Hollow Metal Doors and Frames: Refer to Section 08 1113.

J. Transom Bars: Fixed, of profile same as jamb and head.

K. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inch high to fill opening without cutting masonry units.

L. Floor and Jamb Anchors: Comply with specified requirements in compliance with NAAMM HMMA 866 for application.

M. Tolerances: Comply with manufacturing tolerances in compliance with NAAMM HMMA 866 for stainless-steel doors, frames, and hardware.

2.07 FINISHES

A. Stainless-Steel Finishes:
1. Stainless Steel Finishes: Remove tool and die marks and stretch lines, or blend into finish. Grind and polish surfaces to produce uniform finish, free of cross scratches. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
2. Finish: No. 6, Dull Satin.

3. Grain Direction: For finishes exhibiting grain, run grain vertically on door faces and frame jambs.

2.08 ACCESSORIES

A. Removable Stops: Formed stainless-steel sheet, mitered or butted corners; prepared for countersunk style tamper-proof stainless-steel screws.

B. Astragals for Double Stainless-Steel Doors:

C. Grout for Frames: Provide chemical reaction type mortar grout with maximum slump of 4 inch for hand troweling in place; thinner pumpable grout is prohibited.

D. Silencers: Resilient rubber, fitted into drilled hole; three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.

E. Frame Spreaders: Provide temporary frame spreaders welded or mechanically attached to base of jambs or mullions to serve as bracing during shipping and handling.

PART 3 EXECUTION

3.01 CLEARANCES AND TOLERANCES

A. Edge clearances for swinging doors shall not exceed the following:
1. Between doors and frames, at head and jambs ..., 3/16".
2. Between edges of pairs of doors ..., 1/16"
3. 3. At door sills where a threshold is used ..., ⅜". Measured from bottom of door to top of threshold.
4. At door sills where no threshold is used ..., ¾".
5. Between door bottom and nominal surface of floor coverings at fire rated openings as provided in NFPA 80-990, Paragraph 2.5.5.

B. Manufacturing tolerances: Fabricate frames to tolerances indicated in NAAMM-HMMA 866; tolerances shall be maintained within the following limits:
1. Frames for single door or pair of doors:
   a. Thickness of sheet metal ..., +0.015"; —0.007".
   b. Width, measured between rabbets at the head. Nominal opening width ..., + 1/16"; — 1/32".
   c. Height (total length of jamb rabbet). Nominal opening height ..., + 3/64".
   d. Cross sectional profile dimensions
      1) Face ..., + 1/32".
      2) Stop ..., ± 1/32".
      3) Rabbet ..., + 1/32".
      4) Depth ..., + 1/32".
      5) Throat ..., ± 1/16". Frames overlapping walls to have throat dimension ⅛" greater than dimensioned wall thickness to accommodate irregularities in wall construction.
2. Doors:
   a. Thickness of sheet metal ... +0.015"; —0.007".
   b. Width ..., + 3/64"
   c. Height ..., + 3/64"
   d. Thickness ..., + 1/16"
   e. Hardware cutout dimensions. Template dimensions ..., +0.015"; —0"
   f. Hardware location ..., + 1/32"

3.02 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.

3.03 PREPARATION

A. Remove wraps or covers from doors and frames upon delivery at the building site. Record any damage or error in the stainless steel doors and frames delivered to the job site, and notify the manufacturer/supplier on writing to maintain warranty and/or fire label

B. Promptly clean and touch up any scratches or disfigurement caused in shipping or handling.

C. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces. Check doors and frames for correct size, swing, fire rating and opening number.

D. Store door and frame materials in a dry location on planks at least 4" off ground or 2" off floor slab. Doors shall be stored in a vertical position and spaced at least ⅜" by wood strip or blocking. Materials shall be covered to protect them from damage but in such a manner as to permit air circulation. Place no more than 5 doors or welded frames in a group. In the case of multi-opening frames, no more than three units should be stored in a group, to avoid serious racking or other damage to the bottom of the frame

E. Drill and tap doors and frames to receive non-templated, mortised, and surface-mounted door hardware.

3.04 INSTALLATION

A. General: Install stainless steel doors and frames plumb, rigid, properly aligned, and braced securely until permanent anchors are set. Comply with approved Shop Drawings and with manufacturer's written instructions.

B. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.

C. The installer shall perform the following:
   1. Squareness, ±1/16" measured on a line, 90 degrees from one jamb, at the upper corner of the frame at the other jamb.
   2. Squareness, ± 1/16" measured on a line, 90 degrees from one jamb, at the upper corner of the frame at the other jamb.
   3. Twist, ±1/16" measured at face corners of jambs on parallel lines perpendicular to the plane of the wall.
   4. Plumbness, +1/16" measured on the jamb at the floor.

D. Stainless Steel Frames: Comply with NAAMM-HMMA 840.
   1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.
      a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.

b. Install frames with removable stops located on secure side of opening.

2. Fire-Rated Openings: Install frames according to NFPA 80.
3. Floor Anchors: Secure with postinstalled expansion anchors.
   a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
4. Hardware must be applied in accordance with hardware manufacturer's templates and instructions.
5. Plaster guards and junction boxes are intended to protect hardware mortises and tapped mounting holes from masonry grout of 4" maximum slump consistency which is hand troweled in place. If a light consistency grout (greater than 5" slump when tested in accordance with ASTM C l43/C 143M) is to be used, special precautions must be taken in the field by the installation contractor to protect the aforementioned.
6. Frame products are not intended or designed to act as forms for grout or concrete. Grouting of hollow metal sections shall be done in "lifts" or precautions shall be otherwise taken by the contractor to ensure that frames are not deformed or damaged by the hydraulic forces that occur during this process.
7. Any grout or other bonding material shall be promptly cleaned off of frames or doors following installation. Hollow metal surfaces shall be kept free of grout, tar, or other bonding material or sealer.
8. In-Place Concrete or Masonry Construction: Secure frames in place with post-installed expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
9. Exposed hollow metal surfaces which have been scratched or otherwise marred during installation, cleaning, and/or field welding, shall promptly be finished smooth, cleaned, treated for maximum paint adhesion and touched up with a rust inhibitive primer comparable to and compatible with the shop applied primer and finish paint specified in Section 099000.

E. Stainless steel Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.
   1. Non-Fire-Rated Steel Doors: Comply with NAAMM-HMMA 841 and NAAMM-HMMA guide specification indicated.
   2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
   3. Smoke-Control Doors: Install doors according to NFPA 105.

F. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with stainless steel manufacturer's written instructions.

G. Coordinate frame anchor placement with wall construction.
   1. Provide anchors appropriate for substrate door frame is fastened to and conditions specified for loading on door and frame.

H. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.

I. Install door hardware as specified in Section 08 7100.
   1. Comply with recommended practice for hardware placement of stainless-steel doors and frames in accordance with NAAMM HMMA 866, NAAMM HMMA 830 and NAAMM HMMA 831.

J. Comply with glazing installation requirements as specified in Section 08 8000.

K. Coordinate installation of electrical connections with electrical hardware items being installed on doors and/or frames.

L. Touch up damaged factory finishes.

3.05 TOLERANCES

A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with NAAMM HMMA 866

B. Maximum Diagonal Distortion: 1/16 in measured with straight edge, corner to corner.

3.06 ADJUSTING

A. Adjust for smooth and balanced door movement.

B. Adjust sound control doors so that seals are fully engaged when door is closed.

3.07 CLEANING

A. Clean grout and other materials from stainless-steel doors and frames immediately after installation.

B. Touch up stainless-steel immediately after erection, smooth scratched or damaged areas and polish to match adjacent undamaged finish.

3.08 SCHEDULE

A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION 08 1119

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SECTION 08 5113
ALUMINUM WINDOWS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Applicable provisions of Bidding Requirements, Contract Requirements in Division 0 and all applicable Division 01 sections.

1.02 SUMMARY

A. Section Includes: Architectural Aluminum Windows including perimeter trims, stools, accessories, shims and anchors, and perimeter sealing of window units.
   1. Types of aluminum windows include:
      a. Thermal.
      b. Fix and Operable sashes as indicated on drawings.
      c. Full replacement of window with metal frame and sash where indicated.
      d. Provide window grills (imitation muntins) in windows as shown on drawings.
      e. Replacement of sash only with metal sash; exterior panning over existing wood frame where indicated.
         1) Restoration/ consolidation of existing wood window frame to receive new aluminum cladding

B. Related Sections:
   1. 05 5808 "Security Screens" for field attached Metal Security Screens.
   2. 079200 “Joint Sealants” for joint sealants.
   3. 088100 "Glazing".

1.03 DEFINITIONS

A. Performance class designations according to AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS):
   1. AW: Architectural Window.

B. Performance grade number according to AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS):
   1. Design pressure number in pounds force per square foot used to determine the structural test pressure and water test pressure.

C. Structural Test Pressure: For uniform load structural test, is equivalent to 150 percent of the design pressure.

D. Definitions: For fenestration industry standard terminology and definitions refer to American Architectural Manufactures Association (AAMA) - AAMA Glossary (AAMA AG).

E. Minimum Test Size: Smallest gateway test size permitted for performance class. Products must be tested at minimum test size or at a size larger than minimum test size to comply with requirements for performance class.

1.04 PERFORMANCE REQUIREMENTS

A. General: Provide aluminum windows capable of complying with performance requirements indicated, based on testing manufacturer's windows that are representative of those specified, and that are of minimum test size indicated below:

1. Size required by AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS) for minimum gateway performance.

B. Structural Performance: Provide aluminum windows capable of withstanding the effects of the following loads, based on testing units representative of those indicated for the Project that pass AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS), Uniform Load Structural Test:
   1. Design Wind Loads: Door shall be designed to withstand wind loads as noted on structural drawings.
   2. Deflection: Design glass framing system to limit lateral deflections of glass edges to less than 1/175 of glass-edge length or 3/4 inch (19 mm), whichever is less, at design pressure based on testing performed according to AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS), Uniform Load Deflection Test or structural computations.

C. Thermal Movements: Provide aluminum windows, including anchorage, that allow for thermal movements resulting from the following maximum change allowed in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

D. Recycled Content: Provide documentation indicating post-consumer recycled content plus one-half preconsumer recycled content.

E. VOC Emissions for Sealants: Provide certificate of compliance with California Department of Public Health (CDPH) Standard Method v1.1 – 2010, using the applicable exposure scenario.

F. VOC Content for Sealants: Provide documentation of compliant VOC content for SCAQMD Rule 1168.

1.05 SUBMITTALS

A. Product Data: Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions for each type of aluminum window indicated.

B. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other work, operational clearances and installation details.

C. Samples for Initial Selection: For units with factory-applied color finishes including samples of hardware and accessories involving color selection.

D. Samples for Verification: For aluminum windows and components required.

E. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for each type, class, grade, and size of aluminum window. Test results based on use of downsized test units will not be accepted.

G. Maintenance Data: For operable sash, operating hardware and finishes to be include in maintenance manuals.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: An installer which has had successful experiences with installation of the same or similar units required for this project and other projects of similar size and scope.

B. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum windows that meet or exceed performance requirements indicated and of documenting this performance by inclusion of test reports, and calculations.

C. Source Limitations: Obtain aluminum windows through one source from a single manufacturer.

D. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum windows and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements." Do not modify size and dimensional requirements.
   1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

E. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.07 PROJECT CONDITIONS

A. Field Measurements: Verify aluminum window openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.08 WARRANTY

A. Manufacturer’s Warranty: Submit, for Owner’s acceptance, manufacturer’s standard warranty.
   1. Warranty Period: Two (2) years from Date of Substantial Completion of the project provided however that the Limited Warranty shall begin in no event later than six months from date of shipment by manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis-of-Design Product:
   1. Winco Window Co., 6200 Maple Ave., St. Louis, MO 63130-3305. ASD. Toll Free: 800-525-8089. Tel: 314-725-8088. Fax: 314-725-1419. Web: www.wincowindow.com.
   2. Winco Windows Products used:
      a. Winco Heavy Commercial Thermally Improved Windows as indicated on drawings and the following:
      b. 1450S Series 4” Thermal Fixed (Profile: Offset Double Hung)
      c. 1550 PI Thermal Double Leaf (Butterfly) Inswing Casement (Fixed)
      d. WINCO: Windows, Receptors, Vertical Mullions, Sill Extenders, Snap Trim and Sculptured Snap Trim with profiles as indicated on drawings as manufactured by Winco Windows.
      e. WINCO: Window Grills (imitation muntins) in windows as shown on drawings.
         1) Architect to select from full range of manufacturer trim options.
         2) Spacer Bar Required.
   3. Performance requirements: Provide complete system with all components and configurations indicated on drawings which are in accordance with historic preservation intent as approved by the Philadelphia Historical Commission; these may included custom trim items.

B. Subject to compliance with requirements, provide a complete system of a comparable product by the following and only if basis of design products are not readily available:

1. Graham Windows, Graham Architectural Products; grahamwindows.com

C. Substitutions: Refer to Substitutions Section for procedures and submission requirements.
   1. Pre-Contract (Bidding Period) Substitutions: Submit written requests ten (10) days prior to bid date.
   2. Post-Contract (Construction Period) Substitutions: Submit written request in order to avoid window installation and construction delays.
   3. Product Literature and Drawings: Submit product literature and drawings modified to suit specific project requirements and job conditions.
   4. Certificates: Submit certificate(s) certifying substitute manufacturer (1) attesting to adherence to specification requirements for window system performance criteria, and (2) has been engaged in the design, manufacturer and fabrication of aluminum windows for a period of not less than ten (10) years. (Company Name)
   5. Test Reports: Submit test reports verifying compliance with each test requirement required by the project.
   6. Samples: Provide samples of typical product sections and finish samples in manufacturer's standard sizes.

D. Substitution Acceptance: Acceptance will be in written form, either as an addendum or modification, and documented by a formal change order signed by the Owner and Contractor.

2.02 MATERIALS

A. Aluminum Extrusions: Alloy and temper recommended by aluminum window manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.070” wall thickness at any location for the main frame and sash members.
   1. Recycled Content: Provide documentation indicating post-consumer recycled content plus one-half pre-consumer recycled content.

B. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum window members, trim, hardware, anchors, and other components.

C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.

D. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.

E. Sliding-Type Weather Stripping: Provide woven-pile weather stripping of wool, polypropylene, or nylon pile and resin-impregnated backing fabric. Comply with AAMA 701/702.
   1. Weather Seals: Provide weather stripping with integral barrier fin or fins of semi-rigid, polypropylene sheet or polypropylene-coated material. Comply with AAMA 701/702.

F. Sealant: For sealants required within fabricated windows, provide window manufacturer's standard, permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.
   1. VOC Emissions for Sealants: Provide certificate of compliance with California Department of Public Health (CDPH) Standard Method v1.1 – 2010, using the applicable exposure scenario.

2.03 ALUMINUM CLAD OVER EXISTING AND NEW WOOD FRAME WINDOW

A. Acceptable Product:
   1. Winco 1450S Series: 4 inch Heavy Commercial Thermally Improved Window.

B. Performance: AAMA/WDMA/CSA 101/I.S.2/A440.
   1. Architectural Window: AW-100.
   2. Heavy Commercial: HC-100.
   3. Water Resistance, ASTM E 331: 12 psf (575 Pa).
   4. Water Resistance, ASTM E 547: 12 psf (575 Pa) for AW rated windows.
   5. Air Infiltration, ASTM E 283 at static air pressure of 6.24 psf: 0.03 cfm/sf.
   6. Uniform Load Structural Test, ASTM E 330: 120 psf (5748 Pa).
   7. Forced Entry Resistance, ASTM F 588: Grade 10.
   8. Condensation Resistance Factor (CRF), AAMA 1503.1: Frame: 68.
   9. Thermal Performance ("U" Value), AAMA 1503.1: 0.45 BTU/Hr-F°-Ft^2.
   10. Blast Resistant: Provide a complete blast resistant window assembly meeting UFC 4-010-01.
   11. Provide impact resistant window assembly meeting either FBC 2007 – HVHZ Protocols; or ASTM E1886 and ASTM E1996 (Level D or E) Protocols

C. Frame: Thermally broken.
   1. Wall Thickness: 0.125 inches (3.2 mm).
   2. Depth: 4 inches (102 mm).
   3. Corners: Closely fit and mechanically fastened with screws. Must be sealed using AAMA approved sealants in a multi-step process to provide sealant redundancy.
   4. Bevel: Integral bevel on glazing leg or glazing bead

D. Ventilator and Access Sash: Thermally broken.
   1. Wall Thickness: 0.125 inches (3.2 mm).
   2. Ventilator Depth: 2 inches (51 mm).
   3. All vent extrusions shall be tubular on all 4 sides.
   4. Corners: Mitered and mechanically fastened with screws. Joinery is sealed with small joint sealant.
   5. Each vent shall have two rows of Santoprene® weather stripping installed in a specifically designed weather strip pocket for the extrusion.
   6. Bevel: Integral bevel on glazing leg or glazing bead

E. Weather Strip
   1. All weather strips shall be double Santoprene® thermoplastic rubber or equal.

F. Thermal Barrier
   1. Poured-in-place structural thermal barrier shall transfer during bending and provide composite action between frame components.
   2. Thermal barrier pocket on aluminum extrusions shall be Azo-Braded to create a mechanical lock to improve the adhesion properties between the polyurethane polymer and the surface of the thermal barrier pocket.
   3. Window manufacturer must provide a warranty from the manufacturer of the polyurethane thermal barrier that warrants against product failure as a result of thermal shrinkage beyond 1/8 inch (3.2 mm) from each end and fracturing of the polyurethane for a period not to exceed ten years from the date of window manufacture.
   4. Thermal barriers made of crimped in place polyamide (insulbar®) strips are not acceptable unless all strips are covered and tooled with Dow 795 silicone caulking to climate water migration.

2.04 ALUMINUM WINDOW

A. Window Type: Fixed with operable casement or as otherwise indicated on drawings and in Window Schedule.

B. Performance Requirements: Provide aluminum windows of performance indicated that comply with AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS)
   1. Performance Class and Grade: XO/OX: AW-PG40-HS

C. Condensation-Resistance Factor (CRF): Provide aluminum windows tested for thermal performance according to AAMA 1503, with a CRF not less than Single Slide: 76 (frame) and 77 (glass) or Double Slide: 69 (frame) and 77 (glass).

D. Temperature Index (I): Provide aluminum windows tested for thermal performance according to CSA-A440 with a Temperature Index not less than Single Slide: 57 (frame) and 73 (glass) or Double Slide: 36 (frame) and 74 (glass).

E. Energy Efficiency:
   1. Thermal Transmittance: Provide aluminum windows tested for thermal performance according to AAMA 1503.
      a. Provide aluminum windows tested for thermal performance according to AAMA 1503, with a thermal transmittance (U-factor) no more than Single Slide: 0.25 BTU/hr/sf/°F or Double Slide: 0.28 BTU/hr/sf/°F.
      b. Provide aluminum windows simulated for thermal performance according to AAMA 507 and NFRC 100 with a thermal transmittance (U-factor) range of; Single Slide: 0.23 to 0.38 BTU/hr/sf/°F or Double Slide: 0.25 to 0.39 BTU/hr/sf/°F (Based on center of glass U-factor range 0.10 to 0.32 for triple glazing).
   2. Solar Heat-Gain Coefficient (SHGC): Provide aluminum windows with a whole-window SHGC as determined according to NFRC 200 and AAMA 507 procedures.

F. Air Infiltration: Maximum rate not more than indicated when tested according to AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS), Air Infiltration Test.
   1. Maximum Rate: 0.3 cfm/sq. ft. (0.5 L/s•m²) of area at an inward test pressure of 6.24 lbf/sq. ft. (300 Pa) in accordance with ASTM E283.

G. Water Resistance: No water leakage as defined in AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS) referenced test methods at a water test pressure equaling that indicated, when tested according to ASTM E547 and ASTM E331.
   1. Test Pressure: XO/OX and XX; 20 percent of positive design pressure, but not more than 10 lbf/sq. ft. (478 Pa).

H. Forced-Entry Resistance: Comply with Performance Grade 10 requirements when tested according to ASTM F 588.

I. Life-Cycle Testing: Test according to AAMA 910 and comply with AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS).

J. Operating Force and Auxiliary (Durability) Tests: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS) for operating window types indicated.

K. Sound Transmission Class (STC) and Outdoor-Indoor Transmission Class (OITC): When tested to AAMA Specification 1801 and in accordance with ASTM E1425 and ASTM E90, the STC and OITC Rating shall not be less than:
   1. XO UNIT = 32 (STC) and 26 (OITC)

L. Environmental Product Declarations (EPD): Provide a Type III Product-Specific EPD created from a Product Category Rule specific to North America.

2.05 TRIM AND PANS

A. Provide trim, pans and all other items as indicated on Drawings.

B. Sub Frame and Closure Plate.

C. Sill Starter.

D. Winco Sills: as indicated on drawings inches (as indicated on drawings mm).

E. Sub-Sill: as indicated on drawings Series.

F. Sill Extension: as indicated on drawings inches (as indicated on drawings mm).

G. PVC Comp. Channel (Frame Filler): For as indicated on drawings inch (as indicated on drawings mm) frame depth.

H. Strap Anchor.

I. Snap Cover: Part # as indicated on drawings.

J. Base Clip: Part # as indicated on drawings.

K. Replacement Pan Systems:
1. Pan Head, Jamb and Sill: Part # as indicated on drawings.
2. Pan Head and Jamb: For use with Part # as indicated on drawings.
3. Pan Extender: For use with Part # as indicated on drawings.
4. Pan Sill: For use with Part # as indicated on drawings.
5. Pan Sill: Part #as indicated on drawings.
6. Pan Jamb: Part # as indicated on drawings.
7. Pan Head: Part # as indicated on drawings.
8. Multi-Purpose Pan: Part # as indicated on drawings.

2.06 SCREENS

A. Frame: Extruded aluminum, 6063-T6 alloy and temper.
1. Screen mounting holes shall be pre-drilled at the factory

B. Screen Fabric: 0.011 inch (0.2194 mm) diameter 5154 alloy wire woven in 18 x 16 mesh.
1. Color: Charcoal anodized.

C. Screen Fabric: 0.009 inch (0.2286 mm) diameter stainless steel wire woven in 18 x 16 mesh.

2.07 MULLIONS AND GRIDS

A. Mullion:
1. Non-Thermal Mullion: Part #as indicated on drawings.
2. Thermal Mullion: Part # as indicated on drawings.
3. Provide mullions as indicated on Drawings.

B. Window Depth: as indicated on drawings inches (as indicated on drawings mm).

C. Winco Window Series: types as indicated on drawings and glazing per Glazing Section 088100.
   1. Note: special translucent glazing for one unit as indicated on drawings.

D. Stack:
   1. Vertical.
   2. Horizontal.

E. Non-Removable Grid Frames:
   1. Non-Sloped: as indicated on drawings.
   2. Sloped: as indicated on drawings.
   3. Sculptured: as indicated on drawings.
   4. Hurricane Glazed: as indicated on drawings.
   5. Integral Bevel.

2.08 FINISH

A. Paint Finish: Finish all exposed areas of aluminum windows and components with the following:
   1. 70 percent Kynar in accordance with AA-M12-C42-R1X, AAMA 2605-98
   2. Color: Custom color to be selected by the Architect.

2.09 GLAZING

A. Glass and Glazing Materials: Refer to Division 08 Section "Glazing" for glass units and glazing requirements applicable to glazed aluminum window units.

B. Glazing System: Glazing method shall be a wet/dry type in accordance with manufacturer’s standards. Exterior glazing shall be silicone back bedding sealant. Interior glazing shall be snap-in type glazing beads with an interior gasket in accordance with AAMA 702 or ASTM C864.

C. Glazing: All units shall be factory glazed with butyl tape, silicone cap bead on the exterior, with glazing vinyl and extruded snap-in aluminum glazing bead on the interior.

2.10 HARDWARE

A. General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, or other corrosion-resistant material compatible with aluminum; designed to smoothly operate, tightly close, and securely lock aluminum windows, and sized to accommodate sash weight and dimensions.

B. Horizontal Sliding Windows: Provide the following operating hardware:
   1. Handle: Continuous, integral pulls.
   2. Sash Locks.
   3. Composite adjustable tandem roller.
   4. Stainless Steel roller track.
   5. Standard auto lock.
   6. Limit device.
   7. Optional Sash Lock: Spring-loaded, snap-type lock on bottom rail of lower sash.
   8. Limit Device: Sash stop limit device; for bottom sash located at jamb; two per sash.

2.11 INSECT SCREENS

A. General: Design windows and hardware to accommodate screens in a tight-fitting, removable arrangement, with a minimum of exposed fasteners and latches. Fabricate insect screens to fully integrate with window frame. Locate screens on outside of window and provide for each operable exterior sash.
   1. Comply with SMA 1004, "Specifications for Aluminum Tubular Frame Screens for Windows," for minimum standards of appearance, fabrication, attachment of screen fabric, hardware, and accessories unless more stringent requirements are indicated.

B. Aluminum Insect Screen Frames: Manufacturer's standard aluminum alloy complying with SMA 1004. Fabricate frames with mitered or coped joints or corner extrusions, concealed fasteners and removable PVC spline.
   1. Extruded-Aluminum or Aluminum Tubular Framing Sections and Cross Braces: Not less than 0.050-inch (1.3-mm) wall thickness.
   2. Finish: Manufacturer's standard.

2.12 FABRICATION

A. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
   1. Profiles that are sharp, straight, and free of defects or deformations.
   2. Accurately fit joints; make joints flush, hairline and weatherproof.
   3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
   4. Physical and thermal isolation of glazing from framing members.
   5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
   6. Provisions for field replacement of glazing.
   7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

B. Fabricate aluminum windows in sizes indicated to be confirm by field measurement. Include a complete system for assembling components and anchoring windows.

C. Fabricate aluminum windows that are re-glazable without dismantling sash or framing.

D. Thermally Improved Construction: Fabricate aluminum windows with an integral, concealed, low-conductance thermal barrier; located between exterior materials and window members exposed on interior side; in a manner that eliminates direct metal-to-metal contact. Thermal barriers shall be designed in accordance with AAMA TIR A8.
   1. Frame thermal barrier shall be polyamide with a minimum of 1” (25.4 mm) separation, installed continuously and mechanically bonded to the aluminum.
   2. Sash thermal barrier shall be polyamide with a minimum of 1/2” (12.7 mm) separation, installed continuously and mechanically bonded to the aluminum.

E. Weather Stripping: Provide full-perimeter weather stripping for each operable sash.

F. Weep Holes: Provide weep holes and internal passages in window frames to conduct infiltrating water to exterior.

G. Provide water-shed members as required above lines of natural water penetration.

H. Mullions: Provide mullions and cover plates as shown, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances

and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design loads of window units.

I. Sub frames: Provide sub frames with anchors for window units as shown, of profile and dimensions indicated but not less than 0.093-inch (2.4-mm) thick extruded aluminum. Miter or cope corners, and join with concealed mechanical joint fasteners. Finish to match window units. Provide sub frames capable of withstanding design loads of window units.

J. Factory-Glazed Fabrication: Glaze aluminum windows in the factory where practical and possible for applications indicated. Comply with requirements in Division 08 Section "Glazing" and with AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS).

K. Glazing Stops: Provide snap-on glazing stops coordinated with Division 08 Section "Glazing" and glazing system indicated. Provide glazing stops to match sash.

2.13 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Factory Finishing:
1. Kawneer Permanodic™ AA-M10C21A44 / AA-M45C22A44, AAMA 611, Architectural Class I Color Anodic Coating, Color: #40 Dark Bronze.
2. Kawneer Permanodic™ AA-M10C21A41 / AA-M45C22A41, AAMA 611, Architectural Class I Clear Anodic Coating (Color #14 Clear) (Optional).

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weather tight window installation.
1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.
2. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing windows, hardware, accessories, and other components.

B. Install aluminum framed storefront system level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.

C. Set sill members in bed of sealant or with gaskets, as indicated, for weather tight construction.

D. Install aluminum framed storefront system and components to drain condensation, water penetrating joints, and moisture migrating within sliding door to the exterior.

E. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.03 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.
   1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.

B. Testing Services: Testing and inspecting of installed windows shall take place as follows:
   1. Testing Methodology: Testing Standard shall be per AAMA 502 including reference to ASTM E 783 for Air Infiltration Test and ASTM E 1105 for Water Penetration Test.
      a. Air Infiltration Test: Conduct test in accordance with ASTM E 783 at a minimum uniform static test pressure of 1.57 psf (75 Pa) for CW or 6.24 psf (300 Pa) for AW. The maximum allowable rates of air leakage for field testing shall not exceed 1.5 times the project specifications.
      b. Water Infiltration Test: Water penetration resistance tests shall be conducted in accordance with ASTM E 1105 at a static test pressure equal to 2/3 the specified water test pressure.
   2. Testing Extent: Architect shall select window units to be tested as soon as a representative portion of the project has been installed, glazed, perimeter caulked and cured. Conduct tests for air infiltration and water penetration with manufacturer’s representative present.
   3. Test Reports: Shall be prepared according to AAMA 502.

3.04 ADJUSTING, CLEANING, AND PROTECTION

A. Adjust operating sashes, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weather tight closure. Lubricate hardware and moving parts.

B. Clean aluminum surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

C. Clean glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.

D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

E. Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written recommendations.

3.05 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain window operating system. Refer to Section 017823 "Operating and Maintenance Manuals."

END OF SECTION 085113 08 5113

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SECTION 08 7100.01
DOOR HARDWARE PKG 1

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes commercial door hardware for the following:
   1. Swinging doors.

B. Door hardware includes, but is not necessarily limited to, the following:
   1. Mechanical door hardware.
   2. Electromechanical door hardware.
   3. Cylinders specified for doors in other sections.

C. Related Sections:
   1. Section 08 8001 "Hardware Schedule"
   2. Section 08 1119 “Stainless Steel Doors and Frames”.

D. 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. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:
   1. ANSI/BHMA Certified Product Standards - A156 Series.
   2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
   3. ANSI/UL 294 - Access Control System Units.
   4. UL 305 - Panic Hardware.
   5. ANSI/UL 437- Key Locks.

1.03 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
3. Content: Include the following information:
    a. Type, style, function, size, label, hand, and finish of each door hardware item.
    b. Manufacturer of each item.
    c. Fastenings and other pertinent information.
    d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
    e. Explanation of abbreviations, symbols, and codes contained in schedule.
    f. Mounting locations for door hardware.
    g. Door and frame sizes and materials.
    h. Warranty information for each product.
4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:
1. 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:
    a. 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.
    b. Complete (risers, point-to-point) access control system block wiring diagrams.
    c. Wiring instructions for each electronic component scheduled herein.
2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

E. Informational Submittals:
1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

F. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

1.04 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this

Project and that have a proven record of successful in-service performance.

B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).

C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
   1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
   2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

F. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
   1. Function of building, purpose of each area and degree of security required.
   2. Plans for existing and future key system expansion.
   3. Requirements for key control storage and software.
   4. Installation of permanent keys, cylinder cores and software.
   5. Address and requirements for delivery of keys.

H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
   1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
   2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
   3. Review sequence of operation narratives for each unique access controlled opening.
   4. Review and finalize construction schedule and verify availability of materials.
   5. Review the required inspecting, testing, commissioning, and demonstration procedures

I. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.06 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.07 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
   1. Structural failures including excessive deflection, cracking, or breakage.
   2. Faulty operation of the hardware.
   3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   4. Electrical component defects and failures within the systems operation.

C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

D. Special Warranty Periods:
   1. Ten years for mortise locks and latches.
   2. Five years for exit hardware.
   3. Twenty five years for manual overhead door closer bodies.
   4. Two years for electromechanical door hardware, unless noted otherwise.

1.08 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 PRODUCTS

2.01 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:
   1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.02 HANGING DEVICES

A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
   1. Quantity: Provide the following hinge quantity:
      a. Two Hinges: For doors with heights up to 60 inches.
      b. Three Hinges: For doors with heights 61 to 90 inches.
      c. Four Hinges: For doors with heights 91 to 120 inches.
      d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
   2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
      a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.
      b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.
   3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
      a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
      b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
   4. Hinge Options: Comply with the following:
      a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.
   5. Manufacturers:
      a. Hager Companies (HA) - BB Series, 5 knuckle.
      b. Ives (IV) - 5BB Series, 5 knuckle.
      c. McKinney (MK) - TA/T4A Series, 5 knuckle.

B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 continuous geared hinge. with minimum 0.120-inch thick extruded 6063-T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.
   1. Manufacturers:

a. Hager Companies (HA).
b. Ives (IV).
c. Pemko (PE).

2.03 DOOR OPERATING TRIM

A. Door Push Plates and Pulls: ANSI/BHMA A156.6 door pushes and pull units of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
2. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
3. Manufacturers:
a. Ives (IV).
b. Rockwood (RO).
c. Trimco (TC).

2.04 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.
1. Manufacturers:
a. Dormakaba Best (BE).
b. No Substitution.

B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:
1. Threaded mortise cylinders with rings and cams to suit hardware application.
2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
4. Tubular deadlocks and other auxiliary locks.
5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
6. Keyway: Manufacturer’s Standard.

C. Interchangeable Cores: Provide small format interchangeable cores as specified, core insert, removable by use of a special key; usable with other manufacturers' cylinders.

D. Keying System: Each type of lock and cylinders to be factory keyed.
1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
3. Existing System: Field verify and key cylinders to match Owner's existing system.

E. Key Quantity: Provide the following minimum number of keys:
1. Change Keys per Cylinder: Two (2)
2. Master Keys (per Master Key Level/Group): Five (5).
3. Construction Keys (where required): Ten (10).

F. Construction Keying: Provide temporary keyed construction cores.

G. Key Registration List (Bitting List):

1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

2.05 MECHANICAL LOCKS AND LATCHING DEVICES

A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed. Locksets are to be manufactured with a corrosion resistant steel case and be field-reversible for handing without disassembly of the lock body.
   1. Where specified, provide status indicators with highly reflective color and wording for “locked/unlocked” or “vacant/occupied” with custom wording options if required. Indicator to be located above the cylinder with the inside thumb-turn not blocking the visibility of the indicator status. Indicator window size to be a minimum of 2.1” x 0.6” with a curved design allowing a 180 degree viewing angle with protective covering to prevent tampering.
   2. Manufacturers:
      a. Corbin Russwin Hardware (RU) - ML2000 Series.
      b. Sargent Manufacturing (SA) - 8200 Series.
      c. Schlage (SC) - L9000 Series.

2.06 AUXILIARY LOCKS

A. Mortise Deadlocks, Small Case: ANSI/BHMA A156.36, Grade 1, small case mortise type deadlocks constructed of heavy gauge wrought corrosion resistant steel. Steel or stainless steel bolts with a 1" throw and hardened steel roller pins. Deadlocks to be products of the same source manufacturer and keyway as other specified locksets.
   1. Manufacturers:
      a. Corbin Russwin Hardware (RU) - DL4000 Series.
      b. Sargent Manufacturing (SA) - 4870 Series.
      c. Schlage (SC) - L460 Series.

2.07 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
   1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
   2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
   3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
   4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:
   1. Strikes for Mortise Locks and Latches: BHMA A156.13.
   2. Strikes for Bored Locks and Latches: BHMA A156.2.
   3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
   4. Dustproof Strikes: BHMA A156.16.

2.08 ELECTRIC STRIKES

A. Standard Electric Strikes: Electric strikes conforming to ANSI/BHMA A156.31, Grade 1, for use on non-rated or fire rated openings. Strikes shall be of stainless steel construction tested to a minimum of 1500 pounds of static strength and 70 foot-pounds of dynamic strength with a minimum endurance of 1 million operating cycles. Provide strikes with 12 or 24 VDC capability, fail-secure unless otherwise specified. Where specified provide latchbolt and latchbolt strike monitoring indicating both the position of the latchbolt and locked condition of the strike.
   1. Manufacturers:
      a. HES (HS) - 1006 Series.
      b. Von Duprin (VD) - 6200/6400 Series.

B. Provide electric strikes with in-line power controller and surge suppressor by the same manufacturer as the strike with the combined products having a five year warranty.

2.09 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:
   1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
   2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer’s catalog and template book for specific requirements.
   3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
   4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
   5. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
      a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
      b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
   6. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
   7. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2” wide stiles.
   8. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
   9. Rail Sizing: Provide exit device rails factory sized for proper door width application.
   10. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.
   1. Manufacturers:

a. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.
b. Sargent Manufacturing (SA) - 80 Series.
c. Von Duprin (VD) - 35A/98 XP Series.

2.10 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:
1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Large Body Cast Iron): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control.
1. Manufacturers:
a. Corbin Russwin Hardware (RU) - DC8000 Series.
b. Norton Rixson (NO) - 9500 Series.
c. Sargent Manufacturing (SA) - 281 Series.

2.11 ARCHITECTURAL TRIM

A. Door Protective Trim
1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
2. Size: Fabricate protection plates (kick, armor, or mop) 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.
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. Consult manufacturer’s catalog and template book for specific requirements for size and applications.
4. Protection Plates: ANSI/BHMA A156.6 protection plates (kick, armor, or mop), fabricated from the following:
a. Stainless Steel: 300 grade, 050-inch thick.
5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Manufacturers:

a. Hiawatha, Inc. (HI).
b. Rockwood (RO).
c. Trimco (TC).

2.12 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
1. Manufacturers:
a. Hiawatha, Inc. (HI).
b. Rockwood (RO).
c. Trimco (TC).

C. Overhead Door Stops and Holders: ANSI/BHMA A156.8, Grade 1 Certified Products Directory (CPD) listed overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.
1. Manufacturers:
a. Norton Rixson (RF).
b. Rockwood (RO).
c. Sargent Manufacturing (SA).

2.13 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Manufacturers:

1. National Guard Products (NG).
2. Pemko (PE).
3. Reese Enterprises, Inc. (RE).

2.14 ELECTRONIC ACCESSORIES

A. Request-to-Exit Motion Sensor: Request-to-Exit Sensors motion detectors specifically designed for detecting exiting through a door from the secure area to a non-secure area. Include built-in timers (up to 60 second adjustable timing), door monitor with sounder alert, internal vertical pointability coverage, 12VDC or 24VDC power and selectable relay trigger with fail safe/fail secure modes.
   1. Manufacturers:
      a. Alarm Controls (AK) - SREX Series.
      b. Securitron (SU) - XMS Series.

B. Door Position Switches: Door position magnetic reed contact switches specifically designed for use in commercial door applications. On recessed models the contact and magnetic housing snap-lock into a 1" diameter hole. Surface mounted models include wide gap distance design complete with armored flex cabling. Provide SPDT, N/O switches with optional Rare Earth Magnet installation on steel doors with flush top channels.
   1. Manufacturers:
      a. Securitron (SU) - DPS Series.

C. Switching Power Supplies: Provide power supplies with either single or dual voltage configurations at 12 or 24VDC. Power supplies shall have battery backup function with an integrated battery charging circuit and shall provide capability for power distribution, direct lock control and Fire Alarm Interface (FAI) through add on modules. Power supplies shall be expandable up to 16 individually protected outputs. Output modules shall provide individually protected, continuous outputs and/or individually protected, relay controlled outputs.
   1. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.
   2. Manufacturers:
      a. Securitron (SU) - AQD Series.

D. Intelligent Switching Power Supplies: Provide power supplies with single, dual or multi-voltage configurations at 12 and/or 24VDC. Power Supply shall have battery backup function with an integrated battery charging circuit. The power supply shall have a standard, integrated Fire Alarm Interface (FAI). The power supply shall provide capability for secondary voltage, power distribution, direct lock control and network monitoring through add on modules. The power supply shall be expandable up to 16 individually protected outputs. Output modules shall provide individually protected, continuous outputs and/or individually protected, relay controlled outputs. Network modules shall provide remote monitoring functions such as status reporting, fault reporting and information logging.
   1. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.
   2. Manufacturers:
      a. Securitron (SU) - AQL Series.

2.15 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.16 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.02 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.03 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
   1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
   1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
   2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
   3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
   4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9

Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.04 FIELD QUALITY CONTROL

A. Field Inspection (Punch Report): Reference Division 01 Sections “Closeout Procedures”. Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.
   1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

3.05 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.06 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.07 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.08 DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
   1. Quantities listed are for each pair of doors, or for each single door.

2. The supplier is responsible for handing and sizing all products.
3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

B. Manufacturer's Abbreviations:

1. MK - MCKINNEY	
2. PE - PEMKO	
3. RU - CORBIN RUSSWIN	
4. SH - SCHLAGE ELECTRONIC SECURITY	
5. BE - BEST ACCESS & DOOR CLOSERS	
6. HS - HES	
7. RO - ROCKWOOD	
8. RF - RIXSON	
9. SU - SECURITRON	

HARDWARE SETS

SET: 1.0
DOORS: 101A

2	CONTINUOUS HINGE	10BEFM_SLF-HD1 X LENGTH REQUIRED		PE
1	CONCEALED VERT ROD EXIT, CLASSROOM	ED5800 128955ET	613E	RU
1	CONCEALED VERT ROD EXIT, EXIT ONLY	ED5800 EO	613E	RU
1	CORE	AS REQUIRED TO MATCH FACILITY STANDARD (BEST 5C7DD SYSTEM)	613	BE
2	CONC OVERHEAD STOP	6-336	613E	RF
2	SURFACE CLOSER	DC8210 A3 / DC8200	613E	RU
1	THRESHOLD	273X224-10BE-FGT X LENGTH REQUIRED X MSES25SS		PE
1	GASKETING	PROVIDED BY DOOR/FRAME SUPPLIER		
2	SWEEP	3452-10BE-NB X LENGTH REQUIRED		PE
2	POSITION SWITCH	DPS-M-BK		SU

NOTES: VERIFY AND COORDINATE SCHEDULED HARDWARE WITH EXISTING CONDITIONS PRIOR TO ORDERING. PREPARE EXISTING FRAME AND PROVIDE ALL FILLER PLATES AND

ACCESSORIES REQUIRED FOR PROPER INSTALLATION AND FUNCTION OF NEW HARDWARE. SYSTEM OPERATIONAL NARRATIVEDOOR POSITION SWITCHES MONITOR THE DOORS OPEN/CLOSED STATUS.

SET: 2.0

DOORS: 004C

3	HINGE, FULL MORTISE, HVY WT	T4A3386 [NRP]	US10BE	MK	
1	STOREROOM LOCK	ML2057 128T CT7D	613E	RU	
1	CORE	AS REQUIRED TO MATCH FACILITY STANDARD (BEST 5C7DD SYSTEM)	613	BE	
1	ELECTRIC STRIKE	1600-CS	613E	HS	
1	SMART PAC BRIDGE RECTIFIER	2005M3		HS	
1	DOOR OPERATOR, ACTUATORS, & ACCESSORIES	PROVIDED BY DOOR OPERATOR SUPPLIER			
1	KICK PLATE	K1050 12" CSK BEV	US10BE	RO	
1	THRESHOLD	273X224-10BE-FGT X LENGTH REQUIRED X MSES25SS		PE	
1	GASKETING	S773BL (HEAD & JAMBS)		PE	
1	SWEEP	3452-10BE-NB X LENGTH REQUIRED		PE	
1	POSITION SWITCH	DPS-M-BK		SU	
1	MOTION SENSOR	XMS		SU	
1	REMOTE PUSH BUTTON	PROVIDED BY SECURITY SUPPLIER			
1	POWER SUPPLY	AQL4-R8E1		SU	
1	WIRING DIAGRAM	ELEVATION AND POINT TO POINT AS SPECIFIED			

NOTES: SYSTEM OPERATIONAL NARRATIVEDOOR NORMALLY CLOSED AND SECURE.ELECTRIC STRIKE OPENS AND DOOR OPERATOR IS SET IN MOTION VIA REMOTE PUSH BUTTON ONCE VETTED VIA INTERCOM CALL STATION.ENTRY ALSO POSSIBLE VIA KEY OVERRIDE.FREE EGRESS AT ALL TIMES.MOTION SENSING REQUEST TO EXIT SWITCH TEMPORARILY SHUNTS THE DOOR POSITION SWITCH ALLOWING EGRESS WITHOUT INDICATING ALARM AT MONITORING STATION.DOOR POSITION SWITCH MONITORS DOOR OPEN/CLOSED STATUS.ELECTRIC STRIKE REMAINS CLOSED DURING POWER LOSS. (FAIL SECURE)

SET: 3.0

DOORS: ST1-2					
6	HINGE, FULL MORTISE, HVY WT	T4A3386 [NRP]	US10BE	MK	
1	CONCEALED VERT ROD EXIT, EXIT ONLY	ED5800 EO	613E	RU	
1	CONCEALED VERT ROD EXIT, STOREROOM	ED5800 128959ET CT7SD	613E	RU	
1	CORE	AS REQUIRED TO MATCH FACILITY STANDARD (BEST 5C7DD SYSTEM)	613	BE	
2	SURFACE CLOSER	DC8210 A11	613E	RU	
2	KICK PLATE	K1050 12" CSK BEV	US10BE	RO	
1	THRESHOLD	273X224AFGT X LENGTH REQUIRED X MSES25SS		PE	
1	GASKETING	S773BL (HEAD & JAMBS)		PE	
1	RAIN GUARD	346-10BE		PE	
2	SWEEP	3452-10BE-NB X LENGTH REQUIRED		PE	
1	ASTRAGAL	29324-10BE-NB X DOOR HEIGHT		PE	
NOTES: SYSTEM OPERATIONAL NARRATIVEDOOR POSITION SWITCHES MONITOR THE DOORS OPEN/CLOSED STATUS.					
SET: 4.0					
DOORS: 004B					
3	HINGE, FULL MORTISE, HVY WT	T4A3386 [NRP]	US10BE	MK	
1	RIM EXIT DEVICE, CLASSROOM	ED5200 128955ET CT7SD	613E	RU	
1	CORE	AS REQUIRED TO MATCH FACILITY STANDARD (BEST 5C7DD SYSTEM)	613	BE	
1	SURFACE CLOSER	DC8210 A11	613E	RU	
1	KICK PLATE	K1050 12" CSK BEV	US10BE	RO	
1	THRESHOLD	273X224AFGT X LENGTH REQUIRED X MSES25SS		PE	
1	GASKETING	S773BL (HEAD & JAMBS)		PE	
1	RAIN GUARD	346-10BE		PE	

1	SWEEP	3452-10BE-NB X LENGTH REQUIRED		PE	
NOTES: SYSTEM OPERATIONAL NARRATIVEDOOR POSITION SWITCH MONITORS DOORS OPEN/CLOSED STATUS.					
SET: 5.0					
DOORS: 001A, 001B					
6	HINGE	T4A3786 [NRP]	US10BE	MK	
1	SURFACE VERT ROD EXIT, STOREROOM	ED5470 128959ET M55 CT7D	613E	RU	
1	SURFACE VERT ROD EXIT, EXIT ONLY	ED5470 EO M55	613E	RU	
2	CORE	AS REQUIRED TO MATCH FACILITY STANDARD (BEST 5C7DD SYSTEM)	613	BE	
2	SURFACE CLOSER	DC8210 A11	613E	RU	
2	KICK PLATE	K1050 12" CSK BEV	US10BE	RO	
2	SILENCER	608		RO	
NOTES: VERIFY AND COORDINATE SCHEDULED HARDWARE WITH EXISTING CONDITIONS PRIOR TO ORDERING. PREPARE EXISTING DOOR AND FRAME AND PROVIDE ALL FILLER/MOUNTING PLATES AND ACCESSORIES REQUIRED FOR PROPER INSTALLATION AND FUNCTION OF NEW HARDWARE.					
SET: 6.0					
DOORS: ST1-1					
6	HINGE	T4A3786 [NRP]	US10BE	MK	
1	SURFACE VERT ROD EXIT, CLASSROOM	ED5470 128955ET M55 CT7SD	613E	RU	
1	SURFACE VERT ROD EXIT, EXIT ONLY	ED5470 EO M55	613E	RU	
1	CORE	AS REQUIRED TO MATCH FACILITY STANDARD (BEST 5C7DD SYSTEM)	613	BE	
1	SURFACE CLOSER	DC8210 A3 / DC8200	613E	RU	
1	SURFACE CLOSER	DC8210 A11	613E	RU	
2	KICK PLATE	K1050 12" CSK BEV	US10BE	RO	
1	WALL STOP	403 (OR) 441CU	US10BE	RO	
2	SILENCER	608		RO	
NOTES: VERIFY AND COORDINATE SCHEDULED HARDWARE WITH EXISTING CONDITIONS PRIOR TO ORDERING. PREPARE EXISTING DOOR AND FRAME AND PROVIDE ALL					

FILLER/MOUNTING PLATES AND ACCESSORIES REQUIRED FOR PROPER INSTALLATION AND FUNCTION OF NEW HARDWARE.					
SET: 7.0					
DOORS: 004A					
3	HINGE	T4A3786 [NRP]	US10BE	MK	
1	RIM EXIT DEVICE, CLASSROOM	ED5200 128955ET CT7SD	613E	RU	
1	CORE	AS REQUIRED TO MATCH FACILITY STANDARD (BEST 5C7DD SYSTEM)	613	BE	
1	SURFACE CLOSER	DC8210 A11	613E	RU	
1	KICK PLATE	K1050 12" CSK BEV	US10BE	RO	
3	SILENCER	608		RO	
SET: 8.0					
DOORS: 101B					
8	HINGE	T4A3786 [NRP]	US10BE	MK	
2	DUMMY BAR, EXIT ONLY	ED5000DB EO	613E	RU	
1	DUNNY TRIM	128ET DUNNY LEVER TRIM	613E	RU	
2	SURFACE CLOSER	DC8210 A11	613E	RU	
2	KICK PLATE	K1050 12" CSK BEV	US10BE	RO	
2	SILENCER	608		RO	
NOTES: VERIFY AND COORDINATE SCHEDULED HARDWARE WITH EXISTING CONDITIONS PRIOR TO ORDERING. PREPARE EXISTING DOOR AND FRAME AND PROVIDE ALL FILLER/MOUNTING PLATES AND ACCESSORIES REQUIRED FOR PROPER INSTALLATION AND FUNCTION OF NEW HARDWARE.					
SET: 9.0					
DOORS: 005-1A					
3	HINGE, FULL MORTISE	TA2714 [NRP]	US10BE	MK	
1	STOREROOM LOCK	ML2057 128T CT7D	613E	RU	
1	CORE	AS REQUIRED TO MATCH FACILITY STANDARD (BEST 5C7DD SYSTEM)	613	BE	
1	WALL STOP	403 (OR) 441CU	US10BE	RO	
1	SILENCER	608		RO	
NOTES: VERIFY AND COORDINATE SCHEDULED HARDWARE WITH EXISTING CONDITIONS					

PRIOR TO ORDERING. PREPARE EXISTING FRAME AND PROVIDE ALL FILLER PLATES AND ACCESSORIES REQUIRED FOR PROPER INSTALLATION AND FUNCTION OF NEW HARDWARE.

SET: 10.0
DOORS: 003

3	HINGE, FULL MORTISE	TA2714 [NRP]	US10BE	MK	
1	STOREROOM LOCK	ML2057 128T CT7D	613E	RU	
1	CORE	AS REQUIRED TO MATCH FACILITY STANDARD (BEST 5C7DD SYSTEM)	613	BE	
1	SURF OVERHEAD STOP	10-336	613E	RF	
3	SILENCER	608		RO	

NOTES: VERIFY AND COORDINATE SCHEDULED HARDWARE WITH EXISTING CONDITIONS PRIOR TO ORDERING. PREPARE EXISTING FRAME AND PROVIDE ALL FILLER PLATES AND ACCESSORIES REQUIRED FOR PROPER INSTALLATION AND FUNCTION OF NEW HARDWARE.

SET: 11.0
DOORS: 005-2A

3	HINGE, FULL MORTISE	TA2714 [NRP]	US10BE	MK	
1	STOREROOM LOCK	ML2057 128T CT7D	613E	RU	
1	CORE	AS REQUIRED TO MATCH FACILITY STANDARD (BEST 5C7DD SYSTEM)	613	BE	
1	SURFACE CLOSER	DC8210 A3 / DC8200	613E	RU	
1	KICK PLATE	K1050 12" CSK BEV	US10BE	RO	
1	WALL STOP	403 (OR) 441CU	US10BE	RO	
3	SILENCER	608		RO	

SET: 12.0
DOORS: 005-2B

3	HINGE, FULL MORTISE	TA2714 [NRP]	US10BE	MK	
1	STOREROOM LOCK	ML2057 128T CT7D	613E	RU	
1	CORE	AS REQUIRED TO MATCH FACILITY STANDARD (BEST 5C7DD SYSTEM)	613	BE	
1	SURFACE CLOSER	DC8210 A4	613E	RU	
1	KICK PLATE	K1050 12" CSK BEV	US10BE	RO	
3	SILENCER	608		RO	

SET: 13.0					
DOORS: 108					
3	HINGE, FULL MORTISE	TA2714 [NRP]	US10BE	MK	
1	STOREROOM LOCK	ML2057 128T CT7D	613E	RU	
1	CORE	AS REQUIRED TO MATCH FACILITY STANDARD (BEST 5C7DD SYSTEM)	613	BE	
NOTES: VERIFY AND COORDINATE SCHEDULED HARDWARE WITH EXISTING CONDITIONS PRIOR TO ORDERING. PREPARE EXISTING DOOR AND FRAME AND PROVIDE ALL FILLER/MOUNTING PLATES AND ACCESSORIES REQUIRED FOR PROPER INSTALLATION AND FUNCTION OF NEW HARDWARE.					
SET: 14.0					
DOORS: 103					
3	HINGE, FULL MORTISE	TA2714 [NRP]	US10BE	MK	
1	ACCESS CONTROL CYL LOCK	AD-400 PUSH BUTTON SERIES (MATCH FACILITY STANDARD)	613	SH	
1	CORE	AS REQUIRED TO MATCH FACILITY STANDARD (BEST 5C7DD SYSTEM)	613	BE	
1	WALL STOP	403 (OR) 441CU	US10BE	RO	
1	GASKETING	S88BL (HEAD & JAMBS)		PE	
SET: 15.0					
DOORS: 016A, 104					
3	HINGE, FULL MORTISE	TA2714 [NRP]	US10BE	MK	
1	PRIVACY LOCK	ML2060 128T V21	613E	RU	
1	SURFACE CLOSER	DC8210 A3 / DC8200	613E	RU	
1	KICK PLATE	K1050 12" CSK BEV	US10BE	RO	
1	WALL STOP	403 (OR) 441CU	US10BE	RO	
1	GASKETING	S88BL (HEAD & JAMBS)		PE	
1	COAT HOOK	RM801	US10BE	RO	
SET: 16.0					
DOORS: 013					
1	DEADBOLT	DL4122 CT7D	613E	RU	
2	CORE	AS REQUIRED TO MATCH FACILITY	613	BE	

		STANDARD (BEST 5C7DD SYSTEM)			
1	PUSH PLATE	70C-RKW	US10BE	RO	
1	PULL PLATE	BF 110X70C	US10BE	RO	
1	SURFACE CLOSER	DC8210 A3 / DC8200	613E	RU	

NOTES: BALANCE OF EXISTING HARDWARE TO REMAIN. VERIFY AND COORDINATE SCHEDULED HARDWARE WITH EXISTING CONDITIONS PRIOR TO ORDERING. PREPARE EXISTING DOOR AND FRAME AND PROVIDE ALL FILLER/MOUNTING PLATES AND ACCESSORIES REQUIRED FOR PROPER INSTALLATION AND FUNCTION OF NEW HARDWARE.

SET: 17.0

DOORS: 002, 010, 012

1	STOREROOM LOCK	ML2057 128T CT7D	613E	RU	
1	CORE	AS REQUIRED TO MATCH FACILITY STANDARD (BEST 5C7DD SYSTEM)	613	BE	

NOTES: BALANCE OF EXISTING HARDWARE TO REMAIN. VERIFY AND COORDINATE SCHEDULED HARDWARE WITH EXISTING CONDITIONS PRIOR TO ORDERING. PREPARE EXISTING DOOR AND FRAME AND PROVIDE ALL FILLER/MOUNTING PLATES AND ACCESSORIES REQUIRED FOR PROPER INSTALLATION AND FUNCTION OF NEW HARDWARE.

SET: 18.0

DOORS: 011, 015

1	STOREROOM LOCK	ML2057 128T CT7SD	613E	RU	
1	CORE	AS REQUIRED TO MATCH FACILITY STANDARD (BEST 5C7DD SYSTEM)	613	BE	

NOTES: BALANCE OF EXISTING HARDWARE TO REMAIN. VERIFY AND COORDINATE SCHEDULED HARDWARE WITH EXISTING CONDITIONS PRIOR TO ORDERING. PREPARE EXISTING DOOR AND FRAME AND PROVIDE ALL FILLER/MOUNTING PLATES AND ACCESSORIES REQUIRED FOR PROPER INSTALLATION AND FUNCTION OF NEW HARDWARE.

SET: 19.0

DOORS: 006, 08A

1	ACCESS CONTROL CYL LOCK	AD-400 PUSH BUTTON SERIES (MATCH FACILITY STANDARD)	613	SH	
1	CORE	AS REQUIRED TO MATCH FACILITY	613	BE	

		STANDARD (BEST 5C7DD SYSTEM)			
NOTES: BALANCE OF EXISTING HARDWARE TO REMAIN. VERIFY AND COORDINATE SCHEDULED HARDWARE WITH EXISTING CONDITIONS PRIOR TO ORDERING. PREPARE EXISTING DOOR AND FRAME AND PROVIDE ALL FILLER/MOUNTING PLATES AND ACCESSORIES REQUIRED FOR PROPER INSTALLATION AND FUNCTION OF NEW HARDWARE.					
SET: 20.0					
DOORS: 007					
1	PRIVACY LOCK	ML2060 128T V21	613E	RU	
NOTES: BALANCE OF EXISTING HARDWARE TO REMAIN.VERIFY AND COORDINATE SCHEDULED HARDWARE WITH EXISTING CONDITIONS PRIOR TO ORDERING. PREPARE EXISTING DOOR AND FRAME AND PROVIDE ALL FILLER/MOUNTING PLATES AND ACCESSORIES REQUIRED FOR PROPER INSTALLATION AND FUNCTION OF NEW HARDWARE.					
SET: 21.0					
DOORS: 08B, 201, 202					
1		EXISTING HARDWARE TO REMAIN			

END OF SECTION 08 7100.01

HARDWARE SCHEDULE

1. MK - McKinney
2. PE - Pemko
3. RU - Corbin Russwin
4. SH - Schlage Electronic Security
5. BE - BEST Access & Door Closers
6. HS - HES
7. RO - Rockwood
8. RF - Rixson
9 SU - Securitron

SET 1.0

Doors: Egress stairs ST1-2, ST6-2,
Exits: 101B, 121B,

1	Hinge, Continuous	HG-305 (SS) [NRP]	BRONZE	MK
1	Rim Exit Device, Classroom	ED5200 128955ET CT7SD	BRONZE	RU
1	Core	As Required to Match Facility Standard (Best 5C7DD System)	BRONZE	BE
1	Surface Closer	DC8210 A11	BRONZE	RU
1	Kick Plate	K1050 12" CSK BEV	BRONZE	RO
1	Threshold	273x224AFGT x Length Required x MSES25SS	BRONZE	PE
1	Gasketing	S773BL (Head & Jambs)		PE
1	Rain Guard	346-10BE		PE
1	Sweep	3452-10BE-NB x Length Required		PE
1	Mortar Box	JB-2 Junction Box	BRONZE	Stanley
1	Drip Cap	R199A	BRONZE	Reese
1	Security Astragal	EG-T-308 (continuous)	BRONZE	Markar
1	Armour Plate	J102 x US16	BRONZE	RO

SET 1.1

Doors: Exit Drs. 001, 007C, 033A

1	Hinge, Continuous	HG-305 (SS) [NRP]	BRONZE	MK
1	Rim Exit Device, Classroom	ED5200 128955ET CT7SD	BRONZE	RU
1	Core	As Required to Match Facility Standard (Best 5C7DD System)	BRONZE	BE
1	Surface Closer	DC8210 A11	BRONZE	RU
1	Kick Plate	K1050 12" CSK BEV	BRONZE	RO
1	Threshold	273x224AFGT x Length Required x MSES25SS	BRONZE	PE
1	Gasketing	S773BL (Head & Jambs)		PE
1	Rain Guard	346-10BE		PE
1	Sweep	3452-10BE-NB x Length Required		PE
1	Mortar Box	JB-2 Junction Box	BRONZE	Stanley
1	Drip Cap	R199A	BRONZE	Reese
1	Security Astragal	EG-T-308 (continuous)	BRONZE	Markar
1	Armour Plate	J102 x US16	BRONZE	RO

SET 2.0

Doors: Filter Rm 002, Elec 037

1	Hinge, Continuous	HG-305 (SS) [NRP]	BRONZE	MK
1	Storeroom Lock	ML2057 128T CT7D	BRONZE	RU
1	Core	As Required to Match Facility Standard (Best 5C7DD System)	BRONZE	BE
1	Threshold	273x224AFGT x Length Required x MSES25SS	BRONZE	PE
1	Gasketing	S773BL (Head & Jambs)		PE
1	Rain Guard	346-10BE		PE
1	Sweep	3452-10BE-NB x Length Required		PE
1	Mortar Box	JB-2 Junction Box	BRONZE	Stanley
1	Drip Cap	R199A	BRONZE	Reese
1	Security Astragal	EG-T-308 (continuous)	BRONZE	Markar
1	Armour Plate	J102 x US16	BRONZE	RO

SET 3.0

Doors: 005A Lifeguard

1	Hinge, Continuous	Hinge, Continuous	BRONZE	MK
1	Entry Lock	**ML2057 128T CT7D**	BRONZE	RU
1	Core	As Required to Match Facility Standard (Best 5C7DD System)	BRONZE	BE
1	Threshold	273x224AFGT x Length Required x MSES25SS	BRONZE	PE
1	Gasketing	S773BL (Head & Jambs)		PE
1	Rain Guard	346-10BE		PE
1	Sweep	3452-10BE-NB x Length Required		PE
1	Mortar Box	JB-2 Junction Box	BRONZE	Stanley
1	Drip Cap	R199A	BRONZE	Reese
1	Security Astragal	EG-T-308 (continuous)	BRONZE	Markar
1	Armour Plate	J102 x US16	BRONZE	RO

SET 4.0

Doors: Toilet Rms. 012A, 013

1	Deadbolt	DL4122 CT7D	BRONZE	RU
1	Push Plate	70C-RKW	BRONZE	RO
1	Pull Plate	BF 110x70C	BRONZE	RO
1	Surface Closer	DC8210 A3 / DC8200	BRONZE	RU
1	Threshold	273x224AFGT x Length Required x MSES25SS		PE
1	Gasketing	S773BL (Head & Jambs)		PE
1	Rain Guard	346-10BE		PE
1	Sweep	3452-10BE-NB x Length Required		PE
1	Mortar Box	JB-2 Junction Box	BRONZE	Stanley
1	Drip Cap	R199A	BRONZE	Reese
1	Security Astragal	EG-T-308 (continuous)	BRONZE	Markar
1	Armour Plate	J102 x US16	BRONZE	RO

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SECTION 08 8100
GLAZING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Applicable provisions of Bidding Requirements, Contract Requirements in Division 0 and all applicable Division 01 sections.

B. RELATED SECTIONS
1. Section 081113 Hollow Metal Doors and Frames: for door transoms, side lites and glazing in doors.
2. Section 084113 Aluminum-Framed Entrances and Storefronts: for required insulated glazing for exterior use.

1.02 SUMMARY

A. Section Includes: Glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
1. Doors and Transoms: Exterior requires insulated glazing.
2. Entry Storefront glazing and Interior glazing for doors with side lites and transom as shown on drawings.

1.03 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

C. Interspace: Space between lites of an insulating-glass unit.

1.04 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

1.05 SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Glass Samples: For each type of glass product other than clear monolithic vision glass 12 inches square.

C. Glazing Accessory Samples: For gaskets, sealants and colored spacers, in 12-inch lengths. Install sealant Samples between two strips of material representative in color of the adjoining framing system.

D. Qualification Data: For installers.

E. Product Certificates: For glass and glazing products, from manufacturer.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for 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.

G. Warranties: Sample of special warranties.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

B. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

C. Source Limitations for Glass: Obtain laminated glass and insulating glass from single source from single manufacturer for each glass type.

D. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

E. 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. NGA/GANA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."
   2. FGIA/IGMA Publication for Insulating Glass: IGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

F. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

G. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

H. Strength: Do not substitute relative to designations of annealed, heat-strengthened, and fully tempered glass.

I. Preinstallation Conference: Conduct conference at Project site.
   1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   2. Review temporary protection requirements for glazing during and after installation.

1.07 PRODUCT HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or

other causes.

B. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.08 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
   1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F.

1.09 WARRANTY

A. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form in which laminated-glass manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
   1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
   1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.
   1. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.

B. Provide annealed, heat-strengthened, and fully tempered glass as specifically designated, without substitutions unless advance written permission is provided by the project Architect

2.02 GLASS PRODUCTS

A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide Guardian Glass LLC; or comparable product by one of the following:
      a. Guardian Glass LLC (Basis-of design product).
      b. Pilkington North America.
      c. Vitro Architectural Glass

B. Fully Tempered Float Glass: ASTM C 1048; Kind FT,(clear) Low E unless otherwise indicated; of kind and condition indicated.

C. Fabrication Process:By horizontal (roller-hearth) process with roll-wave distortion horizontally oriented after completion of field glazing unless Architect's advanced written approval is provided.
   1. For uncoated glass, comply with requirements for Condition A.
   2. For coated vision glass, comply with requirements for Condition C (other coated glass).

D. Low-E-Coated Vision Glass: ASTM C1376, coated by vacuum deposition (sputter-coating) process, and complying with other requirements specified.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide Guardian Glass LLC; SunGuard SN 68 on Clear and SN 68 on CrystalGray or comparable product by one of the following:
      a. Guardian Glass LLC (Basis-of design product).
      b. Pilkington North America.
      c. Vitro Architectural Glass

2.03 LAMINATED GLASS

A. Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
   1. Construction: Laminate glass with polyvinyl butyral interlayer to comply with interlayer manufacturer's written recommendations.
   2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
   3. Interlayer Color: Clear.

B. Glass: Comply with applicable requirements in "Glass Products" Article as indicated by descriptions in "Glass Types" Article.

2.04 INSULATING GLASS

A. Manufacturers: Basis of Design; Guardian Industries Corp.; Sunguard Architectural Glass; Subject to compliance with requirements, provide products by one of the following:
   1. Guardian Glass LLC.
   2. Pilkington North America.
   3. PPG Industries, Inc.

B. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.
   1. Sealing System: Dual seal, with manufacturer's standard polyisobutylene primary and silicone secondary.
   2. Spacer: Aluminum with mill or clear anodic finish.
   3. Desiccant: Molecular sieve or silica gel, or blend of both.

C. Glass: Comply with applicable requirements in "Glass Products" Article and in "Laminated Glass" Article as indicated by descriptions in "Insulating-Glass Types" Article and in "Glass Types" Article.

2.05 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. EPDM complying with ASTM C 864.
   2. Silicone complying with ASTM C 1115.
   3. Thermoplastic polyolefin rubber complying with ASTM C 1115.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned EPDM, 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.

2.06 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. VOC Emissions for Sealants: Provide certificate of compliance with California Department of Public Health (CPDH) Standard Method v1.1- 2010, using the applicable exposure scenario.
   4. VOC Content for Sealants: Provide documentation of compliant VOC Content per SCAQMD Rule 1168.
   5. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

2.07 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
   1. AAMA 804.3 tape, where indicated.
   2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
   3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
   1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
   2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.08 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.09 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

2.10 INSULATING GLASS SCHEDULE

A. Glass Type GL-E1: Tinted, Low-E Coated, Insulating Fully Tempered glass. Application: For all exterior windows not required to be Laminated.
   1. Basis-of-Design Product: Guardian Glass LLC.
   2. Overall Unit Thickness: 1 and 5/16 inch.
   3. Minimum Thickness of Each Glass Lite: 1/4 inch (6 mm).
   4. Outboard Lite: Guardian CrystalGray float glass.
      a. Coating: Coating on #2 Surface: Guardian SunGuard SN 68.
      b. Heat Treatment: Fully Tempered.
   5. Interspace: Air filled, 1/2 inch thick, hermetically sealed.
   6. Inboard Lite: Guardian Clear with two plies of tempered glass.
      a. Thickness of Each Glass Ply: 1/4 inch (6 mm).
      b. Interlayer Thickness: 0.090 inch; Clear SGP.
   7. Provide safety glazing labeling.
   8. Perfered option is to make all glazing the same as GL-2 and if there is no cost saving to using this option then provide all as GL-2.

B. Glass Type GL-2: Tinted, Low-E Coated Insulating laminated glass. Application: for exterior glazing where indicated on drawings.
   1. Basis-of-Design Product: Guardian Glass LLC; SunGuard SN 68 on CrystalGray.
   2. Overall Unit Thickness: 1 and 5/16 inch.
   3. Outboard Lite: Guardian CrystalGray float glass.
      a. Coating on #2 Surface: Guardian SunGuard SN 68.
      b. Heat Treatment: Heat Strengthened.

4. Interspace: Air filled, 1/2 inch thick, hermetically sealed.
5. Inboard Lite: Guardian Clear laminated glass with two plies of annealed glass.
    a. Thickness of Each Glass Ply: 1/4 inch (6 mm).
    b. Interlayer Thickness: 0.090 inch; Clear SGP.
6. Provide safety glazing labeling
7. Safety glazing where required.

C. Glass Type GL-3: Clear, Low-E Coated Insulating glass. Application: for exterior glazing where indicated on drawings.
1. Basis-of-Design Product: Guardian Glass LLC CrystalGray float glass
2. Overall Unit Thickness: 1 and 5/16 inch.
3. Outboard Lite: Guardian CrystalGray float glass.
    a. Coating on #2 Surface: Guardian SunGuard SN 68.
    b. Heat Treatment: Heat Strengthened.
4. Inboard Lite: Guardian Clear
    a. Heat Treatment: Heat Strengthened.
5. Perfered option is to make all glazing the same as GL-2 and if there is no cost saving to using this option then provide all as GL-2. Second option if there is no cost saving using this option vs GL-1 then used GL-1 for this option.
6. Use must be Code compliant.
7. Provide safety glazing labeling
8. Safety glazing where required.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

3.03 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where length plus width is larger than 50 inches.
   1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
   2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

K. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

L. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.04 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant if required to comply with performance requirements.

G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape, at locations where fixed stop is located on exterior.

3.05 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.06 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.07 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with

glass, remove substances immediately as recommended in writing by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 088100 08 8100

SECTION 08 9110
LOUVERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Applicable provisions of Bidding Requirements, Contract Requirements in Division 0 and all applicable Division 1 sections.

1.02 SECTION INCLUDES:

A. Furnish and Install: Louvers.

B. Related Sections:
   1. Section 079200 Joint Sealants
   2. Division 23 - Heating, Ventilating, and Air Conditioning
   3. Division 26 - Electrical

C. Engineering by Contractor:
   1. Scope: Engineer all louvers including connections to building structure.
   2. Submittals: Calculations, shop fabrication drawings, field erection and installation drawings, details of connections.

1.03 SUBMITTALS:

A. Product Data: Manufacturer's data including instructions, recommendations, and restrictions.

B. Verification Samples: 12 x 12 inches.

1.04 DELIVERY, STORAGE, HANDLING:

A. Comply with Division 1 General Requirements and manufacturer's instructions and recommendations.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

A. Airline, Nystrom Building Products, www.nystrom.com

B. Airolite Company LLC, www.airolite.com

C. Buckley www.buckleyonline.com

D. Construction Specialties, Inc., www.c-sgroup.com

E. Empire Ventilation Equipment Co., Inc., www.empirevent.com

F. Greenheck Fan Corporation, www.greenheck.com

G. Industrial Louvers Inc., www.industriallouvers.com

H. Ruskin Company, www.ruskin.com

2.02 LOUVERS:

A. Basis of Design: "RS-7315" Storm Resistant, Construction Specialties, Inc., www.c-sgroup.com

B. Material: Extruded aluminum.
   1. Blade Thickness: 0.068 inch.
   2. Frame Thickness: 0.068 inch.

C. Assembly: Mechanically fastened with aluminum or alloy 304 stainless steel fasteners.

D. Mullions: Concealed from exterior.

2.03 LOUVER ACCESSORIES:

A. Clip Angles, Fasteners: Conceal from exterior view.
   1. Clip Angles: 0.125 inch thick aluminum.
   2. Fasteners: Alloy 304 stainless steel.

B. Bird Screens: Required for all louvers, but not louvers with insect screens.
   1. Free Area: 80 percent.
   2. Screen Fabric: 0.5 inch square mesh of 0.063 inch gage aluminum wire.
   3. Frame: Formed aluminum.
   4. Location: Inside face of louver.
   5. Finish: Flat black.

C. Insect Screens: Required for all louvers not directly connected to duct work.
   1. Free Area: 60 percent.
   2. Screen Fabric: 18 x 14 mesh 0.0123 inch aluminum wire.
   3. Frame: Formed aluminum.
   4. Location: Inside face of louver.
   5. Finish: Flat black.

D. Insulated Blank Off Plates:
   1. Face Skins: 0.032 inch thick aluminum sheet on both sides of core.
   2. Core: 1 inch thick, non combustible, semi-rigid, mineral fiber insulation.
   3. Edges: Closed with aluminum channels.
   4. Sizes: Custom for each louver and each condition.
   5. Location: Inside face of louver to close all unused louver area.
   6. Finish of Surfaces Visible From Exterior: Flat black.

E. Sill Flashing Pan: 0.050 inch aluminum, formed into seamless, welded seam, three sided pans with hemmed drip edge.

2.04 LOUVER FABRICATION:

A. Shop fabricate louvers.

B. Fabricate louvers straight, plumb, level, and square with uniform, tight joints.

C. Maintain equal blade spacing from blade to blade and from blade to frame.

D. Provide 0.75 inch deep sealant adhesion legs at entire perimeter of each louver.

E. Visible Metal Finish: Architect to select from manufacturer's standard color chart for Powder Coat and Kynar Finishes.

2.05 JOINT SEALANTS:

A. Comply with Section 079200 Joint Sealants.

2.06 GALVANIC ISOLATION TAPE:

A. 7 mils thick, UV resistant, water resistant, vinyl electrical tape.

B. Basis of Design: “Scotch Super 33+ Vinyl Electrical Tape", 3M Corporation www.3m.com

PART 3 - EXECUTION

3.01 LOUVERS INSTALLATION:

A. Comply with manufacturer’s instructions and recommendations.

B. Comply with approved, engineered installation drawings.

C. Install plumb, level, square, and in alignment with exterior wall plane.

D. Conceal clip angles and fasteners from exterior view.

E. Attach louver to building structure: structural steel, light gage steel framing, or structural masonry.
   1. Do not attach to building veneer systems including, without limitation, masonry veneer.

F. Coordinate installation with flashings built into walls.

G. Isolate louver from direct contact with masonry, concrete, and dissimilar metals.

H. Install screens.

I. Restore damaged finishes to eliminate all evidence of repair.

3.02 ADDITIONAL REQUIREMENTS FOR SILL FLASHING PANS:

A. Collect, control, and drain water which enters through the louver.

B. Provide custom fabricated sill flashing pans continuously under louver sills.

C. Pitch flashing pan 10 degrees toward the exterior of building.
   1. Continuously frame or grout under flashing pan to form pitch.

D. Provide seamless flashing pans up to 9 feet sill length.
   1. For over 9 feet sill length, multiple pans are allowed, but minimize seams.
   2. Overlap seams at least three inches.
   3. Provide two continuous beads of concealed silicone sealant in each overlapped seam.
   4. Cover seam with 6 inch wide strip of 40 mil thick, rubberized asphalt flashing.
   5. Do not expose flexible flashing strip to view or sunlight in the completed installation.

E. Fabricate flashing pan from = 0.032 inch aluminum.

F. Form three sided pans with = 2.0 inches high up turned edges.

G. Fold and hem pan edges.

H. Provide permanently waterproof, folded pan corners.
   1. Do not provide sealant sealed corners.

I. Terminate flashing pan exterior edge as shown or, if not shown, flush with exterior face of louver sill with hemmed drip.

J. Extend flashing pan interior edge as shown or, if not shown, 12 inches inside louver sill.

K. Support interior projecting pan with aluminum supports spaced = 16 inches on center.
   1. Do not mechanically fasten pan to aluminum supports.
   2. Adhere pan to aluminum supports or mechanically fold pan edge to aluminum supports.

L. Do not fasten through or penetrate sill flashing pan at any location.

3.03 ADDITIONAL REQUIREMENTS FOR DUCT CONNECTIONS:

A. For louvers intended to be connected to building ductwork:
   1. Coordinate louvers with building duct work.
   2. Provide sheet metal transitions to connect louvers to building duct work.
   3. Fabricate sheet metal transitions to match building duct work in size, material, insulation, fabrication, quality.

3.04 ADDITIONAL REQUIREMENTS FOR BLANK OFF PLATES:

A. Coordinate installation with building duct work and related work, if any.

B. Accurately cut and fit blank off plates to accommodate all connected ducts and penetrations.

C. Extend blank-off plates over 100 percent of interior louver areas not used for ventilation.

D. Orient black painted face of blank off plate toward louver blades.

E. Provide continuous glazing tape between blank off plate and louver interior frame.

F. Make waterproof and air tight seals between blank off plates and interior louver frame.

G. Mechanically attach blank off plates with sheet metal screws.

H. Locate sheet metal screws within 3 inches of corners and not over 8 inches in between.

END OF SECTION 08 9110

SECTION 09 9000
PAINTS AND COATINGS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Applicable provisions of Bidding Requirements, Contract Requirements in Division 0 and all applicable Division 1 sections.

1.02 SUMMARY

A. Exterior Painting is limited to shop painted stainless steel doors and the below:
   1. Any and all exposed existing and new steel lintels shall be painted as part of the work of this contract as shown on drawings or otherwise specified; ignore any references to interior painting.

B. Section Includes: Surface preparation and field painting of the following:
   1. Exposed exterior items and surfaces.
   2. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.

C. Paint exposed surfaces, except where the paint schedules indicate that a surface or material is not to be painted or is to remain natural. If the paint schedules do not specifically mention an item or a surface, paint the item or surface the same as similar adjacent materials or surfaces whether or not schedules indicate colors. If the schedules do not indicate color or finish, the Architect will select from standard colors and finishes available.
   1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment.

D. Exterior Painting General Note: All Exterior exposed ferrous metal surfaces to be painted except for stainless steel items and unless noted otherwise. Anodized aluminum surfaces are not to be painted; and galvalume roofing materials are to be supplied with manufacturer's finishes and are not to be painted. Use anti-graffiti coatings and Low VOC paints. Follow Philadelphia Parks and Rec Paint Color Guide as selected by architect.
   1. Shop Prepping, Priming and High Performance Coating of all Stainless Steel Doors and Frames.
   2. After complete curing, wrap and protect items for shipping and site storage; do not remove wrapping until after all work is complete and with approval from Owner.

E. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
   1. Prefinished items include the following factory-finished components:
   2. Finished metal surfaces include the following:
      a. Anodized aluminum.
      b. Stainless steel.
      c. Chromium plate.
      d. Copper.
      e. Bronze and brass.
   3. Operating parts include moving parts of operating equipment and the following:
   4. Labels: Do not paint over Underwriters Laboratories (UL), Factory Mutual (FM), or other code-required labels or equipment name, identification, performance rating, or

nomenclature plates.

5. Masonry: Do not paint over Terracotta, Stone and Brick Masonry and Glazed and Decorative CMU.

F. Related Sections:
   1. Section 055000 “Metal Fabrications”.
   2. Section 081119 “Stainless Steel Doors and Frames”

1.03 SUBMITTALS

A. Product Data: For each paint system specified. Include block fillers and primers.

B. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for each type of finish-coat material indicated.

C. Samples for Verification: Of each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.
   1. Provide a list of materials and applications for each coat of each sample. Label each sample for location and application.

D. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.04 QUALITY ASSURANCE

A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to that indicated for this Project with a record of successful in-service performance.

B. Source Limitations: Obtain block fillers, primers, and undercoat materials for each coating system from the same manufacturer as the finish coats.

1.05 PRODUCT HANDLING

A. Deliver materials to the 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 deg F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.
   1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.06 PROJECT CONDITIONS

A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 and 90 deg F.

B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 and 95 deg F.

C. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 deg F 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.

D. Provide adequate ventilation, including mechanical ventilation, to remove paint odors and fumes from areas of the building where odors might migrate to occupied spaces.

1.07 EXTRA MATERIALS

A. Furnish extra paint materials from the same production run as the materials applied in the quantities described below. Package paint materials in unopened, factory-sealed containers for storage and identify with labels describing contents. Deliver extra materials to area designated by Owner.
   1. Quantity: Furnish the Owner with an additional 5 percent, but not less than 1 gal. or 1 case, as appropriate, of each material and color applied.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Provide Basis of Design products listed on drawings and schedule within are from the following manufacturer: Sherwin Williams Company (S-W).

B. Products: Subject to compliance with requirements, provide one of the products in the paint schedules, or an approved equal product of another acceptable manufacturer and only if basis of design products are not readily available.

C. Manufacturers Names: The following manufacturers are referred to in the paint schedules by use of shortened versions of their names, which are shown in parentheses:
   1. Sherwin Williams Company (S-W).
   2. Benjamin Moore (B-M).
   3. PPG Industries, Inc (PPG).

2.02 PAINT MATERIALS, GENERAL

A. Material Compatibility:
   1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
   2. For each coat in a coating system, provide products recommended in writing by manufacturers of topcoat for use in coating system and on substrate indicated.

B. VOC Content of Field-Applied Interior Paints and Coatings: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24); these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:
   1. Flat Paints, Coatings, and Primers: VOC content of not more than 50 g/L.
   2. Nonflat Paints, Coatings, and Primers: VOC content of not more than 150 g/L.
   3. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
   4. Wood stain and clear finish: VOC content not more than 350 g/L.

5. Floor Coatings: VOC not more than 100 g/L.

C. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
   1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

D. Colors: Provide color selections made by the Architect from manufacturer's full range of available colors. Where directed, provide custom colors of the finished paint systems to match the Architect's samples.

E. Exposed Galvanized Steel Surfaces:
   1. Basis of Design Primer for stained ferrous metal spot prime using: S-W Pro Industrial Pro-Cryl Universal Acrylic Primer.
   2. Basis of Design for Paint on galvanized metal: S-W Pro Industrial Waterborne Acrylic Dryfall.
   3. Exposed underside of galvanized roof deck and other galvanized steel surfaces:

F. Stainless Steel Doors and Frames indicated to receive High Performance Coatings:
   1. Refer to drawings and paint schedule and as follows:
   2. Basis of design for High Performance Coating of Stainless Steel Doors and Frames:
      a. SW products to be shop applied strictly following manufacturers requirements:
      b. Prep to comply with SSPC-SP6/NACE 3
      c. Primer: Recoatable Epoxy Primer
      d. 2 Coats: Hi-Solids Polyurethane
   3. Primers on stainless steel require shop prep to meet the requirements of following for the removal of all oil and grease from surface by Solvent Cleaning per:
      a. SSPC-SP 16 in general
      b. SSPC-SP6/NACE 3 per basis of design
      c. SSPC-SP2 and SSPC-SP1 will only be considered with special approval from primer manufacturers and Owner special approval to use Macropoxy 5000 and Acrolon 218 HS due to extraordinary field conditions.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with the Applicator present, under which painting will be performed for compliance with paint application requirements.
   1. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
   2. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.

B. 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 the Architect about anticipated problems using the materials specified over substrates primed by others.

3.02 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 the 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. Preparing Previously Painted Metal Surfaces: Remove existing paint from ferrous metal surfaces as follows:
   1. Scrape to remove paint, exercising care not to damage metalwork.
   2. Following paint stripping, rub steel surfaces to remove rust bloom, and solvent clean prior to priming. Ferrous metal surfaces may be rinsed with water.
   3. Prior to application of finish materials, clean all surfaces so they are free of dust and dirt.
   4. Following initial priming, fill gouges, holes and other surface imperfections with epoxy filler. Spot prime filled areas and allow to dry prior to application of first finish coat.

C. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the 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.
   2. Primers on stainless steel require shop prep to meet the requirements of primer manufacturers and following for the removal of all oil and grease from surface by Solvent Cleaning: SSPC-SP6/NACE 3.

D. Stainless Steel Doors and Frames to be rewrapped:
   1. After Shop Painting and after fully cured, rewrap each door and frame seperately and match each door to its frame and box together for shippment to the field.

E. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.
   1. Provide barrier coats over incompatible primers or remove and re-prime.
   2. Cementitious Materials: Prepare concrete and masonry surfaces to be painted. 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 of surface preparation.
      a. Use abrasive blast-cleaning methods if recommended by paint manufacturer.
      b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's written instructions.
      c. Clean concrete floors to be painted with a 5 percent solution of muriatic acid or other etching cleaner. Flush the floor with clean water to remove acid, neutralize with ammonia, rinse, allow to dry, and vacuum before painting.
   3. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
      a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
      b. Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and backsides of wood, including cabinets, counters, cases, and paneling.

4. Ferrous Metals: 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 the Steel Structures Painting Council's (SSPC) recommendations.
    a. Blast steel surfaces clean as recommended by paint system manufacturer and according to requirements of SSPC-SP 10.
    b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
    c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with the same primer as the shop coat.
5. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

F. Materials Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
3. Use only thinners approved by paint manufacturer and only within recommended limits.

G. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of the 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.

3.03 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.
1. Surface treatments and finishes are indicated in the schedules.
2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
3. Provide finish coats that are compatible with primers used.
4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, covers for finned-tube radiation, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.
5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
8. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
9. Sand lightly between each succeeding enamel or varnish coat.

B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. The number of coats and the film thickness required are the same regardless of application method. Do not apply succeeding coats until the previous coat has cured as

recommended by the manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.

2. Omit primer on metal surfaces that have been shop primed and touchup painted.
3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.

C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
   1. Brushes: Use brushes best suited for the type of material applied. Use brush of appropriate size for the surface or item being painted.
   2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.
   3. Spray Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.
   4. Block Filler on CMU: Follow Manufacturer's recommendations - squeegee block filler to force material into pores in order to produce a relatively smooth surface. In wet areas, a smooth continuous pinhole-free appearance is necessary for proper protection before top-coating and require two coats to provide most uniform surface.

D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.

E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and in occupied spaces.

F. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.
   1. Squeegee block filler to force material into pores in order to produce a relatively smooth surface. A smooth continuous pinhole-free appearance is necessary for proper protection before topcoating and require two coats to provide most uniform surface. Spotting, laps, roller marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

G. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn through or other defects due to insufficient sealing.

H. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

I. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.04 FIELD QUALITY CONTROL

A. The Owner reserves the right to invoke the following test procedure at any time and as often as the Owner deems necessary during the period when paint is being applied:
   1. The Owner will engage the services of an independent testing agency to sample the paint material being used. Samples of material delivered to the Project will be taken, identified, sealed, and certified in the presence of the Contractor.
   2. The testing agency will perform appropriate tests for the following characteristics as required by the Owner:
      a. Quantitative material analysis.
      b. Abrasion resistance.
      c. Apparent reflectivity.
      d. Flexibility.
      e. Washability.
      f. Absorption.
      g. Accelerated weathering.
      h. Dry opacity.
      i. Accelerated yellowness.
      j. Recoating.
      k. Skinning.
      l. Color retention.
      m. Alkali and mildew resistance.
   3. The Owner may direct the Contractor to stop painting if test results show material being used does not comply with specified requirements. The Contractor shall remove noncomplying paint from the site, pay for testing, and repaint surfaces previously coated with the rejected paint. If necessary, the Contractor may be required to remove rejected paint from previously painted surfaces if, on repainting with specified paint, the 2 coatings are incompatible.

3.05 CLEANING AND PROTECTION

A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.
   1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

B. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.

C. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.
   1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.06 EXTERIOR PAINT SCHEDULE

A. General: Provide the finish systems scheduled for each material type indicated, applied at spreading rate recommended by manufacturer to achieve the total dry film thickness (DFT) listed.
   1. Provide 2 finish coats over the listed base coats (primer, filler, bond coat) except as otherwise indicated.

B. Exterior Ferrous Metal:
   1. Semigloss, Acrylic-Enamel Finish:
      a. Primer: 1.3 mils DFT.
         1) Corrosion Fighting Primer.
            a) S-W: Rust-O-Lastic Anti-Corrosive Primer.
            b) B-M: IronClad Retardo Rust-Inhibitive Paint #163.
            c) PPG: 6-208 Speedhide Interior/Exterior Rust Inhibitive Steel Primer.
      b. First and Second Coats: 2.6 mils DFT.
         1) S-W: House & Trim Acrylic Semi-Gloss Enamel.
         2) B-M: MoorGlo Latex House & Trim Paint #096.
         3) PPG: 78 Line Sun-Proof Semi-Gloss Acrylic Latex House and Trim Paint.

C. Exterior Zinc-Coated Metal:
   1. Semigloss, Acrylic-Enamel Finish:
      a. Pretreatment Surface Preparation: As recommended by coating manufacturer.
      b. Primer: 1.2 mils DFT.
         1) S-W: Rust-O-Lastic Hydro-Prime II.
         2) B-M: IronClad Galvanized Metal Latex Primer #155.
         3) PPG: 90-709 Pitt-Tech One Pack Interior/Exterior Primer/Finish DTM Industrial Enamel.
      c. First and Second Coats: 2.6 mils DFT.
         1) S-W: Sea Shore/Four Seasons Acrylic Trim Enamel.
         2) B-M: MoorGlo Latex House & Trim Paint #096.
         3) PPG: 78 Line Sun-Proof Semi-Gloss Acrylic Latex House and Trim Paint.

END OF SECTION 09 9000

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SECTION 09 9133
MINERAL SILICATE COATINGS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Submittal requirements shall be coordinated with Division 01.

1.02 SUMMARY

A. Section includes surface preparation and the field application of silicate coating, on the following exterior substrates:
   1. As indiciated on drawings.

B. Related Requirements:
   1. Section 03 01 30 – Maintenance of Cast-in-Place Concrete
   2. Section 04 01 01 – Masonry Repair

C. Related Products
   1. Cleaning Agents
   2. Crack fillers
   3. Water Repellent / Sealers

1.03 REFERENCES

A. American Society for Testing and Materials (ASTM) D 16 – Standard Terminology for Paint, Related Coatings, Materials, and Applications.

B. General: The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.

C. ASTM (ASTM)
   1. ASTM E 96, "Standard Test Methods for Water Vapor Transmission of Materials.
   2. ASTM E 514, "Standard Test Method for Water Penetration and Leakage Through Masonry.
   3. ASTM ASTM G 154, “Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials.
   4. ASTM D 6886-12, “Standard Test Method for Determination of the Individual Volatile Organic Compounds (VOCs) in Air-Dry Coatings by Gas Chromatography.

D. Deutsches Institut für Normung (DIN), European Standard (EN), and International Organization for Standardization (ISO):
   1. DIN EN 1062, manufacturing standard for sol-silicate coating.
   2. ISO 6504-3, “Paints and varnishes - Determination of hiding power - Part 3: Determination of contrast ratio of light-colored paints at a fixed spreading rate.
   3. ISO 2813, “Paints and varnishes - Determination of specular gloss.
   4. EN 1062-3, “Paints and varnishes - Coating materials and coating systems for exterior masonry and concrete - Part 3: Determination of liquid water permeability.
   5. DIN EN 1504-2, “Products and systems for the protection and repair of concrete structures - Definitions, requirements, quality control and evaluation of conformity - Part 2: Surface protection systems for concrete.”

6. DIN EN ISO 7783-2, “Coating materials and coating systems for exterior masonry and concrete - Part 2: Determination and classification of water-vapor transmission rate (permeability):
7. DIN 4102-A2, “Fire Behavior of Building Materials and Building Components - Part 2: Building Components; Definitions, Requirements and Tests.

1.04 DEFINITIONS

A. Silicate coating, base coat: The first applied textured coat of the sol-silicate coating.

B. Silicate coating, top coat: The second applied coat of the sol-silicate coating.

C. Dilution: A sol-silicate based diluent.

1.05 SYSTEM DESCRIPTION

A. A materials-compatible highly vapor permeable decorative coating system offering strong weathering protection for exterior exposure.
   1. Silicate Coating: An incombustible two coat system comprising of two smooth coats.
      a. Silicate coating penetrates the surface and in a chemical reaction combines with the substrate through chemical and mechanical bonds forming a hard amorphous microporous layer with extremely high vapor permeability.
      b. Unaffected by acids, UV exposure, or air-borne pollutants.
      c. Unique mineral layer structure prevents liquid water penetration into the coated substrate and maintains moisture balance through vapor diffusion to keep wall assemblies breathable and dry, thus resisting mold and biological growth.
      d. Will not reduce substrate vapor permeability.

1.06 ACTION SUBMITTALS

A. Product Data: Submit product data showing material proposed. Submit sufficient information to determine compliance with the Drawings and Specifications. Provide published documentation describing materials, characteristics, and limitations.

B. Samples: Submit samples for verification purposes, fabrication techniques and workmanship.

C. Manufacturer's Instructions: Submit manufacturer’s instructions including technical data sheets, material safety data sheets, mixing instructions, application requirements, special procedures, and conditions requiring special attention.

D. Samples for Initial Selection: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

E. Samples for Verification: For each type of finish system and each color and gloss of topcoat, two samples, representing actual product, color, and patterns
   1. Submit Samples on rigid backing, 8 inches square.
   2. Apply coats on Samples in steps to show each coat required for system.
   3. Label each coat of each Sample.
   4. Label each Sample for location and application area.

F. Product List: Cross-reference to paint and stain system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.07 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Paint: 5 percent, but not less than 1 gal. or 1 case, as appropriate, of each material and color applied.

1.08 CLOSE-OUT SUBMITTALS

A. Manufacturer’s Warranty: Executed copy of manufacturer’s warranty.

1.09 QUALITY ASSURANCE

A. Qualifications
   1. Manufacturer Qualifications: Provide evidence that Manufacturer is a firm engaged in the manufacture of silicate coatings of types required, and whose products have been in satisfactory use in similar service for a minimum of fifteen years.
   2. Applicator Qualifications:
      a. Provide evidence Applicator is a firm having successful application of products within this specification with at least one project similar in type and scope to that required for this Project.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name, material and product brand name, and lot number, if any.

B. Store materials in their original undamaged packages and containers inside a well ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity with ambient temperatures continuously maintained at not less than 45 deg F.
   1. Maintain containers in clean condition, free of foreign materials and residue.
   2. Remove rags and waste from storage areas daily.

1.11 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. Do not apply in freezing conditions, when rain is expected, or in high winds.

1.12 WARRANTY

A. Provide manufacturer’s written product warranty
   1. Warranty period from date of Substantial Completion is 15 years.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design:

1. Items specified are to establish a standard of quality for design, function, materials, compatibility, performance, warranty, and appearance
2. Equivalent products by listed manufacturers are acceptable.
3. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

B. Manufacturers:
1. Basis of Design: KEIM Mineral Coatings, Inc., 10615 Texland Blvd. #600, Charlotte, North Carolina 28273. Telephone 704-588-4811. Email keim-info@keim.com
   a. Local Representative, Cohalan Company, LLC - Mid-Atlantic Representative for KEIM, Shannon Cohalan Phone: 302-684-3299, Email: Shannon@keimmineralsystems.com
2. BEECK Mineral Paints, 8161 Regent Parkway #101, Fort Mill. South Carolina 29715 Telephone 704-940-3603. Email info@beeckmineralpaints.com Web: www.BeeckMineralPaints.com
3. Cathedral Stone Products
4. Mineral Life International

2.02 MATERIALS

A. Cleaners
1. Basis of Design: KEIM Heavy Duty Cleaner Concentrate

B. Repair Material
1. Basis of Design:
   a. Existing cast stone window infill: KEIM Concretal Universal Mortar or CONCRETAL FINE FILLER, as needed.
   b. "GROB" FOR MICROCRACKING CONDITIONS

C. Water Repellant
1. Basis of Design: KEIM Silan-100

D. Mineral Silicate Paint/Coating, Base Coat: Provide mineral silicate based opaque paint/coating meeting or confirming to:
1. DIN EN 1062, manufacturing standard for sol-silicate coating.
2. DIN EN 1504-2/2.2, Products and systems for the protection and repair of concrete structures/Surface protection systems for concrete.
3. DIN 4102-A2 & EN 13501-1, non-flammable standard – will not burn
4. ASTM E 96 Vapor Permeability- 75 – 85 perms.
5. ASTM G 154 Accelerated Weathering – no fading, cracking, peeling.
6. ASTM E 514 62-MPH Wind-Driven Rain Test – no water penetration.
7. ASTM D 6886-12 Standard Test Method for Individual Volatile Organic Compounds (VOCs) – Less than 1 gram per liter VOC (Volatile Organic Content).
8. Tinted lighter than the top finish coating.
9. Basis of Design: KEIM Concretal W

E. Mineral Silicate Paint/Coating, Top Coat: Provide mineral silicate based opaque paint/coating meeting or confirming to:
1. DIN EN 1062, manufacturing standard for sol-silicate coating.
2. DIN EN 1504-2/2.2, Products and systems for the protection and repair of concrete structures/Surface protection systems for concrete.
3. DIN 4102-A2 & EN 13501-1, non-flammable standard – will not burn
4. ASTM E 96 Vapor Permeability- 75 – 85 perms.
5. ASTM G 154 Accelerated Weathering – no fading, cracking, peeling.

6. ASTM E 514 62-MPH Wind-Driven Rain Test – no water penetration.
7. ASTM D 6886-12 Standard Test Method for Individual Volatile Organic Compounds (VOCs) – Less than 1 gram per liter VOC (Volatile Organic Content).
8. Tinted lighter than the top finish coating.
9. Basis of Design: KEIM Concretal W

F. Dilution for Silicate Coating: Provide sol-silicate dilution meeting or conforming to:
1. DIN 4102-A2, non-flammable standard – will not burn.
2. ASTM E 96 Vapor Permeability – 77 perms.
3. ASTM D 6886-12 Standard Test Method for Individual Volatile Organic Compounds (VOCs) – Less than 1 gram per liter VOC (Volatile Organic Content).
4. Basis of Design: “KEIM Concretal Dilution”

G. Refer to Finish Schedule and Paint Legend for paint colors.

2.03 EQUIPMENT

A. Tools:
1. Silicate Coating, Base and Top Coats: Apply by natural bristle façade brush, professional roller, or professional airless spray equipment and back-roll as required for even distribution.

2.04 FINISHES

A. Silicate Coating, Base and Top Coats:
1. Apply in full coverage evenly distributed coats to a smooth mineral matte finish without lap lines, voids, “holidays”, or drips. Compare manufacturer-verified mock up consumption data with application consumption data to ensure enough product is applied.
2. Maintain a wet edge to prevent sight lines and textural differences.
3. Apply enough product to prevent shading and textural differences that contribute to striping, especially with the base coat. Applying inadequate amount of product requires corner to corner recoating.
4. When rolling product, roll off in same direction across façade to prevent shading differences that affect appearance of color.
5. When spraying product.
   a. Do not strain silicate coatings.
   b. Remove paint filters from spray gun and spray pump.
   c. Use only new hoses. Used hoses may contain paint thinners or solvents.
   d. Paint thinners and cleaning solvents are not compatible with silicate coatings.
   e. Clear gun and spray equipment with warm soapy water and rinse well with clean water to remove residual paint thinners and solvents.
   f. Never use tips with smaller orifices than recommended. Smaller tips clog and prevent proper coating application. Improper application voids warranty and shortens longevity of the coatings.
   g. Prevent overspray drift or misting onto glass objects.
6. When working from scaffolding, work as a team moving across façade maximum eight (8) vertical feet per applicator to ensure complete coverage and wet edge left to right and top to bottom of each section.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Confirm by examination the areas and conditions under which the work is to be applied for compliance with manufacturer's instructions. Do not proceed with the work until unsatisfactory conditions have been corrected.
   1. Verify substrate is secure, sound, dry, and absorbent, and free of dirt, grease, salts, oil-based paints, release agents, curing agents, and other bond breakers.
   2. Verify substrate has no pretreatments or priming materials applied unless such conditions are approved by manufacturer.
   3. Verify surfaces or materials to be coated are fully cured to manufacturer recommendations.
   4. Confirm coating surfaces are less than 40 percent relative humidity as measured by a masonry moisture meter prior to application of silicate coatings.
   5. Beginning of the work shall indicate acceptance of the areas and conditions as satisfactory by the Applicator.

3.02 PREPARATION

A. Protection:
   1. Lay ground cloths and take measures as necessary to protect surfaces subject to contact by products specified by this Section.
   2. Silicate paint coatings and dilution may etch or bond to glass, metal, and concrete.

3.03 .APPLICATION

A. Conform to reviewed product data, manufacturer's written instructions, and provisions of the Contract Documents

B. Plan the work properly.
   1. Maintain temperature during and after application. Substrate and ambient air temperature must be between 41 °F (5 °C) and 86 °F (30 °C).
   2. Work ahead of the sun on shaded façades to avoid working on hot substrates.
   3. Work to logical stopping points (corners, seams, architectural features, etc.).
   4. Apply silicate coatings as directed by 2.4 FINISHES.
   5. Protect from wind and rain prior to, during, and for a minimum 24 hours after application.
   6. Obtain manufacturer's written instructions for application outside of the above parameters.

C. Silicate Coating:
   1. Base Coat:
      a. Dilute sol-silicate coating with maximum 15 percent dilution (4 gallons with 2.3 liters dilution). Stir well by hand or 600-800 RPM mixing equipment.
      b. Apply base coat of diluted silicate coating.
      c. Allow minimum 12 hours drying time.
   2. Top Coat
      a. Do not dilute. Stir well by hand or 600-800 RPM mixing equipment.
      b. Apply top coat of undiluted silicate coating.
   3. Touch Up:
      a. Some colors touch up well, some do not. Always perform a test and allow the touch up to cure minimum 12 hours before evaluation. Colors become lighter upon

drying.

b. For colors that do not touch up well, expect corner to corner recoating for acceptable results.
c. When touching up or recoating, use the same tools and techniques for best results.
d. Articulate the application confining the recoating to the borders of the repair

3.04 CLEANING AND PROTECTION

A. Clean tools, spills, and accidental drips immediately with plenty of water.

B. Leave applications clean and premises free from residue and debris from work of this Section. Do not scratch or damage adjacent finished surfaces.

C. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

D. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

E. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

END OF SECTION 09 9133