Attachment C-

Division 2- Technical Specifications

SECTION 040120 - MASONRY REPAIRS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes maintenance of unit masonry consisting of brick, clay masonry restoration. as follows:

1. Installing flashing.
2. Unused anchor removal.
3. Repairing unit masonry, including replacing units.
4. Painting steel uncovered during the work.
5. Reanchoring veneers.
6. Repointing joints.
7. Cleaning replaced and repointed unit masonry surfaces.

1.3 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. Samples for Initial Selection: For the following:

1. Pointing Mortar: Submit sets of mortar for pointing in the form of sample mortar strips, 6-inches long by 3/8 inch wide, set in aluminum or plastic channels.
   a. Submit a set of at least three samples of different mixes of colored sands and cements that produce a mortar matching the existing mortar when cured and dry.
   b. Submit with precise measurements on ingredients, proportions, gradations, and sources of colored sands from which each Sample was made.
2. Sealant Materials: See Section 079200 "Joint Sealants."

C. Samples for Verification: For the following:

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.
   a. For each brick type, provide straps or panels containing at least four bricks. Include multiple straps for brick with a wide range.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For mason

1.5 QUALITY ASSURANCE

A. Mason: Engage an experienced masonry restoration and cleaning firm to perform work of this Section. Firm shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance. Experience installing standard unit masonry is not sufficient.

B. Mockups: Prepare mockups of masonry to demonstrate aesthetic effects and set quality standards for materials and execution and for fabrication and installation.

1. Masonry Repair: Prepare sample areas for each type of masonry material indicated to have repair work performed. Size mockup not smaller than 36-inches by 24-inches. Erect sample areas in existing walls unless otherwise indicated, to demonstrate quality of materials, workmanship, and blending with existing work.

a. Allow a waiting period of not less than seven days after completion of sample cleaning to permit a study of sample panels for negative reactions.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver masonry units to Project site strapped together in suitable packs or pallets or in heavy-duty cartons.

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

C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

D. Store sand where grading and other required characteristics can be maintained and contamination avoided.

1.7 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit masonry restoration and cleaning work to be performed according to manufacturers' written instructions and specified requirements and when there is no risk of water entering the building.

B. Repair masonry units and repoint mortar joints only when air temperature is above 35 degrees and it is predicted to remain so for at least 7 days after completion of the Work unless otherwise indicated.

C. Cold-Weather Requirements: Comply with the following procedures for masonry repair and mortar-joint pointing unless otherwise indicated:

1. When air temperature is below 40 deg F heat mortar ingredients, masonry repair materials, and existing masonry walls to produce temperatures between 40 and 120 deg F
2. When mean daily air temperature is below 40 deg F provide blankets to cover masonry for 7 days after repair and pointing.

D. Hot-Weather Requirements: Protect masonry repair and mortar-joint pointing when temperature and humidity conditions produce excessive evaporation of water from mortar and repair materials. Provide artificial shade and wind breaks and use cooled materials as required to minimize evaporation. Do not apply mortar to substrates with temperatures of 90 deg F and above unless otherwise indicated.

E. For manufactured repair materials, perform work within the environmental limits set by each manufacturer.

F. Clean masonry surfaces only when air temperature is 40 deg F and above and is predicted to remain so for at least 7 days after completion of cleaning.

1.8 COORDINATION

A. Coordinate masonry work and cleaning with owners use at Project site. Plan and execute the Work accordingly.

PART 2 - PRODUCTS

2.1 MASONRY MATERIALS

A. Face Brick: Provide face brick, including specially molded, ground, cut, or sawed shapes where required to complete masonry work.

1. Provide units with colors, color variation within units, surface texture, size, and shape to match existing brickwork and with physical properties
   a. For existing brickwork that exhibits a range of colors or color variation within units, provide brick that proportionally matches that range and variation rather than brick that matches an individual color within that range.

B. Building Brick: Provide building brick complying with ASTM C 62, of same vertical dimension as face brick, for masonry work concealed from view.

1. Grade SW, MW, or NW for concealed backup.

C. Salvaged Brick: Salvage brick during demolition. Clean off residual mortar.

2.2 MORTAR MATERIALS

A. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

B. Masonry Cement: ASTM C 91.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Lafarge North America Inc.
b. Lehigh Cement Company
c. National Cement Company, Inc.

C. Colored Cement Product: Packaged blend made from portland cement and hydrated lime masonry cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.

1. Products: Subject to compliance with requirements available products that may be incorporated into the Work include, but are not limited to, the following:

a. Colored Portland Cement-Lime Mix:

1) Holcim (US) Inc.; Rainbow Mortamix Custom Color Cement/Lime.
2) Lafarge North America Inc.; Eaglebond Portland & Lime.
3) Lehigh Cement Company; Lehigh Custom Color Portland/Lime Cement.

b. Colored Masonry Cement:

1) Lafarge North America Inc.; U.S. Cement Custom Color Masonry Cement.
2) Lehigh Cement Company; Lehigh Custom Color Masonry Cement.
3) National Cement Company, Inc.; Coosa Masonry Cement.

2. Formulate blend as required to produce color matching existing mortar.

D. Aggregate for Mortar: ASTM C 144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. White-Mortar Aggregates: Natural white sand or crushed white stone.
3. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

2.3 ACCESSORY MATERIALS

A. Ties and Anchors: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:

1. Hohmann & Barnard HB-5213-2X

a. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 153/A 153M, Class B-2 coating.

2. Hohmann & Barnard Spira-Lok

a. Stainless Steel Type 304, One-Piece flexible wall tie for repair and restoration of deteriorating brick masonry. Diameter and length as required for existing wall construction.

3. Thor Helical Crack Stitching Bars

   a. Stainless Steel Type 304, ¼" diam x 39" long, for crack repair of masonry walls. Use with WHO-60 grout, polymer modified cement-based mortar for bonding metal bars and anchors into masonry joints.

4. Galvanized Steel Sheet: ASTM A 653/A 653M, Commercial Steel, ASTM A 82/A 82M; with ASTM A 153/A 153M, Class B-2 coating.
5. Expansion Bolt, 304 Stainless with a Brass 260 Alloy Sleeve.

B. Embedded Flashing:

1. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual and as follows:

   a. Stainless Steel: ASTM A 240/A 240M, Type 304, 24 gauge.

2. Flexible Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy.

   a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

      1) Hohmann & Barnard, Inc.; Flex-Flash.

3. Application: Unless otherwise indicated, use the following:

   a. Where flashing cannot be fully supported use metal flashing.
   b. Where flashing is fully supported use flexible flashing.

4. Solder and Sealants for Sheet Metal Flashings

   a. Solder for Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.

5. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

C. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.

D. Weep/Vent Products:

1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer's standard.

2. Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, full height and width of head joint and depth 1/8 inch less than depth of outer wythe; in color selected from manufacturer's standard.

E. Masonry Cleaners:

1. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from

new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. ProSoCo, Inc.

F. Antirust Coating: Fast-curing, lead- and chromate-free, self-curing, universal modified-alkyd primer complying with MPI #79, Alkyd Anticorrosive Metal Primer or 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.

PART 3 - EXECUTION

3.1 UNUSED ANCHOR REMOVAL

A. Within the work areas, remove masonry 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 masonry.

3.2 BRICK REMOVAL AND REPLACEMENT

A. At locations indicated, remove bricks that are damaged, spalled, or deteriorated or are to be reused. Carefully demolish or remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.

1. Remove brick to replace brick flashing at areas indicated on the drawings.

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

1. To install continuous flashing in existing walls, alternate sections of masonry in 2 to 5 feet.
2. The replaced masonry should be properly cured (five to seven days) before the intermediate masonry sections or supports are removed.
3. Alternately, temporary braces can be installed if longer sections of brickwork are removed.
   a. Braces to be spaced no further than 5 feet apart.

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

D. Remove in an undamaged condition as many whole bricks as possible.

1. Remove mortar, loose particles, and soil from brick by cleaning with hand chisels, brushes, and water.
2. Remove sealants by cutting close to brick with utility knife and cleaning with solvents.
3. Store brick for reuse. Store off ground, on skids, and protected from weather.

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

F. Replace removed damaged brick with a blend of new and salvaged brick in good quality, where possible, or with new brick matching existing brick, including size.

G. Install replacement brick into bonding and coursing pattern of existing brick. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.

1. Maintain joint width for replacement units to match existing joints.
2. Use setting buttons or shims to set units accurately spaced with uniform joints.

H. Lay replacement brick with completely filled bed, head, and collar joints. Butter ends with sufficient mortar to fill head joints and shove into place. Wet both replacement and surrounding bricks that have ASTM C 67 initial rates of absorption (suction) of more than 30 g/30 sq. in. per min.. Use wetting methods that ensure that units are nearly saturated but surface is dry when laid.

1. Tool exposed mortar joints in repaired areas to match joints of surrounding existing brickwork.
2. When mortar is sufficiently hard to support units, remove shims and other devices interfering with pointing of joints.
3. Point head of top course with ¾” depth lifts and a pointing trough.

3.3 PAINTING STEEL UNCOVERED DURING THE WORK

A. Inspect steel exposed during masonry removal. Prepare and paint steel as follows:

1. Remove paint, rust, and other contaminants according to SSPC-SP 3, "Power Tool Cleaning, as applicable to meet paint manufacturer's recommended preparation.
2. Immediately paint exposed steel with two coats of 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, notify Architect before proceeding.

3.4 WIDENING JOINTS

A. Do not widen a joint, except where indicated or approved by Architect.

B. Location Guideline: Where an existing masonry unit abuts another or the joint is less than 1/8 inch widen the joint for length indicated and to depth required for repointing after obtaining Architect's approval.

C. Carefully perform widening by cutting, grinding, routing, or filing procedures demonstrated in an approved mockup.

D. Widen joint to width equal to or less than predominant width of other joints on building. Make sides of widened joint uniform and parallel. Ensure that edges of units along widened joint are in alignment with joint edges at unaltered joints.

3.5 MASONRY INSTALLATION, GENERAL

A. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

B. Blend at least 20 percent of the existing brick into the new brick.

1. At locations visible to the public replace with salvaged brick only.

C. Mix units from several pallets or cubes as they are placed.

D. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

3.6 TOLERANCES

A. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

B. Joints:

1. For bed joints, do not vary from thickness by more than 1/16 inch from one masonry unit to the next.

3.7 MORTAR BEDDING AND JOINTING

A. Hollow block as follows:

1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
2. With entire units, including areas under cells, fully bedded in mortar at starting course on footings.

B. Solid masonry and glass units:

1. Completely fill bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
2. Point top head joint using ¾" lifts and packing with a pointing trowel.
3. Tool exposed joints to match existing mortar when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

3.8 ANCHORING MASONRY VENEERS

A. Anchor masonry veneers to backup with masonry-veneer anchors to comply with the following requirements:

1. Embed tie sections in masonry joints to provide adequate spacing for insulation and to match adjacent construction.
2. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
3. Space anchors not more than 18 inches o.c. vertically and 24 inches o.c. horizontally, with not less than 1 anchor for each 2 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 8 inches, around perimeter.

3.9 EXPANSION JOINTS

A. General: Install expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span expansion joints without provision to allow for in-plane wall or partition movement.

B. Form expansion joints in brick as follows:

1. Form open joint full depth of brick wythe and of 3/8 inch for installation of sealant and backer rod specified in Section 079200 "Joint Sealants."

C. Provide horizontal, pressure-relieving joints by inserting a compressible filler of 3/8-inch width.

1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.10 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated

B. Install stainless steel through wall flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections. Seal penetrations in flashing with adhesive, sealant, or tape.
2. At masonry-veneer walls, extend flashing through veneer, across air space behind veneer, and up face of backup at least 8 inches; with upper edge secured with a termination bar at 12" oc.. Apply sealant to top of termination bar.
3. Prefabricate welded end dams and install at all interruptions in the horizontal surface of the flashing.

C. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:

1. Space weep 24 inches o.c..

3.11 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean brick by bucket-and-brush hand-cleaning method described in "BIA Technical Notes 20."

END OF SECTION 040120

SECTION 040122 - MASONRY CLEANING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes maintenance of unit masonry consisting of brick, clay masonry restoration. as follows:

1. Cleaning existing unit masonry surfaces.
2. Removal of exiting asphalt for masonry.

1.3 DEFINITIONS

1.4 ACTION SUBMITTALS

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

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For mason

1.6 QUALITY ASSURANCE

A. Mason: Engage an experienced masonry restoration and cleaning firm to perform work of this Section. Firm shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance. Experience installing standard unit masonry is not sufficient.

B. Mockups: Prepare mockups of masonry to demonstrate aesthetic effects and set quality standards for materials and execution and for fabrication and installation.

1. Masonry Cleaning: Prepare sample areas showing cleaning methods and effectiveness. Size mockup not smaller than 36-inches by 24-inches. Sample areas in inconspicuous area unless otherwise indicated, to demonstrate quality of materials, workmanship, and blending with existing work.

a. Allow a waiting period of not less than seven days after completion of sample cleaning to permit a study of sample panels for negative reactions.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site strapped together in suitable packs or pallets or in heavy-duty cartons.

1.8 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit masonry cleaning work to be performed according to manufacturers' written instructions and specified requirements and when there is no risk of water entering the building.

B. Clean masonry surfaces only when air temperature is 40 deg F and above and is predicted to remain so for at least 7 days after completion of cleaning.

1.9 COORDINATION

A. Coordinate masonry cleaning with owners use at Project site. Plan and execute the Work accordingly.

PART 2 - PRODUCTS

2.1 MASONRY CLEANERS

A. Proprietary Cleaner: Manufacturer's standard-strength cleaner designed for removing environmental staining.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. ProSoCo, Inc.

2. Products:
   a. Sure Klean 766 Limestone & Masonry Prewash
   b. Sure Klean Restoration Cleaner

PART 3 - EXECUTION

3.1 PREPARATION

1. Review each elevation of the building and remove asphalt from the face of the masonry as follows:

2. Remove large particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
3. Test cleaning methods on sample wall that is not readily visible. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Read the cleaning solution manufacturer's instructions for the proper dilution appropriate for the surface cleanliness/condition of the textured finish. Mix cleaning solution in accordance with those manufacturer's instructions.
4. Protect adjacent surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.

B. PREWASH APPLICATION
1. Surface and Air Temperatures: Cleaning effectiveness is diminished when surface and air temperature falls below 50 °F. For best results, allow wall surface to warm to a temperature above 50 °F
2. Thoroughly wet the area to be cleaned using a low-pressure sprayer, 200 to 350 kPa (30 to 50 psi) prior to the application of the cleaning solution itself. The wall surface to be cleaned must be wet when the cleaning solution is applied. Lower elevations should be protected to prevent absorption of run-off from above, which can cause "clean streaking".
3. Apply cleaning solutions. Follow the cleaning solution manufacturer's instructions for application and scrubbing. Follow the solution manufacturer's recommendations for dwell time on the wall surface prior to rinsing.
4. Rinse the wall with large amounts of clean, pressurized water from top to bottom before the cleaning solution can dry. All wall areas below the cleaned area must also be rinsed down thoroughly in a vertical section. Failure to completely flush the cleaned area and all wall areas below of the cleaning solution may leave residues that may emerge upon exposure to precipitation.

C. CLEANER APPLICATION
1. Repeat steps outlined for Prewash.

END OF SECTION 040122

SECTION 053100 - STEEL DECKING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Roof deck.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated.

B. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the licensed professional engineer responsible for their preparation.

C. Shop Drawings:

1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.3 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Product Certificates: For each type of steel deck.

C. Evaluation reports.

D. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

C. Professional Engineer Qualifications: A professional engineer who is licensed to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of

the system, assembly, or product that are similar in material, design, and extent to those indicted for this Project.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

B. Delegated Design: Engage a qualified professional engineer, as defined in Part 1.4 “Quality Assurance," to design steel deck, including attachment to existing building construction

2.2 ROOF DECK

A. Manufacturers:

B. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:

1. Galvanized and Shop-Primed Steel Sheet: ASTM A653/A653M, Structural Steel (SS), G60 zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.

    a. Color: To be determined by Architect

2. Deck Profile: As indicated
3. Profile Depth: Match existing
4. Design Uncoated-Steel Thickness: Per delegated design

2.3 ACCESSORIES

A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.

D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

F. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck. For drains, cut holes in the field.

G. Galvanizing Repair Paint: SSPC-Paint 20 or MIL-P-21035B, with dry film containing a minimum of 94 percent zinc dust by weight.

H. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.

B. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

C. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

D. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

E. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

F. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

G. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.

1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.

H. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated.

I. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.

3.2 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Field welds will be subject to inspection.

C. Prepare test and inspection reports.

3.3 PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.

B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.

END OF SECTION 053100

SECTION 061053 - MISCELLANEOUS CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including City of Philadelphia Standard Contract Requirements, amendments, and attachments; and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Wood blocking and nailers.
2. Wood blocking and sheathing attached to existing precast concrete mansard.
3. Fasteners.

1.3 DEFINITIONS

A. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.

B. Lumber grading agencies, and the abbreviations used to reference them, include the following:

1. NeLMA: Northeastern Lumber Manufacturers' Association.
2. SPIB: The Southern Pine Inspection Bureau.
3. WCLIB: West Coast Lumber Inspection Bureau.
4. WWPA: Western Wood Products Association.

1.4 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include product data for all fasteners.
3. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
4. For fire-retardant treatments specified to be High-Temperature (HT) type include physical properties of treated lumber both before and after exposure to elevated

temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.

5. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
6. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

B. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:

1. Power-driven fasteners.
2. Pre-drilling for anchor devices
3. Preservative-treated wood.
4. Fire-retardant-treated wood.

1.5 ACTION SUBMITTALS

A. Shop Drawings:

1. Include layout, spacings, sizes, thicknesses, and types of wood framing; fabrication; and fastening and anchorage details, including mechanical fasteners, for anchoring ¾-inch exterior sheathing over approximately 5" rigid insulation to existing precast concrete mansard.

2. Indicate and account for preformed metal standing seam roof panels with weather barrier underlayment as the covering over the engineered sheathing and wood blocking system.

B. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the licensed professional engineer responsible for their preparation.

1.6 QUALITY ASSURANCE

A. Professional Engineer Qualifications: A professional engineer who is licensed to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicted for this Project.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Part 1.7 “Quality Assurance," to design wood blocking system and fastening details for attachment of ¾-inch exterior sheathing to existing precast concrete mansard.

2.2 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. 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 dressed lumber, S4S, unless otherwise indicated.

2.3 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA C.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

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

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

1. Application: All wood unless noted otherwise.

2.4 FIRE-RETARDANT-TREATED MATERIALS

A. General: Comply with performance requirements in AWPA C20 (lumber).

1. Use treatment that does not promote corrosion of metal fasteners.
2. Use Exterior type for exterior locations and where indicated.

B. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.

C. Application: All wood unless noted otherwise.

2.5 DIMENSION LUMBER FRAMING

A. Maximum Moisture Content: 19 percent.

B. Other Framing: Construction, Stud, or No. 2 grade of any of the following species:

1. Southern pine; SPIB.
2. Douglas fir-larch; WCLIB or WWPA.
3. Mixed southern pine; SPIB.
4. Douglas fir-south; WWPA.
5. Hem-fir; WCLIB or WWPA.
6. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.

2.6 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.

B. For items of dimension lumber size, provide Construction, Stud, or No. 2 grade lumber with 19 percent maximum moisture content of any species.

C. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:

1. Mixed southern pine, No. 2 grade; SPIB.
2. Hem-fir or hem-fir (north), Construction or No. 2 Common grade; WCLIB, or WWPA.
3. Spruce-pine-fir (south) or spruce-pine-fir, Construction or No. 2 Common grade; NeLMA, WCLIB, or WWPA.

D. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

2.7 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners of Type 304 stainless steel.

B. Nails, Brads, and Staples: ASTM F 1667.

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

D. Wood Screws: ASME B18.6.1.

E. Screws for Fastening to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

2.8 MISCELLANEOUS MATERIALS

A. Flexible Flashing: Self-adhesive, rubberized-asphalt compound, bonded to a high-density, polyethylene film to produce an overall thickness of not less than 0.025 inch.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. 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, grounds, and similar supports to comply with requirements for attaching other construction.

B. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

C. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

D. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

E. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

1. Field Treatment: Copper naphthenate.

F. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.

G. 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 between members. Install fasteners without splitting wood; do not countersink nail heads, unless otherwise indicated.

3.2 WOOD GROUND, BLOCKING, AND NAILER INSTALLATION

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

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.

3.3 PROTECTION

A. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06 1053

SECTION 061600 – WALL SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Wall sheathing.

B. Related Requirements:

1. Section 061053 "Miscellaneous Carpentry" for Delegated-Design of wood sheathing attached to existing precast concrete mansards.

2. Section 074100 "Preformed Metal Standing Seam Roofing" for water-resistive barrier applied over wall sheathing.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PANEL PRODUCTS

A. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.

B. Factory mark panels to indicate compliance with applicable standard.

2.2 WALL SHEATHING

A. Plywood Sheathing: Exterior sheathing.

1. Span Rating: Not less than 16/0.
2. Nominal Thickness: Not less than 3/4 inch.

2.3 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. For wall sheathing, provide fasteners of Type 304 stainless steel.
2. For 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 B 117.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

D. Screws for Fastening Sheathing to Wood Framing: ASTM C 1002.

E. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

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

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

C. Securely attach 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”.
3. ICC-ES evaluation report for fastener.

D. 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.

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

F. 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.

3.2 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. Wall Sheathing:

a. Nail to wood framing. Apply a continuous bead of glue to framing members at edges of wall sheathing panels.
b. Screw to cold-formed metal framing.
c. Space panels 1/8 inch apart at edges and ends.

END OF SECTION 061600

SECTION 070150 - PREPARATION FOR RE-ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including City of Philadelphia Standard Contract Requirements, amendments, and attachments; and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

A. Roof tear off.
B. Removal of base flashings.
C. Repair and/or replacement of damaged or missing “in wall” flashing.
D. Repair of light weight insulating fill and fastener pull out testing.
E. Removal of abandoned equipment

B. Related Sections:

A. Division 07 Section "Modified Bituminous Membrane Roofing – Torch Applied".

B. Division 07 Section "Polyvinyl Chloride (PVC) Membrane Roofing".

1.3 MATERIALS OWNERSHIP

A. Except for items or materials indicated to be reused, reinstalled, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from Project site.

1.4 DEFINITIONS

A. Roofing Terminology: See ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

B. Existing membrane Roofing System: Existing roofing system as noted on the drawings or herein.

C. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and reinstalled.

D. Existing to Remain: Existing items of construction that are not indicated to be removed.

1.5 SUBMITTALS

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

B. Temporary roofing materials and systems.

C. Fastener pull-out test report.

D. Written report on all roof drain testing performed

E. Photographs or Video: show existing conditions of adjoining construction and site improvements, including exterior and interior finish surfaces that might be misconstrued as having been damaged by reroofing operations. Submit before Work begins.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by membrane roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning membrane roofing removal. Comply with hauling and disposal regulations of authorities having jurisdiction.

1.7 PROJECT CONDITIONS

A. Owner will occupy building immediately below reroofing area. Conduct demolition and preparation so Owner's operations will not be disrupted.

B. Protect building to be reroofed, adjacent buildings, walkways, site improvements, exterior plantings, and landscaping from damage or soiling from reroofing operations.

C. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities by providing cover, fencing and other protection as required by the owner.

D. Conditions existing at time of inspection for bidding will be maintained by Owner as far as practical.

E. Limit construction loads on roof to 100 lb/sq ft rooftop equipment wheel loads and 30 lb/sqft for uniformly distributed loads.

F. Weather Limitations: Proceed with reroofing only when existing and forecasted weather conditions permit Work to proceed without water entering existing and new roofing system or building.

G. Hazardous Materials: It is not expected that hazardous materials such as asbestos-containing materials will be encountered in the Work. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

1.8 WARRANTY

A. Existing Warranties: Remove, replace, patch and repair materials and surfaces cut or damaged during reroofing, by methods and with materials so as not to void existing system warranty. Notify warrantor before proceeding.

A. Notify warrantor of existing system on completion of reroofing, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

PART 2 - PRODUCTS

2.1 Plate Steel:

A. Steel plate stock for repair of deck openings 12 inches x 12 inches or less: 16-gauge.

B. Steel plate stock for repair of deteriorated steel deck as noted on the drawings: 14-gauge.

2.2 Metal Deck

A. A. Full sections to match existing in gauge, profile, and finish, and as necessary to comply with requirements of applicable insurance agencies and local codes.

2.3 FASTENERS

A. Type: TEKS by Buildex, Division of ITW. Substitute fasteners will be considered.

A. Fasteners for deck side lap stitching: 10-16 x 3/4 inch Hex Washer Head, TEKS/1 with pilot point.
B. Fasteners for deck to steel (1/4-inch thick max.): 12-24 x 7/8 inch Hex Washer Head, TEKS/4.
C. 3. Fasteners for deck to structural steel (1/2-inch thick max.): 12-24 x 1-1/4 inch Hex Washer Head, TEKS/5

PART 3 - EXECUTION

3.1 PREPARATION

A. Access to Work Sites: As directed by owner.

B. Roof traffic may only pass over areas that are to be reroofed. Protect roofing systems if roof replacement is not imminent.

A. Loosely lay 1-inch minimum thick, molded expanded polystyrene (MEPS) insulation over the roofing membrane in areas indicated. Loosely lay 15/32 IN plywood or OSB panels over MEPS past edges of plywood or OSB panels a minimum of 1 IN. Secure plywood or OSB with sandbags to keep protection in place.

B. Limit traffic and material storage to areas of existing roofing membrane that have been protected.
C. Maintain temporary protection and leave in place until replacement roofing has been completed. Remove temporary protection on completion of reroofing.
D. Repair any damage to existing roof resulting from construction operations.

C. Roof Drainage

A. Investigate Existing Roof Drainage System.
1. Test all enclosed roof drainage systems by discharging water from a 3/4 inch diameter garden hose for 15 minutes in each drain.

1) If any drain backs up, report this to Owner and Architect.
2) Owner will arrange for drain cleaning and/or repair by others.
3) Retest any drain which required cleaning and/or repair.

2. Prepare a written report on all roof drain testing performed.

B. Maintenance of Roof Drainage

1. Maintain roof drains in functioning condition to ensure roof drainage at end of each workday. Prevent debris from entering or blocking roof drains and conductors. Use roof-drain plugs specifically designed for this purpose. Remove roof-drain plugs at end of each workday, when no work is taking place, or when rain is forecast.
2. If roof drains are temporarily blocked or unserviceable due to roofing system removal or partial installation of new membrane roofing system, provide alternative drainage method to remove water and eliminate ponding. Do not permit water to enter into or under existing membrane roofing system components that are to remain.

D. Rooftop Utility Lines

A. Prepare an inventory of all rooftop utility lines.
B. Determine which rooftop utility lines, if any, might be adversely affected by the reroofing work and make a list of those requiring temporary shutoff during roofing work.
C. Notify Owner of temporary shutoff requirements and coordinate necessary utilities shutoff and return to service, by Owner, during reroofing.
D. Verify that all rooftop utilities and service piping have been shut off before beginning the Work.
E. Verify that all rooftop utilities have been returned to service after completion of work.

3.2 ROOF TEAR-OFF

A. During removal operations, have sufficient and suitable materials on-site to facilitate rapid installation of temporary protection in the event of unexpected rain.

B. Materials may only be removed from the roof through the means of and enclosed chute the empties directly into a dumpster.

C. It is the intent of this project that everything associated with the existing roof is to be removed from the roof to a clean stable substrate. As part of this scope the following components shall be completely removed and discarded:

1. Existing debris and materials on roof surface.

2. Existing roofs, cants, tapered edge strips, insulations, waterproofings, and underlayments down to the surface of the roof deck. Contractor shall exercise caution during roof removal operations as necessary to prevent damaging the existing deck.

3. Existing sheet metal flashings, counterflashings (except where may be noted on drawings or elsewhere to reuse), counterflashing reglet receivers, scuppers, conductor heads, downspouts, gravel stop fascias, fascias, copings, flanged sleeves and collars, and pitch pan flashings.

4. Brackets, fasteners, protrusions etc. in parapet walls that would impede or hinder proper completion of the work.

5. Existing wood blocking as noted on drawings and/or as necessary to provide conditions shown on drawings.

D. Remove only as much existing roofing and insulation as can be recovered with new roofing and made watertight the same day or before the arrival of inclement weather.

E. Perform cutting, drilling, and removals in a manner that will prevent damage to adjoining construction which is to remain.

F. Prior to any cutting, drilling or removals, investigate both sides of the surface affected.

G. Notify and coordinate with the Owner's Representative prior to interrupting or disconnecting utilities.

3.3 GENERAL SUBSTRATE PREPARATION

A. Inspect deck after tear-off of existing roofing system.

B. Verify that new roof system substrate is visibly dry and free of moisture.

C. If deck or substrate surface is not suitable for receiving new roofing or if structural integrity of deck is suspect, immediately notify Architect. Do not proceed with new roofing installation until direct by Architect.

D. At equipment to be removed for reroofing shut off all affected electrical, plumbing and gas lines and disconnect all electrical, plumbing, gas lines and ventilation ducts as required to allow for lifting mechanical units and other work required for the work. All required disconnection, reconnection and modification of the electrical and mechanical systems shall be performed by a licensed mechanical/electrical subcontractor. Lift the units off the curbs or supports in a manner that will not damage the curb or the unit. Coordinate all work in this section with the Owner's Representative.

E. Temporarily displace junction boxes, rooftop conduit and gas lines, or other items that may interfere with work. All required disconnection and reconnection shall be performed by a licensed mechanical/electrical subcontractor as applicable to the work being performed. Schedule shut-offs and disconnections with the Owner.

F. Contractor shall contain and prevent any discharge of HVAC condensate or other HVAC related moisture or liquid discharge onto daily work areas during roof removal and replacement operations.

3.4 DECK

A. Repair all damaged deck, including openings and deterioration.

1. Structural Concrete Deck –Repair to create a smooth finish level with adjacent surfaces.

    a. Fill voids in deck surface that do not penetrate more than half of the deck thickness.
    b. Cover openings thru the deck, less than 12 inches in diameters, with steel plate. Plates to be securely fastened in place with a minimum of four fasteners.
    c. Report openings larger than 12 inches to the Architect to determine proper repair procedures.

2. Lightweight Deck: Repair voids in lightweight insulating fill with specified materials following manufacturer's instruction.
3. Metal Deck – Repair to create a structurally sound clean deck.

    a. Surface Corrosion: Remove rust by wire-brushing or scraping. Remove dust and debris by power vacuum and prime the brushed and scraped areas with the specified steel deck primer, applied as recommended by the manufacturer; allow primer time to dry before proceeding.

        1. Severe Corrosion,12 inches x 12 inches or less: Repair the defects with 14-gauge steel plate stock. Lap the plate a minimum of 6-inches on all sides of the defect. Fasten the plate with No. 14 self-drilling screws installed at each rib. Position fasteners a minimum of two inches in from the outside edge of the repair plate. Provide a minimum of four (4) fasteners for each repair plate.

    b. Severe Corrosion areas larger than 12 inches x 12 inches:

        1. Install full decking sections to match existing, spanning to at least three joists. Install new decking in accordance with the requirements of FM, Steel Deck Institute, and applicable local codes.

    c. Loose deck sections: Install additional fasteners to secure deck. In no case shall the fastener spacing exceed 12 inches on center.

3.5 WALLS:

A. Completely remove materials by scraping or chipping all loose bituminous materials, mortar fins and mortar and bituminous high spots, roof system components, fasteners, brackets, etc., on masonry walls to provide a suitable substrate.

3.6 PENETRATIONS:

A. Completely remove all bituminous and sealant materials and pipe insulation from the surfaces of all pipes, equipment service lines, supports, walls, etc. that are to receive new bituminous, sealant and/or sheet metal flashing materials.

3.7 WOOD BLOCKING

A. Replace deteriorated wood blocking whether of not scheduled for removal with similar in type and size.

3.8 EXISTING EXPANSION JOINTS

A. Remove existing expansion joint assemblies, rebuild curb and provide watertight assembly at the same time. No water intrusion will be allowed at any time.

3.9 FASTENER PULL-OUT TESTING

A. Perform fastener pull-out test according to SPRI FX-1, and submit test report to roofing manufacturer before installing new roofing system.

1. Obtain roofing manufacturer's approval to proceed with specified fastening pattern. Roofing e manufacturer may furnish revised fastening pattern commensurate with pull-out test results.

3.10 DISPOSAL

A. Remove any debris resulting from these operations on a daily basis or more often if requested by Owner's Representative. Take all necessary precautions to ensure that debris does not blow around the site. Keep dumpsters covered; remove from site daily. Debris shall be removed from roofs by use of covered chutes or approved mechanical means. Chutes must be pulled up and stored when not in use.

END OF SECTION 070150

SECTION 074100 - PREFORMED METAL STANDING SEAM ROOFING

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This section covers the pre-finished, pre-fabricated Architectural standing seam roof system. All metal trim, accessories, fasteners, insulation and sealants indicated on the drawings as part of this section.
B. Drawings and general provisions of the Contract, including general and Supplementary Conditions and Division 01 Specifications, apply to this section.
C. Related Work Specified Elsewhere
    1. Roof Deck structural steel, flat roof systems, perimeter edge systems. Roof hatches, firestopping not included in this section.

1.02 SUMMARY

A. Section Includes
    1. Factory formed Standing Seam metal roof panels

1.03 DEFINITIONS

A. Metal Roof Panel Assembly: Metal roof panels, attachment system components, miscellaneous metal framing, thermal, and accessories necessary for a complete weathertight roofing system.
B. References:
    1. American Society for Testing and Materials (ASTM)
        a. ASTM A 653: Steel Sheet, Zinc Coated by the Hot Dip Process
        b. ASTM A 792: Steel Sheet, Aluminum-Zinc Alloy Coated by the Hot Dip Process
        c. ASTM B 209: Aluminum and Aluminum Alloy Sheet and Plate
        d. ASTM B370 Standard Specification for Copper Sheet and Strip for Building Construction
    2. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
        a. SMACNA Architectural Sheet Metal Manual, 1993 edition
    3. American Iron and Steel Institute (AISI)
        a. AISI Cold Formed Steel Design Manual
    4. Aluminum Association
        a. Aluminum Design Manual
    5. Metal Construction Association
        a. Preformed metal Wall Guidelines
    6. Code References
        a. ASCE, Minimum Loads for Buildings and Other Structures
        b. BOCA National Building Codes
        c. UBC Uniform Building Code
        d. SBC Standard Building Code

1.04 QUALITY ASSURANCE

A. Manufacturer and erector shall demonstrate experience of a minimum of ten (10) years in this type of project.
B. Installer shall demonstrate experience of a minimum of five (5) years in this type of project.
C. Panels shall be factory-produced only. No portable, installer-owned or installer-rented machines will be permitted.

1.05 SYSTEM DESCRIPTION

A. Material to comply with:
   1. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

1.06 ROOF SYSTEM PERFORMANCE TESTING

A. General Performance: Metal roof panels shall comply with performance requirements without failure due to defective manufacture, fabrication, installation or other defects in construction.
B. Roof System shall be designed to meet Standard Building Code Wind Load requirements.
C. Panels to meet:
   1. Water Penetration: When tested per ASTM E-283/1680 and ASTM E-331/1646 there shall be no uncontrolled water penetration or air infiltration through the panel joints.
   2. UL 2218 - Impact Resistance rated.
   3. Wind Uplift Resistance: Class 90 rating, minimum, when tested in accordance with UL 580.

1.07 WARRANTIES

A. Weathertight warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace standing seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.
   1. Warranty Period: 30 Years from date of Substantial Completion
B. Finish warranty: Manufacturer's standard form in which manufacturer agrees to repair finish or replace standing seam metal roof panels that show evidence of deterioration of factory-applied finish within specified warranty period.
   1. Exposed Panels Finish - deterioration includes the following:
      a. Color fading more than 5 hunter units when tested according to ASTM D 2244
      b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214
      c. Cracking, checking, peeling or failure of a paint to adhere to a bare metal.
   2. Warranty Period: 20 Years from the date of substantial completion
C. Installer shall furnish written warranty for a two (2) year period from date of substantial completion of building covering repairs required to maintain roof and flashings in watertight condition.

1.08 SUBMITTALS

A. Furnish detailed drawings showing profile and gauge of exterior sheets, location and type of fasteners, location, gauges, shape and method of attachment of all trim locations and types of sealants, and any other details as may be required for a weather-tight installation.
B. Provide finish samples of all colors specified.
C. Shop drawings: Show fabrication and installation layouts of metal roof panels, metal wall panels or metal soffit panels, details of edge conditions, side-seam joints, panel profiles, corners, anchorages, trim, flashings, closures and accessories, and special details. Distinguish between factory and field-assembled work
D. Coordination Drawings: Roof plans, drawn to scale, on which the following are shown and coordinated with each other, based on input from installer of the items involved:
   1. Roof panels and attachments
   2. Metal trusses, bracings and supports
   3. Roof-mounted items including snow guards and items mounted on roof curbs.

1.09 DELIVERY, STORAGE AND HANDLING

A. Ordering: Comply with manufacturer's ordering instruction and lead time requirements to avoid construction delays.

B. Deliver components, sheets, metal roof panels and other manufactured items so as not to be damaged or deformed. Package metal roof panels for protection during transportation and handling.
C. Unload, store and erect metal roof panels in a manner to prevent bending, warping, twisting and surface damage.
D. Stack metal roof panels on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal roof panels to ensure dryness. Do not store metal roof panels in contact with other materials that might cause staining, denting or other surface damage.
E. Protect strippable protective coating on any metal coated product from exposure to sunlight and high humidity, except to the extent necessary for material installation.

1.10 PROJECT CONDITIONS
A. Weather Limitations: proceed with installation only when existing and forecasted weather conditions permit metal roof panel work to be performed.
B. Field Measurements: Verify actual dimensions of construction contiguous with metal roof panels by field measurements before fabrication.

1.11 COORDINATION
A. Coordinate sizes and locations of roof curbs, equipment supports and roof penetrations with actual equipment provided.
B. Coordinate metal roof panels with rain drainage work, flashing, trim and construction of decks, parapet walls and other adjoining work to provide a leakproof, secure and noncorrosive installation.

PART 2 - PRODUCTS

2.01 PANEL DESIGN
A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates and accessories required for a weathertight installation.
B. Roof panels shall be 18” wide with a 1 ¾” high seam as produced by one of the following or an approved equal.
    1. Petersen Aluminum Corporation – Snap-Clad.
    2. Firestone Building Products – UC-14
    3. Englert Incorporated – A1500
C. Panels to be produced with Factory supplied hot melt mastic in the seams.
D. Panels to be produced Smooth - Factory Standard.
E. Panels to be designed for attachment with concealed fastener clips, spaced as required by the manufacturer to provide for both positive and negative design loads, while allowing for the expansion and contraction of the entire roof system resulting from variations in temperature.
F. Forming: Factory formed - continuous end rolling method.

2.02 MATERIALS AND FINISHES
A. Factory formed roofing panels shall be fabricated of .040 Aluminum
B. Color shall be Dark Bronze
C. Finish shall be Kynar 500 or Hylar 5000 Fluorocarbon coating with a top side film thickness of 0.70 to 0.90 mil over a 0.25 to 0.3 mil prime coat to provide a total dry film thickness of 0.95 to 1.25 mil, to meet AAMA 621. Bottom side shall be coated with a primer with a dry film thickness of 0.25 mil. Finish shall conform to all tests for adhesions, flexibility and longevity as specified by Kynar 500 or Hylar 5000 finish supplier.

D. Trim: Trim shall be fabricated of the same material and finish to match the profile, and will be press broken in lengths of 10 to 12 feet. Trim shall be formed only by the manufacturer or their approved dealer. Trim to be erected in overlapped condition. Use lap strips only as indicated on shop drawings. Miter conditions shall be factory welded material to match the sheeting.
E. Closures: use composition or metal profiled closures at the top of each elevation to close ends of the panels. Metal closures to be made in the same material and finish as face sheet.
F. Clips – Manufacturer's standard stainless-steel clips
G. Fasteners: Fasteners shall be of pan head, bi-metal, 304 stainless. Designed for maximum pullout capacity in wood decking.
H. Roofing Underlayment
    1. On all surfaces to be covered with roofing material, furnish and install a 40 mil Peel & Stick membrane, required as outlined by metal panel manufacturer. Membrane to be a minimum of 40 mil thickness, smooth, non-granular, high temperature. Material shall comply with metal panel manufacturer's requirement for a 30-year weathertightness warranty.
I. Sealants
    1. Exterior grade silicone sealant recommended by roofing manufacturer or
    2. One-part non-sag, gun grade exterior type polyurethane recommended by the roofing manufacturer.

2.03 FABRICATION

A. Comply with dimensions, profile limitations, gauges and fabrication details shown and if not shown, provide manufacturer's standard product fabrication.
B. Fabricate components of the system in factory, ready for field assembly.
C. Fabricate components and assemble units to comply with fire performance requirements specified.
D. Apply specified finishes in conformance with manufacturer's standard, and according to manufacturer's instructions.

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine alignment of roof sheathing, prior to installation.
B. For the record, prepare written report, endorsed by installer, listing conditions detrimental to performance of the Work.
C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 UNDERLAYMENT

A. Underlayment shall be laid in horizontal layers with joints lapped toward the eaves a minimum of 6, and well secured along laps and at ends as necessary to properly hold the felt in place. All underlayment shall be preserved unbroken and whole.

B. Peel and Stick Underlayment shall lap all hips and ridges at least 12 to form double thickness and shall be lapped 6 over the metal of any valley or built-in gutters and shall be installed as required by the Standing Seam Panel Manufacturer to attain the desired 20 Year Weathertightness

3.02 FASTENERS

A. Place fasteners as indicated in manufacturer's standards.

3.03 INSTALLATION

A. Install the metal roof panel system in accordance with the manufacturer's instructions, installation drawings, and approved shop drawings, so that it is weathertight and allows for thermal movement.

B. Locate space and fasten all clips in accordance with roof panel manufacturer's recommendations. For required fasteners, use proper torque settings to obtain controlled uniform compression for a positive seal without rupturing the sealing washers.

C. Panels must be locked in the field by a mechanical seamer.

D. Do not place utility penetrations through the panel seams.

E. Do not allow panels or trim to come into contact with dissimilar materials (i.e. copper, lead, graphite, treated lumber, mortar, etc). Protect from water run-off from these materials.

F. Perform field cutting of panels and related sheet metal components by means of hand or electric shears. At no time shall a hot/friction saw be used.

G. Remove protective film immediately after installation.

3.4 DAMAGED MATERIAL

A. Upon determination of responsibility, repair or replace damaged metal panels and trim to the satisfaction of the Architect and Owner.

END OF SECTION 074100

SECTION 074293 - SOFFIT PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes metal soffit panels.

B. Related Sections:

1. Section 076200 "Sheet Metal Flashing and Trim.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

B. Shop Drawings:

1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
2. Accessories: Include details of flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.

C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.

1. Include similar Samples of trim and accessories involving color selection.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:

1. Metal Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal panel accessories.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For each product, tests performed by a qualified testing agency.

C. Sample Warranties: For special warranties.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panels to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. UL-Certified, Portable Roll-Forming Equipment: UL-certified, portable roll-forming equipment capable of producing metal panels warranted by manufacturer to be the same as factory-formed products. Maintain UL certification of portable roll-forming equipment for duration of work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal panels during installation.

1.8 FIELD CONDITIONS

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

1.9 COORDINATION

A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including rupturing, cracking, or puncturing.
b. Deterioration of metals and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 30 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:

1. Wind Loads:

a. Basic Wind Speed (3 Second gust): 90 mph.
b. Wind Importance Factor: 1.15.
c. Wind Exposure (All directions): C.
d. Occupancy Category: IV.

2. Deflection Limits: For wind loads, no greater than 1/180 of the span.

B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) when tested according to ASTM E 283 at the following test-pressure difference:

1. Test-Pressure Difference: 1.57 lbf/sq. ft.

C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METAL SOFFIT PANELS

A. General: Provide metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.

B. Metal Soffit Panels:

1. Finish: Kynar 500 or Hylar 5000.

C. Flush-Profile Metal Soffit Panels: Perforated panels formed with vertical panel edges and intermediate stiffening ribs symmetrically spaced and flat pan between panel edges; with flush joint between panels.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. PAC-CLAD; Petersen Aluminum Corporation; Flush Wide Vented Soffit.

b. EMCO Building Products; Full Vented Soffit Panel.

c. Berridge Manufacturing Co; Flush Vented Soffit Panel.

2. Aluminum Sheet: Coil-coated sheet, ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.

a. Thickness: 0.040 inch.
b. Surface: Smooth, flat at edges and perforated in center.
c. Exterior Finish: Two-coat fluoropolymer.
d. Color: As selected by Architect from manufacturer's full range.

D. Miscellaneous Metal Sub-framing and Furring: ASTM C 645, cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A 792/A 792M, Class AZ50 (Class AZM150) aluminum-zinc-alloy coating designation

unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

E. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

1. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch thick, flexible closure strips; cut or pre-molded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

F. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Finish flashing and trim with same finish system as adjacent metal panels.

G. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

2.3 FABRICATION

A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
4. Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.

a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal soffit panel manufacturer for application but not less than thickness of metal being secured.

2.4 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.

1. Examine framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal panel manufacturer.
2. Examine sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal panel manufacturer.

a. Verify that air- or water-resistive barriers been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

1. Soffit Framing: Clip furring channels to supports, as required to comply with requirements for assemblies indicated.

3.3 METAL PANEL INSTALLATION

A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal panels.
2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Install flashing and trim as metal panel work proceeds.
6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
7. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:

1. Aluminum Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.

1. Apply panels and associated items true to line for neat and weathertight enclosure.
2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.

E. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel system including trim, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.

F. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners

where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.

1. Install exposed flashing and trim that is without buckling, and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to achieve waterproof performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.4 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074293

SECTION 075216
MODIFIED BITUMINOUS MEMBRANE ROOFING –TORCH APPLIED

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including City of Philadelphia Standard Contract Requirements, amendments, and attachments; and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Styrene-butadiene-styrene (SBS) modified bituminous membrane roofing.
   a. Anchor Sheet - Glass mat reinforced SBS ply mechanically attached.
   b. Base Ply – Polyester reinforced SBS ply, torch grade.
   c. Intermediate Ply – Polyester mat reinforced SBS, torch grade
   d. Cap Ply – Glass mat reinforced SBS, torch grade, fire rated with white granules.
2. Roof insulation and substrate boards.
3. Walkway pads.
4. Roofing sealants and flashings.
5. Pitch pockets.

B. Related Sections:
1. Section 06 1053 “Miscellaneous Carpentry” for wood nailers and blocking.
2. Section 07 6200 "Sheet Metal Flashing and Trim" for metal roof flashings and counter flashings.
3. Section 07 7129 "Manufactured Roof Expansion Joints" for proprietary manufactured roof expansion-joint assemblies.
4. Section 07 9200 "Joint Sealants" for joint sealants, joint fillers, and joint preparation.

1.3 REFERENCES

A. Reference Standards: References in these specifications to standards, test methods, codes etc., are implied to mean the latest edition of each such standard adopted. The following is an abbreviated list of associations, institutions, and societies which may be used as references throughout these specifications.

ASTM	American Society for Testing and Materials Philadelphia, PA (215) 299-5585
FM	Factory Mutual Engineering and Research Norwood, MA (617) 762-4300

IBC International Code Council
Country Club Hills, IL (800) 214-4321

NRCA National Roofing Contractors Association
Rosemont, IL (708) 299-9070

OSHA Occupational Safety and Health Administrations
Washington, DC (202) 523-8036

SMACNA Sheet Metal and Air Conditioning Contractors National Association
Chantilly, VA (703) 803-2980

UEAtc The European Union of Agrément, General Secretariat: British Board of Agrément, Bucknalls Lane, Garston, Watford, Herts WD25 9BA, UK

UL Underwriters Laboratories
Northbrook, IL (708) 272-8800

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall not wrinkle or split over time and shall remain watertight.

B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.

C. Roofing System Design: Provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE/SEI 7. Roof membrane manufacturer shall provide calculations and attachment requirements to meet code requirements for the following roof areas:

1. Field of roof, Perimeter and corner uplift resistance shall be calculated to meet FM 1-90 criteria

D. FM Approvals Listing: Provide membrane roofing, base flashings, and component materials that comply with requirements in FM Approvals 4450 and FM Approvals 4470 as part of a membrane roofing system, and that are listed in FM Approvals' "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals markings.

1. Fire/Windstorm Classification: Class 1A-90
2. Hail Resistance Rating: MH

1.5 SUBMITTALS

Prior to starting work and before the preconstruction meeting, the following submittals shall have been submitted for review:

A. Product Data:
   1. Product Data each type of product indicated.
   2. Manufacturer's written instructions for installation
   3. Product Data for applicable accessories.
   4. MSDS

B. Temporary Protection: Plan diagram and narrative of procedures and schedules.

C. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.

   1. Base flashings and membrane terminations.
   2. Tapered insulation, including slopes.
   3. Crickets, saddles, and tapered edge strips, including slopes.
   4. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
   5. Manufacturer's standard details for the specific roofing system assembly

D. Qualification Data: For qualified installer, manufacturer, and testing agency.

   1. Written confirmation from the roof membrane manufacturer stating:

      a. Intent to warrant the roof system as specified in the contract documents
      b. The Contractor is an Approved Applicator meeting Acceptable Roofing Applicator requirements of the contract documents and is eligible to install the specified roof system as necessary to quality for the specified Manufacturer's Warranty.

   2. List of three completed projects using the type roof membrane specified, or a specified equivalent. Include the following information for each project:

      a. Project name
      b. Project size and scope of work
      c. Owner/client contact name and phone number

E. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.

   1. Submit evidence of complying with performance requirements.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of membrane roofing system.

G. Research/Evaluation Reports: For components of membrane roofing system, from the currently ratified ICC-code as well as the Philadelphia code.

H. Maintenance Data: For roofing system to include in maintenance manuals.

I. Warranties: Samples of manufacturer and installer warranties.

1.6 SUBMITTALS FOR RECORD – After Completion of Work

A. Certificate of Analysis: From the testing laboratory of the primary roofing materials manufacturer, confirming the physical and mechanical properties of the roofing membrane components. Testing shall be in accordance with the parameters published in ASTM D 5147 and UEAtc* and indicate Quality Assurance/Quality Control data as required to meet the specified properties. A separate Certificate of Analysis for each production run of material shall indicate the following information:

1. Material type
2. Lot number
3. Production date
4. Dimensions and Mass (indicate the lowest values recorded during the production run)

    a. Roll length
    b. Roll width
    c. Selvage width
    d. Total thickness
    e. Thickness at selvage
    f. Weight

5. Physical and Mechanical Properties
    a. Low temperature flexibility
    b. Breaking load
    c. Ultimate elongation
    d. Dimensional stability
    e. Compound stability
    f. Granule embedment
    g. Resistance to thermal shock (foil faced products)

B. Invoice slips for all materials.

C. Maintenance Data: Complete maintenance manuals for all components of roofing system.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is UL listed and FM approved for membrane roofing system identical to that used for this Project.

B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by membrane roofing system manufacturer to install manufacturer's product, is eligible to receive manufacturer's warranty, and has a minimum of three years of experience.

C. Source Limitations: Obtain components including fasteners for membrane roofing system from same manufacturer as membrane roofing or approved by membrane roofing manufacturer.

D. Exterior Fire-Test Exposure: ASTM E 108, Class A for application and roof slopes indicated, as determined by testing identical membrane roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.

E. Fire-Resistance Ratings: Where indicated, provide fire-resistance-rated roof assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

F. Preliminary Roofing Conference: Before starting demolition, conduct conference at MLK Recreation Center.

1. Meet with Owner, Architect, Owner's insurer if applicable, roofing installer, roofing system manufacturer's representative, and installers whose work interfaces with or affects roofing, including installers of roof accessories, pipe insulation, protective coatings, etc.
   a. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
   b. Review and finalize construction schedule and verify availability of materials, installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   c. Review deck substrate requirements for conditions and finishes, including flatness and fastening.
   d. Review structural loading limitations of roof deck during and after roofing.
   e. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
   f. Review governing regulations and requirements for insurance and certificates if applicable.
   g. Review temporary protection requirements for roofing system during and after installation.
   h. Review roof observation and repair procedures after roofing installation.
   i. Review material and personnel access limitations, storage locations (roof and on ground) and debris removal.
   j. Review procedures for removal and replacement of existing pipe insulation.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Handle and store insulation and other roofing materials out of direct exposure to the elements. Store roll goods on a clean, flat and dry surface. All material stored on the roof overnight shall be stored on pallets. Rolls of roofing must be stored on ends and placed over column points.

Store materials on the roof in a manner so as to preclude overloading of deck and building structure. Store materials such as solvents, adhesives and asphalt cutback products away from open flames, sparks or excessive heat. Cover all material using a breathable cover. Polyethylene or other non-breathable plastic coverings are not acceptable.

1. Any damaged, wet, or frozen goods shall be removed from the site immediately at no charge to the Owner.

D. Place equipment in a manner to avoid deflection of the structure.

1.9 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

B. Surfaces on which the installation or roofing membrane is to be applied shall be clean, smooth, dry, free of the possibility of frost, dew or contaminants that would prevent proper installation.

C. Waste products (petroleum, grease, oil and solvents, vegetable or mineral oil and animal fat, or direct contact with steam venting) shall not be allowed to come in contact with the roof membrane system.

D. Daily Seal: Roof shall be sealed to ensure that moisture does not penetrate beneath any completed sections of the roof by temporarily sealing the loose edge of the membrane at the end of each work day and prior to the arrival of inclement weather. The manufacturer's requirements shall be followed closely. Contractor shall inspect existing components for moisture intrusion along the tie-in after opening the daily seal on the next work day. All temporary and/or wet or damaged materials shall be removed prior to starting work.

1.10 WARRANTY

A. Manufacturer’s Warranty: Manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period.

1. Warranty includes membrane roofing, base flashings, roof insulation, fasteners, cover boards, substrate board, metal trim, and all components of membrane roofing system.
2. Warranty Period: 30 year NDL on all manufacturer’s approved materials from date of Substantial Completion.

B. Roofer’s Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering the Work of this Section, including all components of membrane roofing system such as membrane roofing, base flashing, roof insulation, fasteners, cover boards, substrate boards, and walkway products, for the following warranty period:

1. Warranty Period: Two years from date of Substantial Completion on all materials installed.

PART 2 - PRODUCTS

2.1 SBS-MODIFIED ASPHALT-SHEET MATERIALS

A. SBS-Modified Bituminous Membrane Roofing using the torch down method for the base ply, cap sheet, and flashings (except for wood substrates)

1. Manufacturers: Subject to compliance with requirements, provide products of the following manufacturers and their products listed below:
   a. Soprema.
   b. Johns Manville.

2.2 ANCHOR SHEET

A. ASTM 4601, Type II, Oxidized Asphalt, glass mat.

1. Soprema: Sopra-G

2. Johns Manville: PermaPly 28

2.3 VAPOR BARRIER SHEET MATERIALS

A. SBS Asphalt, woven polyethylene mat.

1. Johns Manville: Dynabase PR

2. Soprema: Elastophene SP 2.2

2.4 BASE PLY MATERIALS

A. ASTM D 6164, Grade S, Type I, SBS-modified asphalt sheet (reinforced with polyester); smooth surfaced; suitable for torch application.

1. Soprema: Sopralene Flam 180

2. Johns Manville: Dynaweld 180 S

2.5 CAP SHEET MATERIALS

A. Granule-Surface Roofing Membrane Cap Sheet: ASTM D 6164, Grade G, Type I, SBS-modified asphalt sheet (reinforced with glass fibers); white granular surfaced; suitable for torch application.

1. Soprema: Sopralene FR GR

2. Johns Manville: Dynaweld Cap 180 FR CR G

2.6 FLASHING BASE PLY MATERIALS

A. ASTM D 6163, Grade S, Type I or II, SBS-modified asphalt sheet (reinforced with glass fibers); smooth surfaced; suitable for torch application.

1. Soprema: Sopralene Flam 180

2. Johns Manville: Dynaweld 180 S

2.7 FLASHING CAP PLY MATERIALS:

A. Granule-Surface Roofing Membrane Cap Sheet: ASTM D 6164, Grade G, Type I or II, SBS-modified asphalt sheet (reinforced with polyester); white granular surfaced; suitable for torch application or- ASTM D 6163, Grade G, Type I or II, SBS-modified asphalt sheet (reinforced with glass fibers); white granular surfaced; suitable for torch application.

1. Soprema: Soprelene FR GR

2. Johns Manville: Dynaweld Cap 180 FR CR G

2.8 REINFORCED LIQUID APPLIED FLASHING.

A. System shall include manufacturer's standard paste resin and repair mortar; reinforcement layer; flashing resin; and surfacing granules.

1. Johns Manville: PermaFlash

2. Soprema: Alsan

2.9 AUXILIARY ROOFING MEMBRANE MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing membrane.

1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
2. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

a. Plastic Foam Adhesives: 50 g/L.
b. Gypsum Board and Panel Adhesives: 50 g/L.
c. Multipurpose Construction Adhesives: 70 g/L.
d. Fiberglass Adhesives: 80 g/L.
e. Contact Adhesive: 80 g/L.
f. Other Adhesives: 250 g/L.
g. Nonmembrane Roof Sealants: 300 g/L.

h. Sealant Primers for Nonporous Substrates: 250 g/L.
i. Sealant Primers for Porous Substrates: 775 g/L.

B. Mastic Sealant: Polyisobutylene, plain or modified bitumen; nonhardening, nonmigrating, nonskinning, and nondrying.

C. Sealant: Single component moisture cured polyurethane sealant as part of the roofing manufacturers approved system.

D. Substrate Primer: Liquid applied substrate conditioner.

1. Soprema: Elastocol 350

2. Johns Manville: Asphalt Primer

E. Cold Applied Adhesive: Solvent free, polymeric adhesive, non-toxic and low-odor, complying with all roofing membrane adhesive VOC regulations, and meeting the requirements of ASTM D7379.

a. Soprema - Colply EF Adhesive

b. Johns Manville: MBR Cold Applied.

c. Firestone - LiquiGard

F. Fasteners: Factory-coated steel fasteners and metal plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roofing membrane components to substrate; tested by manufacturer for required pullout strength, and acceptable to roofing system manufacturer. Fasteners shall be equal to the following
1. Anchor sheet – OMG OlyLok

G. Roofing Granules: Ceramic-coated roofing granules, No. 11 screen size with 100 percent passing No. 8 (2.36-mm) sieve and 98 percent of mass retained on No. 40 (0.425-mm) sieve, color to be white.

H. Miscellaneous Accessories: Any and all pre-manufactured roof accessories such as pitch pockets and reinforced fluid applied waterproofing membrane to implement special conditions as noted in the drawings. Provide those recommended by roofing system manufacturer.

2.10 COVER BOARDS

A. Cover Board: Board manufactured to serve as a substrate for the installation of torched SBS membrane and meeting the following criteria,

1. Thickness - 1/4 inch min.
2. Compressive Strength – 900 psi
3. Flexural Strength – 80 psi
4. Water Absorption - <5.5%

B. Bead –Applied Insulation Adhesive: Adhesive shall be approved by the roofing manufacturer and match the quality, performance and odor of the adhesive listed.
   1. OlyBond 500

2.11 ROOF INSULATION

A. General: Preformed roof insulation boards manufactured or approved by roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated and that produce FM Approvals-approved roof insulation.

B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, felt or glass-fiber mat facer on both major surfaces. Boards shall be no greater than 4 x 4 feet.

C. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/2 inch per 12 inches unless otherwise indicated.

D. Provide saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to a minimum ¼ inch final slope.

2.12 ROOF INSULATION ACCESSORIES

A. General: Furnish roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with membrane roofing.

B. Fasteners: Factory-coated steel fasteners and metal plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roofing membrane components to substrate; tested by manufacturer for required pullout strength, and acceptable to roofing system manufacturer. Fasteners shall be equal to the following.
   1. OMG CD-10 and plate at structural concrete
   2. TruFast 15 EHD and plate at metal deck

C. Bead –Applied Insulation Adhesive: Adhesive shall be approved by the roofing manufacturer and match the quality, performance and odor of the adhesive listed.
   1. OlyBond 500

D. Cant Strips: ASTM C 728, perlite insulation board, 1-1/2” x 4”.

E. Wood Nailer Strips: Comply with requirements in Division 06 Section “Miscellaneous Carpentry.”

F. Tapered Edge Strips: ASTM C 728, perlite insulation board.

2.13 WALKWAYS

A. Walkway Cap Sheet Strips: White granular surfaced; suitable for torch application method

   1. Soprema: -SopraWalk

2. Johns Manville DynaTread

2.14 PITCH POCKETS

A. General: Furnish pitch pocket accessories recommended by roofing manufacturer for intended use and compatibility with membrane roofing.

B. Pourable Sealer: Manufacturer's standard low VOC, rubber, 1-part flexible, self leveling, moisture cure, pourable sealer. (1-Part)

PART 3 - EXECUTION

3.1 GENERAL

A. After completion and extinguishing all torches, contractor must provide a fire watch for a minimum of three (3) hours.

B. All fuel products shall be removed from the immediate work area and transported off site as instructed by the DPP Project Coordinator.

C. The Contractor is responsible for project safety. Where conditions are deemed unsafe to use open flames. Hot-air welding equipment may be used in lieu of roof torches to seal membrane side and end laps where heat welding the laps is necessary. Refer to NRCA CERTA, local codes and building owner's requirements for hot work operations.

3.2 EXAMINATION

A. Perform all preparatory work outlined in Section 07 0150, Preparation for Re-Roofing, and as shown on the contract drawings. Prior to installing roof, examine substrates, and other field conditions for compliance with the following requirements and other conditions affecting performance of roofing system:

1. Verify that roof penetrations are securely in place and curbs are set and braced and that roof drain bodies are securely clamped in place and not broken or inoperable.
2. Verify that existing lightweight concrete substrate is visibly dry and free of moisture.
3. Verify that deck repair material has cured per manufacturer's requirements before installing base sheet.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Review substrate for voids, deteriorated materials, and cracks. Remove all deficient substrate and fill with Insulation boards. Boards must be full sized. Multiple partial boards may not be installed. Areas less than 12 sf may be filled with lightweight concrete.

B. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

C. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

D. Preparation of existing substrates for liquid flashing installation:

1. Aluminum Composite Panel substrate prep: Clean as per SSPC Surface Preparation Standard No. 15. Do not damage aluminum substrate.

2. Steel substrate prep: Clean as per SSPC Surface Preparation Standard No 11. Do not permit stains to remain on surface.

3. PVC substrate prep: Use 20 grit sandpaper to remove all EPDM glue residue and to roughen up surface. Do not use power tool.

3.4 ANCHOR SHEET INSTALLATION (Lightweight Concrete Only)

A. Lay the anchor sheet directly over lightweight insulation fill, lapping sides and ends four (4) inches. Using the specified fasteners, fasten each sheet a minimum of every seven and one half (7 1/2) inches through laps and stagger fasten the remainder of the sheet in two (2) rows, each on ten (10) inch centers. Actual fastening pattern shall be per pull test review and requirements by FM to meet wind resistance criteria.

3.5 VAPOR BARRIER INSTALLATION (Structural Concrete Only)

A. Apply substrate primer in an even full coat.

B. Begin by unrolling the membrane to its complete length. Once relaxed for a minimum of twenty minutes, reroll the membrane.

C. Unroll membrane on substrate for alignment.

D. Place membrane so edge lap will be centered on drain.

E. Application shall provide a smooth surface, free of air pockets, wrinkles, fish mouths or tears.

F. Install lapped course, extending over and terminating beyond cants. Attach as follows:

1. Fully adhere by torching.

G. Ensure manufacturer required side-laps and end-laps are maintained, or as indicated below.

1. 6 in end-laps
2. 3 in side laps
3. End-laps should be staggered 3 ft apart.

H. While unrolling and heating the sheet, ensure a constant flow hot bitumen approximately ¼ to 1/2 in flows ahead of the roll as it is unrolled, and there is 1/8 to 1/4 in bleed out at all laps.

I. At the side, melt the plastic burn-off film from the top surface using a torch or hot-air welder.

J. At end-laps, cut a 45 degree dog-ear away from the selvage edge. Ensure the membrane is fully heat-welded watertight at all T-joints.

K. Each day, physically inspect all side and end-laps, and ensure the membrane is sealed watertight. Where necessary, use a torch or hot-air welder and a clean trowel to ensure all laps are sealed.

L. Inspect the installation each day to ensure the plies are fully adhered. Repair all voids, wrinkles, open laps and all other deficiencies.

3.6 INSULATION INSTALLATION

A. Install insulation where shown on drawings or where required by the Project Manual.

B. Comply with roofing system manufacturer's written instructions for installing roof insulation.

C. Install insulation in a minimum of two layers with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Offset joints between layers a minimum of 12 inches. Fill gaps exceeding 1/4 inch with insulation. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

D. Install sumps at the drains with a ½” : 1’ slope.

E. Install tapered edge strips at perimeter edges of roof and at raised curbs that do not terminate at vertical surfaces.

F. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints a minimum of 6 IN in each direction from joints of insulation below. Loosely butt cover boards together and fasten to roof deck together with the insulation if approved by roof membrane manufacturer.

G. Insulation Cant Strips: Install and secure preformed 45-degree insulation cant strips at junctures of roofing membrane system with vertical surfaces or angle changes more than 45 degrees.

H. Adhesive Installation - Apply ½” wide beads. Allow adhesive to rise to ¾“–1”. Set the insulation boards after foam rises but prior to adhesive skinning over. Immediately after positioning the insulation, weight each board. Position weights so they are centered over the corners of the insulation boards. Weight shall be left in place for about 5- 15 minutes.

3.7 WOOD BLOCKING

A. Install nailers, of minimum one-inch thickness and minimum three inches width. The maximum unsupported overhang for all applications shall not exceed two inches.

B. Nailers shall be firmly anchored to the deck using fastener devices and spacing in compliance the roofing manufacturer and SMACNA. Anchors shall be spaced to provide a design value of not less than 250 lbf/ft for perimeters and 300 lbf/ft at corners after application of the appropriate margin of safety.

C. Height of nailers shall match the height of the adjacent surface level or a tapered edge shall be installed to bridge the varying heights.

D. If the compressive strength of the concrete deck is less than 2,500 psi (17,000 kPa) or the concrete thickness is less than 2-1/2 inches (64 mm), an on-site test shall be carried out to confirm anchor performance.

E. Attachment of wood blocking to standard masonry block, the top two courses shall be filled with ASTM C 270 mortar and allowed to cure for 28 days.

3.8 ROOFING MEMBRANE INSTALLATION, GENERAL

A. Install roofing membrane system according to roofing system manufacturer's written instructions and applicable recommendations in ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing."

B. Contractor shall perform all testing and other examination of deck surface as recommended by the roofing materials manufacturer and as recommended by manufacturer of the roof deck materials. Responsibility for determination of moisture content of deck being suitable for application of roofing materials shall be the sole responsibility of the Contractor.

C. Prime all dissimilar surfaces to which asphalt or membrane shall come in contact. Apply at the rate of 100 to 150 sf per gallon. Coat with primer all metal flashings and fascia that come in contact with membrane.

D. Apply general purpose SBS mastic and roofing cement to seal drain leads, metal flanges, seal along membrane edge at terminations, and where specified.

E. Do not use general purpose SBS mastics and roofing cement where flashing cement applications are required. Do not use SBS mastics and roofing cement beneath SBS-modified bitumen membrane and flashing plies.

F. Start installation of roofing membrane in presence of roofing system manufacturer's technical personnel.

G. Cooperate with testing agencies engaged or required to perform services for installing roofing system.

H. Should conditions be uncovered or created which would be detrimental to the proper conduct of specified work, immediately notify the Owner Representative of these conditions for resolution.

I. Begin installation of the roof membrane system at the low point of the roof and proceed upslope. Install membrane plies shingle style, perpendicular to the slope.

J. Extend roofing membrane and flashings as shown to provide complete membrane over area(s) indicated to be roofed. Seal to all equipment projections through membrane and seal all membrane and flashing seams. Ensure complete bonding to vertical surfaces and, where shown or recommended by material manufacturer, to horizontal surfaces.

K. Coordinate installation of roofing system so insulation and other components of the roofing membrane system which are not to be permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.

1. At end of each day's work, provide tie-offs to cover exposed roofing membrane sheets and insulation with a course of coated felt set in roofing cement or hot roofing asphalt, with joints and edges sealed.
2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.
3. Remove and discard temporary seals before beginning work on adjoining roofing.

3.9 BASE SHEET INSTALLATION

A. Begin by unrolling the membrane to its complete length. Once relaxed for a minimum of twenty minutes, reroll the membrane.

B. Unroll membrane on substrate for alignment.

C. Place membrane so edge lap will be centered on drain.

D. Application shall provide a smooth surface, free of air pockets, wrinkles, fish mouths or tears.

E. Install lapped course, extending over and terminating beyond cants. Attach as follows:
1. Fully adhere by torching.

F. Ensure manufacturer required side-laps and end-laps are maintained, or as indicated below.

1. 6 in end-laps
2. 3 in side laps
3. End-laps should be staggered 3 ft apart.

G. While unrolling and heating the sheet, ensure a constant flow hot bitumen approximately ¼ to 1/2 in flows ahead of the roll as it is unrolled, and there is 1/8 to 1/4 in bleed out at all laps.

H. At the, melt the plastic burn-off film from the top surface or embed granules, where present, using a torch or hot-air welder.

I. At end-laps, cut a 45 degree dog-ear away from the selvage edge. Ensure the membrane is fully heat-welded watertight at all T-joints.

J. Each day, physically inspect all side and end-laps, and ensure the membrane is sealed watertight. Where necessary, use a torch or hot-air welder and a clean trowel to ensure all laps are sealed.

K. Inspect the installation each day to ensure the plies are fully adhered. Repair all voids, wrinkles, open laps and all other deficiencies.

3.10 CAP SHEET INSTALLATION

A. Construct and stage the project so that PHASED APPLICATION can be achieved. Phased application maintains a watertight condition with the base ply and reinforcing plies to vertical surfaces without the installation of the cap sheet. The base ply may stay exposed per the manufacturer's requirements and recommendations. When roof top equipment and trades have finished, the application of the cap sheet installation may begin only after the manufacturer has conducted an inspection of the base sheet and provided a written report verifying examination of the base sheet. The contractor must schedule this inspection and notify the Architect five (5) days in advance.

B. Apply cap sheet in accordance with roofing system manufacturer's instruction and the following requirements.

C. Prime metal flanges (all jacks, edge metal, lead drain flashings, etc.) and concrete and masonry surfaces with a uniform coating of ASTM D 41-85 asphalt primer.

1. Cutting or alterations of bitumen, primer, and sealants will not be permitted.

D. Apply all layers of roofing free of wrinkles, creases or fishmouths. Exert sufficient pressure on the roll during application to ensure prevention of air pockets. Stagger the lap seams between the base ply layer and the finish ply layer.

E. Begin by unrolling the base membrane to its complete length. Once relaxed for a minimum of twenty minutes, reroll the field membrane ply each end, one end at a time to insure proper alignment.

F. Install the cap sheet membrane starting at the low point of the roof area. The membrane shall be installed parallel to the base ply. Keep end laps away from locations where the positive flow of water to drains will be inhibited.

G. Fully bond the finish ply to the base ply. Maintain manufacturers required laps or as indicated below.

1. 6 in end-laps

2. 3 in side laps

3. End-laps should be staggered 3 ft apart.

4. Stagger Cap ply laps 3 ft from base ply laps

H. Asphalt bleedout must be present and continuous at all seams. A minimum 1/4 inch flow-out must be obtained at all seam areas. A maximum 3/4 inch flow-out must not be exceeded.

I. To ensure the proper flow of bitumen at the seam areas, a weighted roller or broom may be used. The roller operator should follow behind the torch no more than 4 ft nor less than 3 ft to be sure that the membrane will be in condition to produce proper flow.

J. Check all seams for full and uniform adhesion. All unadhered seams shall be lifted and resealed. Press or roll seam to achieve a minimum 3/8 inch compound flow-out of bitumen.

K. If end laps fall in line, a full width of membrane must be installed over the end laps.

L. Treatment of Bleed-Out: Broadcast ceramic granules of the same color as the membrane into the bleed-out of asphalt at all side and end laps to provide a continuous appearance.

M. Broadcast mineral granules over all bitumen overruns on the finish ply surface, while the bitumen is still hot, to ensure a monolithic surface color.

3.11 FLASHING AND STRIPPING INSTALLATION

A. Install base flashing over cant strips and other sloped and vertical surfaces, at roof edges, and at penetrations through roof; secure to substrates according to roofing system manufacturer's written instructions, and as follows:

1. Prime substrates as per written requirements of roofing system manufacturer.
2. Base Ply Application at insulation and plywood curbs: Nail top of base sheet to the top of curb following the manufacturer’s recommendations.
3. Base Ply Application at concrete and cover board: Torch adhere flashing sheet to substrate at rate required by roofing system manufacturer.
4. Flashing Cap Sheet Application: Torch adhere flashing sheet to substrate at rate required by roofing system manufacturer.
5. At skylight curbs and other locations as directed by the architect, install the base flashing with Cold Applied Adhesive.

B. Extend base ply flashing up walls a minimum of 8 inches above roofing membrane and 4 inches onto field of roofing membrane. Extend base ply flashing at parapets over top surface and down two inches past wood blocking

C. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing.

1. Seal top termination of base flashing with a strip of glass-fiber fabric set in asphalt roofing cement].

D. Install roofing membrane cap-sheet stripping where metal flanges and edgings are set on membrane roofing according to roofing system manufacturer's written instructions.

E. Roof Drains: Set 30-by-30-inch square metal flashing in bed of asphalt roofing cement on completed roofing membrane. Cover metal flashing with roofing membrane cap-sheet stripping and extend a minimum of 6 inches beyond edge of metal flashing onto field of roofing membrane. Clamp roofing membrane, metal flashing, and stripping into roof-drain clamping ring.

1. Install stripping according to roofing system manufacturer's written instructions.

3.12 LIQUID FLASHING INSTALLATION

A. Prepare substrate as per liquid flashing manufacturer's written recommendations.

B. Apply manufacturer's standard paste and repair depressions in substrate material as per manufacturer's recommendations. Apply in thicknesses as per manufacturer's written recommendations.

C. Apply manufacturer's standard reinforcement fabric.

D. Apply manufacturer's standard flashing resin. Apply summer grade flashing resin when ambient temperature is between 59 and 122 degrees F. Apply winter grade flashing resin when ambient temperature is between 25 and 68 degrees F.

E. Maintain manufacturer's written requirements for overlap and coverage.

F. Apply manufacturer's standard surfacing granules and/or color finish where indicated on the drawings.

3.13 PITCH POCKET INSTALLATION

A. Remove existing pitch pockets and clean all penetrations down to base metal. Follow SSPC Surface Preparation Standard No. 11 to provide a roughened, clean, bare metal surface free of all visible oil, grease, dirt, rust, coating, oxides, mill scale, corrosion products and other foreign matter. Do not permit stains to remain on surface.

B. Prime and install new pitch pocket as per manufacturer's written instructions and to satisfy all requirements for warranty.

3.14 ROOF SYSTEM INTERFACE WITH RELATED COMPONENTS

A. The following is a list of descriptions for correct installation of components integrated into the roof membrane assembly. In all cases, unless otherwise approved, incorporate flanged components into the system between the application of the base ply and the finish ply. The flange must be primed with a uniform coating of approved ASTM D 41-85 asphalt primer and allowed to dry thoroughly; all flanges must be set in approved mastic.

1. Concrete parapet walls: Prime and torch adhere a base ply extend a minimum of three (3) inches onto the base ply of the field. After the field cap ply has been applied to the top of the cant, prepare the surface area that is to receive flashing cap sheet coverage by application of asphalt primer; allowing primer to dry thoroughly. Torch apply flashing cap sheet into place using three foot widths (cut off the end of roll) always lapping the factory selvage edge. Extend the flashing cap sheet a minimum of four (4) inches beyond the toe of the cant onto the prepared surface of the finished roof and up the wall to the desired flashing height. Exert pressure on the flashing cap sheet during application to ensure complete contact with the wall/roof surfaces, preventing air pockets. Check and seal all loose laps and edges. Extend the roofing over the parapet and terminate.

2. Curbs: Cover insulation, wood, and metal curbs with ½ inch Gypsum sheathing mechanically fastened into place. Install flashing as described for the parapet walls.
3. Edge Metal: Completely prime metal flanges and allow to dry prior to installation. Turn the base ply down two (2) inches past the roof edge and over the nailer. After the base ply and continuous cleat (if applicable) have been installed, set the flange in mastic and stagger nail every three (3) inches on center or as recommend by the metal manufacturer. Strip-in the flange using the stripping-ply material, extending a minimum of four (4) inches beyond the edge of the flange. Terminate the cap ply at the gravel-stop rise of the edge metal.
4. Lead drain flashings. The roof drain sump shall be clean and free of all rust and dirt before installing the flashing. Completely prime the lead drain flashing and allow to dry prior to installation. After the base ply has been applied, set the lead flashing sheet in mastic and form to turn down inside of the drain bowl. Ply-in the perimeter of the lead flashing using an additional layer of the base ply material, overlapping the perimeter of the lead a minimum of four (4) inches. Terminate the cap ply to extend beneath the clamping ring seal. Install the clamping ring with all clamps, bolts etc., in place.
5. Metal pipe: Reinforced, fluid applied flashing material is to be used for all post supports and low flashing lights. Reinforced, fluid applied material may also be used as base flashing for walls behind hard to flash objects. Follow manufacturers' recommended application guidelines. The metal is to be thoroughly cleaned of existing roofing materials by wire brushing and/or grinding before installation of the liquid flashing system.
6. Sealant. Caulk all exposed finish ply edges at gravel stops, waste stacks, pitch pans, vent stacks, etc, with a smooth continuous bead of approved sealant.

3.15 WALKWAY INSTALLATION

A. Walkway Pads: Install walkway pads using units of size indicated or, if not indicated, of manufacturer's standard size according to walkway pad manufacturer's written instructions.
   1. Cut the walktread into maximum five (5) ft lengths and allow to relax until flat.
   2. Fully adhere the sheets.
   3. Space sheets with two (2) inches between sheets to allow for proper drainage.
   4. Cut pads so as not to interfere with drainage at valleys of tapered insulation.

3.16 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform test and inspections and to prepare test reports.

B. Test Cuts: Test specimens will be removed to evaluate problems observed during quality-assurance inspections of roofing membrane as follows:

   1. Approximate quantities of components within roofing membrane will be determined according to ASTM D 3617.
   2. Test specimens will be examined for interply voids according to ASTM D 3617 and to comply with criteria established in Appendix 3 in ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing."
   3. Repair areas where test cuts were made according to roofing system manufacturer's written instructions.

C. Roofing system will be considered defective if it does not pass tests and inspections.

1. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.17 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period. Remaining construction cannot pass over completed roof areas.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

3.18 FINAL INSPECTION

A. Contractor shall advise the Architect in writing that the work is substantially completed and include a list of outstanding items for completion. Architect shall examine the work and advise if the work is substantially complete along with any incomplete or incorrect issues to be completed or corrected.

B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.

C. Notify Architect and Owner 48 hours in advance of date and time of inspection.

D. Drain Verification: Drains shall be inspected by a certified plumbing a warranted to be free flowing. Ensure that roof drains strainers are properly installed,

E. Air Handling Units. Reconnect all ductwork, electrical and supply connection. At final inspection, verify that all connections are restored to a complete working, watertight, and safe condition, following SMACNA standards.

ROOFING INSTALLER'S WARRANTY

F. WHEREAS <**Insert name**> of <**Insert address**>, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:

1. Owner: <**Insert name of Owner**>.
2. Address: <**Insert address**>.
3. Building Name/Type: <**Insert information**>.
4. Address: <**Insert address**>.
5. Area of Work: <**Insert information**>.
6. Acceptance Date: <**Insert date**>.
7. Warranty Period: <**Insert time**>.
8. Expiration Date: <**Insert date**>.

G. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

H. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

I. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:

    a. lightning;
    b. peak gust wind speed exceeding <**Insert wind speed**> mph;
    c. fire;
    d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
    e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
    f. vapor condensation on bottom of roofing; and
    g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.

2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations,

attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.

5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

J. IN WITNESS THEREOF, this instrument has been duly executed this <**Insert day**> day of <**Insert month**>, <**Insert year**>.

1. Authorized Signature: <**Insert signature**>.
2. Name: <**Insert name**>.
3. Title: <**Insert title**>.

END OF SECTION 07 5216

SECTION 075419 – POLYVINYL CHLORIDE (PVC) MEMBRANE ROOFING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Adhered PVC membrane roofing system.

B. Cover board.

C. Roof insulation.

1.2 RELATED SECTIONS

A. Division 06 Section "Miscellaneous Rough Carpentry" for wood nailers, cants, curbs, and blocking [and for wood-based, structural-use roof deck panels].

B. Division 07 Section "Sheet Metal Flashing and Trim" for metal roof penetration flashings, flashings, and counter flashings.

1.3 REFERENCES

A. Roofing Terminology: Refer to the following publications for definitions of roofing work related terms in this Section:

1. ASTM D 1079 “Standard Terminology Relating to Roofing and Waterproofing.”
2. Glossary of NRCA’s “The NRCA Roofing and Waterproofing Manual.”
3. Roof Consultants Institute “Glossary of Building Envelope Terms.”

B. Sheet Metal Terminology and Techniques: SMACNA “Architectural Sheet Metal Manual.”

1.4 DESIGN CRITERIA

A. General: Installed roofing membrane system shall remain watertight; and resist specified wind uplift pressures, thermally induced movement, and exposure to weather without failure.

B. Material Compatibility: Roofing materials shall be compatible with one another under conditions of service and application required, as demonstrated by roofing system manufacturer based on testing and field experience.

C. Installer shall comply with current code requirements based on authority having jurisdiction.

D. Wind Uplift Performance: Roofing system shall be identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist wind uplift pressure calculated in accordance with ASCE 7.

E. Fire-Test-Response Characteristics: Provide 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. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.

1. Exterior Fire-Test Exposure: Class A, ASTM E 108, for application and roof slopes indicated.

1.5 SUBMITTALS

A. Product Data: Manufacturer's data sheets for each product to be provided.

B. Detail Drawings: Provide roofing system plans, elevations, sections, details, and details of attachment to other Work, including:

1. Base flashings and membrane terminations.
2. Tapered insulation, including slopes.
3. Crickets, saddles, and tapered edge strips, including slopes.
4. Insulation fastening and adhesive patterns.

C. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system.

D. Guarantees: Provide manufacturer's current guarantee specimen.

E. Prior to beginning the work of this section, roofing contractor shall provide a copy of the final System Assembly Letter issued by the manufacturer indicating that the products and system to be installed shall be eligible to receive the specified manufacturer's guarantee.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive the specified manufacturer's guarantee.

B. Test Reports:

1. Roof drain and leader test or submit plumber's verification.
2. Roof deck fastener pullout test.

C. Source Limitations: Obtain all components from the single source roofing manufacturer guaranteeing the roofing system. All products used in the system shall be labeled by the single source roofing manufacturer issuing the guarantee.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storage.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.8 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when current and forecasted weather conditions permit roofing system to be installed in accordance with manufacturer's written instructions and guarantee requirements.

1.9 GUARANTEE

A. Provide manufacturer's system No Dollar Limit Roofing System Guarantee.

1. Single-source special guarantee includes roofing membrane, base flashings, roofing membrane accessories, roof insulation, fasteners, cover board, [vapor retarder], walkway products, and other single-source components of roofing system marketed by the manufacturer.
2. Guarantee Period: 30 years from date of Substantial Completion.

B. Installer’s Guarantee: Submit roofing Installer's guarantee, including all components of roofing system for the following guarantee period:

1. Guarantee Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 POLYVINYL-CHLORIDE ROOFING MEMBRANE - PVC

A. PVC Sheet: ASTM D 4434, Type III, fabric reinforced

1. Manufacturers: Subject to compliance with requirements, provide products of the following manufacturers and their products listed below:

a. Soprema.

b. Johns Manville
c. Sika Sarnafil

2. Thickness: 60 mils,nominal
3. Exposed Face Color: White

2.2 AUXILIARY ROOFING MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing.

1. Liquid-type auxiliary materials shall meet VOC limits of authorities having jurisdiction.

B. Sheet Flashing: Manufacturer's internally reinforced or scrim reinforced, smooth backed membrane with same thickness and color as sheet membrane. Basis of design: JM PVC

C. Bonding Adhesive: Manufacturer's standard water-based bonding adhesive for membrane, and flashings.

D. Liquid Applied Flashing: Manufacturer’s single ply liquid and fabric reinforced flashing system created with a fleece polyester scrim and a two-component polyurethane based liquid applied flashing material, consisting of a liquid resin and a curing agent. Basis of design: JM SP Liquid Flashing Resin and JM SP Liquid Flashing Scrim

E. Liquid Applied Flashing Primer: Manufacturer’s single ply liquid flashing primer. Basis of design: JM SP Liquid Flashing TPO and PVC Primer, JM SP Liquid Flashing Concrete Primer, or JM SP Liquid Flashing Metal and Wood Primer

F. Metal Termination Bars: Manufacturer's standard predrilled stainless-steel or aluminum bars, with anchors. Basis of design: JM Termination Systems

G. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.

H. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, cover strips, sealants, and other accessories as approved and/or manufactured by the membrane manufacturer.

2.3 WALKWAYS AND SAFETY STRIPS

A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads sourced from membrane roofing system manufacturer.

2.4 COVER BOARDS

A. Cover Board: Board manufactured to serve as a substrate for the installation of torched SBS membrane and meeting the following criteria,

1. Thickness - 1/4 inch min.
2. Compressive Strength – 900 psi
3. Flexural Strength – 80 psi
4. Water Absorption - <5.5%

2.5 ROOF INSULATION

A. General: Preformed roof insulation boards manufactured or approved by roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated and that produce FM Approvals-approved roof insulation.

B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, felt or glass-fiber mat facer on both major surfaces. Boards shall be no greater than 4 x 4 feet.

C. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/2 inch per 12 inches unless otherwise indicated.

D. Provide saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to a minimum ¼ inch final slope.

2.6 ROOF INSULATION ACCESSORIES

A. General: Furnish roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with membrane roofing.

B. Fasteners: Factory-coated steel fasteners and metal plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roofing membrane components to substrate; tested by manufacturer for required pullout strength, and acceptable to roofing system manufacturer. Fasteners shall be equal to the following.
1. OMG CD-10 and plate at structural concrete
2. TruFast 15 EHD and plate at metal deck

C. Bead –Applied Insulation Adhesive: Adhesive shall be approved by the roofing manufacturer and match the quality, performance and odor of the adhesive listed.
1. OlyBond 500

D. Tapered Edge Strips: ASTM C 728, perlite insulation board.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions for compliance with the requirements affecting performance of roofing system.

1. General:

a. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.
b. Verify that blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.

2. Steel Decks:

a. Verify that deck is suitable for installing the roof system. Notify the architect of any deteriorated deck.

3. Concrete Decks:

a. Verify that concrete substrate is visibly dry and that the deck is suitable for installing the roof system. Notify the architect of any deteriorated deck.

4. Lightweight Concrete Decks:

a. Verify that lightweight concrete substrate is visibly dry and free of moisture.
b. Verify that lightweight concrete has ability to provide minimum base sheet fastener pull-out resistance.

1) Provide documentation of pull out resistance values using manufacturer's approved procedures.

5. Ensure general rigidity and proper slope for drainage.
6. Verify that deck is securely fastened with no projecting fasteners and with no adjacent units in excess of 1/16 inch (1.6 mm) out of plane relative to adjoining deck.

3.2 PREPARATION

A. Clean and remove from substrate sharp projections, dust, debris, moisture, and other substances detrimental to roofing installation in accordance with roofing system manufacturer's written instructions.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction.

3.3 INSULATION INSTALLATION

A. Coordinate installation of roof system components so insulation and cover board are not exposed to precipitation or left exposed at the end of the workday.

B. Comply with roofing system manufacturer's written instructions for installation of roof insulation and cover board.

C. Install tapered insulation under area of roofing to conform to slopes indicated.

D. Install insulation boards with long joints in a continuous straight line. Joints should be staggered between rows, abutting edges and ends per manufacturer's written instructions. Fill gaps exceeding 1/4 inch with like material.

E. Install insulation in at least two layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (150 mm) in each direction.

F. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.

G. Adhered Insulation: Adhere each layer of insulation to substrate as follows:

1. Install each layer in a two-part urethane adhesive according to roofing system manufacturer's instruction.
2. Install each layer to resist uplift pressure at corners, perimeter, and field of roof.

3.4 COVER BOARD INSTALLATION

A. Coordinate installing membrane roofing system components so cover board is not exposed to precipitation or left exposed at the end of the workday.

B. Comply with membrane roofing system manufacturer's written instructions for installing roof cover board.

C. Install cover board with long joints in a continuous straight line. Joints should be staggered between rows, abutting edges and ends per manufacturer's written instructions. Fill gaps exceeding 1/4 inch with cover board.

1. Cut and fit cover board within 1/4 inch of nailers, projections, and penetrations.

D. Adhered Cover Board: Adhere cover board to substrate as follows:

1. Install each layer in a two-part urethane adhesive according to roofing system manufacturer's instruction.
2. Install to resist uplift pressure at corners, perimeter, and field of roof.

3.5 ROOFING MEMBRANE INSTALLATION, GENERAL

A. Install roofing membrane in accordance with roofing system manufacturer's written instructions, applicable recommendations of the roofing manufacturer and requirements in this Section.

B. Cooperate with testing and inspecting agencies engaged or required to perform services for installing roofing system.

C. Coordinate installing roofing system so insulation and other components of the roofing membrane system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is imminent.

1. Provide tie-offs at end of each day's work to cover exposed roofing membrane sheets and insulation.

2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.
3. Remove and discard temporary seals before beginning work on adjoining roofing.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.6 ADHERED ROOFING MEMBRANE INSTALLATION

A. Install roofing membrane over area to receive roofing in accordance with membrane roofing system manufacturer's written instructions.

1. Unroll roofing membrane and allow to relax before installing.
2. Install sheet in accordance with roofing system manufacturer’s written instructions.

B. Accurately align roofing membrane and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

C. Solvent Based Bonding Adhesive for smooth backed membranes: Apply solvent-based bonding adhesive to substrate and underside of roofing membrane at rate required by manufacturer and allow to partially dry before installing roofing membrane. Do not apply bonding adhesive to splice area of roofing membrane.

D. Water Based Bonding Adhesive for smooth backed membranes: Apply water-based bonding adhesive to substrate at rate required by manufacturer and immediately install roofing membrane. Do not apply bonding adhesive to splice area of roofing membrane.

E. Bonding Adhesive for fleece backed membranes: Apply water-based bonding adhesive to substrate at rate required by manufacturer and immediately install roofing membrane. Do not apply bonding adhesive to splice area of roofing membrane.

F. Urethane Membrane Adhesive for fleece backed membranes: Apply Urethane Adhesive to substrate at rate required by manufacturer and install fleece-backed roofing membrane. Do not apply bonding adhesive to splice area of roofing membrane.

G. Mechanically fasten roofing membrane securely at terminations, penetrations, and perimeter of roofing.

H. Apply roofing membrane with side laps shingled with roof slope, where possible.

I. Seams: Clean seam areas, overlap roofing membrane, and hot-air weld side and end laps of roofing membrane according to manufacturer's written instructions to ensure a watertight seam installation.

1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roofing membrane.
2. Verify field strength of seams a minimum of twice daily and repair seam sample areas.

    a. Remove and repair any unsatisfactory sections before proceeding with installation.

3. Repair tears, voids, and incorrectly lapped seams in roofing membrane that do not meet requirements.

J. Spread sealant or mastic bed over deck drain flange at deck drains and securely seal roofing membrane in place with clamping ring.

K. Install roofing membrane and auxiliary materials to tie into existing roofing.

L. Proceed with installation only after unsatisfactory conditions have been corrected.

3.7 BASE FLASHING INSTALLATION

A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.

B. Apply solvent-based bonding adhesive at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.

C. Apply water-based bonding adhesive in two-sided application, at required rate, and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.

D. Apply single ply liquid applied flashing system per manufacturer’s written instructions.

E. Flash penetrations and field-formed inside and outside corners per manufacturer’s installation instructions.

F. Clean seam areas and overlap and firmly roll sheet flashings into the adhesive. Weld side and end laps to ensure a watertight seam installation.

G. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

H. Proceed with installation only after unsatisfactory conditions have been corrected.

3.8 WALKWAY INSTALLATION

A. Flexible Walkways: Install walkway products in locations indicated. Heat weld and adhere walkway products to substrate according to roofing system manufacturer's written instructions.

B. Roof-Paver Walkways: Install walkway roof pavers according to manufacturer's written instructions in locations indicated, to form walkways. Leave 3 inches (75 mm) of space between adjacent roof pavers.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.9 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform roof tests and inspections and to prepare test reports.

B. Final Roof Inspection: Arrange for roofing system manufacturer to inspect roofing installation on completion and submit report to Architect.

1. Notify Architect or Owner 48 hours in advance of date and time of inspection.

C. Repair or remove and replace components of roofing system where test results or inspections indicate that they do not comply with specified requirements.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.10 PROTECTION AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 075419

SECTION 076200 – SHEET METAL FLASHINGS AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including City of Philadelphia Standard Contract Requirements, amendments, and attachments; and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Custom sheet metal flashings and trim.
2. Flashings, slip flashings, and counter flashings.
3. Downspouts and scuppers.

B. Related Sections:

1. Section 07 7100 “Manufactured Roof Edge Systems” for manufactured copings and expansion joints.

1.3 REFERENCES

A. Reference standards of the following sources are applicable to certain of the products specified in Part 2 - Products of this Section:

1. American Society for Testing and Materials (ASTM)

2. Federal Specification (FS)

3. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA)

4. American National Standards Institute/Single Ply Roofing Industry (ANSI/SPRI)

1.4 FIELD CONDITIONS AND DIMENSIONS

A. Prior to ordering materials, or doing any work, verify at the site all dimensions, details, and conditions that may affect the work. No allowance for additional compensation will be considered for discrepancies between dimensions indicated in the specifications and drawings and actual field dimensions, or for the Contractor’s failure to comply with this requirement.

1.5 CONFLICTS

A. Immediately refer any conflicts among requirements of these specifications and drawings, those of regulatory agencies, and those of roof system / materials manufacturer’s recommendations and good roofing and masonry practices to the Owner for resolution.

1.6 MATERIAL DELIVERY, STORAGE, AND HANDLING

A. Inspect materials delivered to the site for evidence of contact with moisture. Reject delivery of materials with stained or wet wrappers, or torn covers. Packaging labels must be readable, identify the material, and indicate conformance with the reference standard applicable to the material. Additionally, for roofing membrane sheet and adhesives/cements, labels shall indicate the date of manufacture and lot number.

1.7 CODE COMPLIANCE

A. Edge Metal shall comply with local code requirements for wind uplift and shall meet the testing requirements of ANSI/SPRI ES-1

1.8 SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

B. Shop Drawings: For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details.

PART 2 – PRODUCTS

2.1 METAL

A. Prefinished aluminum: Kynar 500 coating; color as selected by the Owner; use for the following metal components where indicated:

1. Conductor Head and Scupper - .050 Aluminum
2. Joint plate – .050 Aluminum
3. Edge metal - .040 Aluminum
4. Counter flashing – .032 Aluminum
5. Pipe Hoods - .032 Aluminum
6. Slip flashing – .032 Aluminum

B. Galvanized steel (paintable): ASTM A 526 hot-dipped zinc-coated 22-gauge sheet steel, commercial quality; coating designation G 90, phosphatized, not chemically treated, not oiled; gauges as follows:

1. Continuous cleats – 22 gauge
2. Metal Panel Cap – 18 gauge

C. Mill finished aluminum:

1. Gutter Straps – 3/16” x 1”

2.2 FABRICATION, GENERAL

A. Custom fabricate sheet metal flashing and trim to comply with details indicated and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.

1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
2. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
3. Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.
4. Form sheet metal flashing and trim to fit substrates without excessive oil-canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
5. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabrication Tolerances:

1. Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.

D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.

E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

F. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard and by FM Global Property Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.

G. Seams:

1. Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.

2.3 FABRICATION

A. Counter flashing: Fabricate to dimensions indicated on drawings. Provide the counterflashing with a 3/4-inch hemmed drip edge and a 1/2-inch 45 degree angle sealant slot. Maximum length of counterflashing sections to be 10 feet. Shop fabricate interior and exterior corners.

B. Slip flashing: Fabricate to dimensions necessary to accommodate existing conditions, providing a minimum 4-inch face if conditions allow.

C. Parapet and Roof Edge Scuppers: Provide design as indicated in the drawings. Fabricate scuppers to dimensions required, with closure flange trim to exterior, 4-inch-wide wall flanges to interior, and base extending 4 inches beyond cant or tapered strip into field of roof.

D. Conductor Heads: Provide design as indicated in the drawings. Fabricate conductor heads with fully welded flanged back and stiffened top edge and of dimensions and shape required, complete with outlet tubes, exterior flange trim, and built-in overflows.

2.3 FASTENERS

1. Fasteners: Formed Aluminum Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:
2. Fasteners for Aluminum or Stainless to wood: Series 300 stainless steel screws.
3. Fasteners for Galvanized to wood: ASTM A 153 hot dip galvanized nails.
4. Fasteners for Galvanized to concrete: Blue Climaseal Tapcon.
5. Fastener Sizes: Use fasteners of sizes that will penetrate wood blocking or sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws and not less than 1 inch for concrete screws.

PART 3 – EXECUTION

3.1 INSTALLATION, GENERAL

A. Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.

1. Install fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, sealant.
3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.
5. Install continuous cleats with fasteners spaced not more than 12 inches o.c.
6. Space individual cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
7. Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.
8. Do not field cut sheet metal flashing and trim by torch.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Coat concealed side of uncoated-aluminum and stainless steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.

1. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
2. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.

D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Seal joints as required for watertight construction.

1. Use sealant-filled joints unless otherwise indicated.

a. Embed hooked flanges of joint members not less than 1 inch into sealant.
b. Form joints to completely conceal sealant.
c. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way.
d. Adjust setting proportionately for installation at higher ambient temperatures.

1) Do not install sealant-type joints at temperatures below 40 deg F.

2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

3.2 METAL COMPONENTS

A. Counterflashings: Coordinate installation of counterflashing with installation of base flashings. Provide counterflashings, as detailed, at locations indicated on the drawings and as follows:

1. Secure counterflashings with fasteners spaced at 12 inches on center or exceed the requirements of FM 1-49 “Perimeter Flashing”.
2. Provide a continuous bead of sealant along the top edge kick-out of the counterflashings to shed water and provide a watertight seal.
3. Lap counterflashing joints minimum of 4 inches.

B. Slip flashings: Provide slip counterflashings at the following locations:

1. At curb locations where existing equipment could not be lifted or removed during installation of flashing materials.

2. At curb locations where the face of the existing metal counterflashing is less than 4 inches in height.
3. At other locations indicated on drawings.
4. Secure slip flashing at 12 inches on center.

C. Parapet and Roof Edge Scuppers:

1. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
2. Anchor scupper closure trim flange to exterior wall and seal with elastomeric sealant to scupper.
3. Loosely lock front edge of scupper with conductor head.

D. Conductor Heads: Anchor securely to wall, with elevation of conductor head rim at minimum of 1 inch below scupper discharge.

E. Joints: Secure 6- inch wide concealed plate at each joint and apply two full beads of sealant on both ends.

3.3 INSTALLATION TOLERANCES

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

3.4 CLEANING

Retain first paragraph below for metal surfaces unless metal is painted, coated, or lacquered.

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

Retain first paragraph below for soldered joints.

B. Clean off excess sealants.

3.5 PROTECTION

A. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures, as determined by Architect.

END OF SECTION 076200

SECTION 077100 – MANUFACTURED ROOF EDGE SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including City of Philadelphia Standard Contract Requirements, amendments, and attachments; and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Copings.
2. Roof Edge Fascia.

B. Related Sections:

1. Section 07 5216 “Modified Bituminous Membrane Roofing”
2. Section 07 6200 "Sheet Metal Flashing and Trim" for custom- and site-fabricated sheet metal flashing and trim.
3. Section 07 7200 "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.
4. Section 07 9200 "Joint Sealants" for field-applied sealants between roof specialties and adjacent materials.

1.3 PERFORMANCE REQUIREMENTS

A. General Performance: Roof specialties shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

B. FM Approvals' Listing: Manufacture and install systems that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-90. Identify materials with FM Approvals' markings.

C. SPRI Wind Design Standard: Manufacture and install systems tested according to SPRI ES-1 and capable of resisting the following design pressures:

1. Design Pressure: 110 mph.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that

resist rotation and avoid shear stress as a result of thermal movements. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For roof specialties. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work. Include the following:

1. Details for expansion and contraction; locations of expansion joints, including direction of expansion and contraction.
2. Pattern of seams and layout of fasteners, cleats, clips, and other attachments.
3. Details of termination points and assemblies, including fixed points.
4. Details of special conditions.

C. Samples for Initial Selection: For each type of roof specialty indicated with factory-applied color finishes.

1.5 INFORMATIONAL SUBMITTALS

A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each system.

B. Warranty: Sample of warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing specialties to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Each system shall be certified by the manufacturer to meet performance design criteria according to the following test standards:

1. ANSI/SPRI ES-1 Test RE-3 for Coping: The coping system shall be tested simultaneously on horizontal and vertical surfaces and shall exceed horizontal and vertical design wind pressure as calculated in accord with the ANSI/SPRI ES-1 Test RE-3. Use the current edition of ANSI/SPRI ES-1 Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.

a. Wind speed 110 mph

1.8 DELIVERY, STORAGE, AND HANDLING

A. Do not store roof specialties in contact with other materials that might cause staining, denting, or other surface damage. Store roof specialties away from uncured concrete and masonry.

B. Protect strippable protective covering on roof specialties from exposure to sunlight and high humidity, except to extent necessary for the period of roof specialties installation.

1.9 WARRANTY

A. Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 EXPOSED METALS

A. Aluminum Sheet: Alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.

1. Surface: smooth flat finish.
2. Exposed Coil-Coated Finishes: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

a. Two-Coat Fluoropolymer: AAMA 620. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.
b. Concealed Surface: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

2.2 CONCEALED METALS

A. Aluminum Sheet: ASTM B 209, alloy and temper recommended by manufacturer for type of use and structural performance indicated.

B. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation.

2.3 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. Fasteners: Formed Aluminum Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:

1. Fasteners for Aluminum or Stainless to wood: Series 300 stainless steel screws.
2. Fasteners for Galvanized to wood: ASTM A 153 hot dip galvanized nails.
3. Fasteners for Galvanized to concrete: Blue Climaseal Tapcon.
4. Fastener Sizes: Use fasteners of sizes that will penetrate wood blocking not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws and not less than 1 inch for concrete screws.

C. Elastomeric Sealant: A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 50, for Use NT

D. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

2.4 ROOF EDGE SYSTEM

A. Manufactured system consisting of formed-metal cap in section lengths not exceeding 12 feet, concealed anchorage; corner units, end cap units, and concealed splice plates with same finish as coping caps. Custom fabricate shapes as required to conform to existing conditions and creae a continuous flange. Weld corners and special angles

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Hickman Company, W. P.
b. American Architectural Metals.
c. Metal-Era, Inc.

2. Cap Metal: Formed aluminum.

a. Finish: Two-coat fluoropolymer.
b. Color: As selected by Architect from manufacturer's full range.

3. Splice Metal: Formed aluminum, .050 inch thick.

a. Finish: Two-coat fluoropolymer.
b. Color: Matching cap metal.

4. Corners: Factory mitered and continuously welded.
5. Ends: Close all exposed ends with welded caps.
6. Intersection: Slope to create a smooth transition and fabricate a welded “T” to joint perpendicular metal sections.

7. Special Fabrications: None
8. Cap Attachment Method: Snap-on.
9. Anchor Plates: Concealed, galvanized-steel sheet 24 ga., with integral cleats.

2.5 COPING

A. Manufactured, two-piece, roof-edge fascia consisting of .050 cap metal cover in section lengths not exceeding 12 feet, 8 inch splice plate and an 12 inch minimum galvanized-anchor plate.

2.6 ROOF-EDGE FASCIA

A. Canted Roof-Edge Fascia and Gravel Stop: Manufactured, three-piece, roof-edge fascia consisting of .063 cap metal fascia cover in section lengths not exceeding 12 feet and a continuous formed galvanized-steel sheet water dam cant, and an aluminum compression plate with extended vertical leg terminating in a drip-edge cleat.

B. Roof-Edge Fascia: Manufactured, two-piece, roof-edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding 12 feet and a continuous formed anchor bar with integral drip-edge cleat to engage fascia cover.

2.7 FASCIA EXTENSION

A. Manufactured, two-piece, fascia extension consisting of .063 cap metal cover in section lengths not exceeding 12 feet, 8 inch splice plate and a continuous galvanized-anchor plate

2.8 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Examine walls, roof edges, and parapets for suitable conditions for roof specialties.

C. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. General: Install roof edge system according to manufacturer's written instructions. Anchor securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete roof edge systems.

1. Install roof edge system level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
2. Provide uniform, neat seams with minimum exposure of solder and sealant.
3. Install to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
4. Torch cutting of is not permitted.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment.
2. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.

C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.

1. Space movement joints at a maximum of 12 feet with no joints within 18 inches of corners or intersections unless otherwise shown on Drawings.
2. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.

D. Seal metal joints with two beads of butyl sealant to the splice plate each side of joint, unless other provisions are made by the manufacturer.

E. Seal EPDM joints with a 6 inch wide strip of EPDM

F. Seal joints as required for watertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F.

3.3 COPING INSTALLATION

A. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners.

B. Anchor copings to meet performance requirements.

1. Interlock face and back leg drip edges of snap-on coping cap into cleated anchor plates anchored to substrate at manufacturer's required spacing that meets performance requirements

3.4 ROOF-EDGE FLASHING INSTALLATION

A. Install cleats, cants, and other anchoring and attachment accessories and devices with concealed fasteners.

B. Anchor roof edgings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

3.5 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder and sealants.

C. Remove temporary protective coverings and strippable films as roof specialties are installed. On completion of installation, clean finished surfaces including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain roof specialties in a clean condition during construction.

D. Replace roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077100

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Urethane joint sealants.
3. Butyl sealants
4. Preformed Silicone sealants

B. Related Sections:

1. Section 04 0120 "Masonry Repairs" for repair work associated with masonry control and expansion joints.

1.3 PRECONSTRUCTION TESTING

A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

1. Use ASTM C 1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
2. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

1.4 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch wide joints formed between two 6-inch long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

D. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.

D. Preconstruction Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:

1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

E. Warranties: Sample of special warranties.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.

C. Product Testing: Owner shall arrange to Test joint sealants using a qualified testing agency.

D. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

1.7 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.8 WARRANTY

A. Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

C. Warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from natural causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. Stain-Test-Response Characteristics: Sealants shall be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

C. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 50, for Use NT.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, shall be one of the following or an approved equal:

a. Dow Corning Corporation; 795.
b. Pecora Corporation; 895.
c. Sika Corporation, Construction Products Division; SikaSil-C995.

2.3 URETHANE JOINT SEALANTS

A. Multicomponent, Nonsag, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 50, for Use NT.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, shall be one of the following or an approved equal:

a. Pecora Corporation; Dynatrol II.
b. Polymeric Systems, Inc.; PSI-270.
c. Tremco Incorporated; Dymeric 240.

2.4 BUTYL-RUBBER-BASED JOINT SEALANT:

A. Single component, Butyl Rubber based Sealant, ASTM C 1311.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, shall be one of the following or an approved equal:

a. Pecora Corporation; BC-158.
b. Tremco Incorporated; Tremco Butyl Sealant.
c. Bostik, Inc.; Chem-Calk 300.

2.5 PREFORMED JOINT SEALANTS

A. Preformed Silicone Joint Sealants: Manufacturer's standard sealant consisting of precured low-modulus silicone extrusion, in sizes to fit joint widths indicated, combined with a neutral-curing silicone sealant for bonding extrusions to substrates.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, shall be one of the following or an approved equal:

a. Dow Corning Corporation; 123 Silicone Seal.
b. Pecora Corporation; Sil-Span.

B. Preformed Foam Joint Sealant: Manufacturer's standard preformed, precompressed, open-cell foam sealant manufactured from urethane foam with minimum density of 10 lb/cu. ft. and impregnated with a nondrying, water-repellent agent. Factory produce in precompressed sizes in roll or stick form to fit joint widths indicated; coated on one side with a pressure-sensitive adhesive and covered with protective wrapping.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, shall be one of the following or an approved equal:

a. EMSEAL Joint Systems, Ltd.; Emseal 25V.
b. Sandell Manufacturing Co., Inc.; Polyseal.
c. Willseal USA, LLC; Willseal 150.

2.6 JOINT SEALANT BACKING

A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type B (bicellular material with a surface skin, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.7 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air.

3. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

B. Joint Priming: Prime all joint substrates where existing sealant has been removed and to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.

G. Installation of Preformed Silicone-Sealant System: Comply with the following requirements:

1. Apply masking tape to each side of joint, outside of area to be covered by sealant system.
2. Apply silicone sealant to each side of joint to produce a bead of size complying with preformed silicone-sealant system manufacturer's written instructions and covering a bonding area of not less than 3/8 inch. Hold edge of sealant bead 1/4 inch inside masking tape.
3. Within 10 minutes of sealant application, press silicone extrusion into sealant to wet extrusion and substrate. Use a roller to apply consistent pressure and ensure uniform contact between sealant and both extrusion and substrate.
4. Complete installation of sealant system in horizontal joints before installing in vertical joints. Lap vertical joints over horizontal joints. At ends of joints, cut silicone extrusion with a razor knife.

3.4 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

1. Extent of Testing: Test completed and cured sealant joints as follows:

a. Perform 10 tests for the first 1000 feet of joint length for each kind of sealant and joint substrate.
b. Perform 1 test for each 1000 feet of joint length thereafter or 1 test per each floor per elevation.

2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

3. Inspect tested joints and report on the following:

a. Whether sealants filled joint cavities and are free of voids.
b. Whether sealant dimensions and configurations comply with specified requirements.
c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.

4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

B. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage

or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.7 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:

a. Construction joints in cast-in-place concrete.
b. Joints between plant-precast architectural concrete units.
c. Control and expansion joints in unit masonry.
d. Joints in dimension stone cladding and copings.
e. Joints between metal panels.
f. Joints between different materials listed above.

2. Silicone Joint Sealant: Single component, nonsag, neutral curing, Class 50
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

B. Urethane Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:
   a. Minor joints not in contact with a sealant joint.
2. Urethane Joint Sealant: Multicomponent, nonsag,, Class 50
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

C. Butyl Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces

1. Joint Locations:
   a. Concealed metal to metal joints, in compression.
2. Single component, Butyl Rubber based Sealant, ASTM C 1311

D. Acoustical Sealant
1. Joint Locations. Interior wall to ceiling joints.

E. Preformed Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Locations:
   a. As indicated on drawings
2. Preformed Joint Sealant: Preformed silicone
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 079200

SECTION 081100 - STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Standard and custom hollow metal doors and frames.
2. Door hardware

B. Related Sections

1. Division 6 Section “Miscellaneous Carpentry”.
2. Division 9 Section "Exterior Painting" for field painting hollow metal doors and frames.

1.3 REFERENCES

1. IBC 2018 – International Building Code
2. NFPA-80-99 – Fire Doors and Windows
3. ANSI A117.1-98 – Accessible and Usable Buildings and Facilities
4. ANSI A224.1-90 – Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces
5. ANSI A250.4-94 – Physical Endurance Tests for Steel Doors
6. ANSI A250.8-98 – Recommended Specifications for Standard Steel Doors and Frames
7. ANSI A250.11-01 – Recommended Erection Instructions for Steel Frames
8. ANSI A250.6-97 – Hardware on Standard Steel Doors (Reinforcement-Application)
9. SDI-117-00 – Manufacturing Tolerances for Standard Steel Doors and Frames
10. SDI-122-99 – Installation and Troubleshooting Guide for Standard Steel Doors and Frames
11. SDI-124-98 – Maintenance of Standard Steel Doors and Frames
12. UL10C – Standard for Positive Pressure Fire Tests of Door Assemblies

1.4 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings.

B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.

C. Custom Hollow Metal Work: Hollow metal work fabricated according to ANSI/NAAMM-HMMA 861.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, fire-resistance rating, and finishes.

B. Shop Drawings: Include the following:

1. Elevations of each door design.
2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, joints, field splices, and connections.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of hollow metal door and frame assembly.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.

B. Manufacturer Qualifications: Manufacturer must be a member in good standing of the Steel Door Institute (SDI).

C. Fire Rated Door Assemblies:

1. All labeled fire door assemblies must be of a type that has been classified and listed in accordance with the latest edition of NFPA-80 and tested in compliance with NFPA-252, UL-10C, and UBC-7-2.

2. This project requires door assemblies and components that are compliant with positive pressure and S-label requirements. Specifications must be cross-referenced and coordinated with hardware and other door manufacturers to ensure that total opening engineering is compatible with UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and UBC 7-2 Fire Tests of Door Assemblies.

3. Certification(s) of Compliance: Make certification(s) of compliance available upon request by the Authority Having Jurisdiction.

D. Preinstallation Conference: Conduct conference at Project site.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to finish of factory-finished units.

B. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch- high wood blocking. Do not store in a manner that traps excess humidity.

1. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

1.8 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.9 COORDINATION

A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Amweld Building Products, LLC.
2. Ceco Door Products; an Assa Abloy Group company.
3. Curries Company; an Assa Abloy Group company.
4. Republic.

2.2 MATERIALS

A. Manufacture all doors and frames of commercial quality cold rolled steel per ASTM-A366, or galvanized to A60 or G60 minimum coating weight standard per ASTM-A924. Internal reinforcing may be manufactured of hot rolled pickled and oiled steel per ASTM-A569.

B. Fabricate supports and anchors of not less than 18-gauge sheet steel, galvanized where galvanized frames are used.

C. Where items are to be built into exterior walls, provide inserts, bolts and fasteners which are hot dipped galvanized in compliance with ASTM-A153, Class C or D as applicable.

D. Provide rust inhibitive enamel or paint primer, baked on, and suitable as a base for specified finish paints complying with ANSI-A224.1, “Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces on Steel Doors and Frames.”

2.3 STANDARD HOLLOW METAL DOORS

A. General: Provide 1 ¾" thick doors of ANSI-A250.8 grades and models specified below. Provide door face types as shown on the drawings.

1. Exterior Doors: Level 3, Model 2 - Seamless.
   a. Insulate exterior doors with a solid slab of expanded polystyrene or polyurethane foam permanently bonded to the inside of each face skin. Close the top of all doors flush by the addition of a 16-gauge screwed-in top cap, sealed to prevent water infiltration.

      1) Amweld: 17LE-16
      2) Ceco: Legion-16-SEM
      3) Curries: 707N-16
      4) Republic: DE16

   b. Bevel doors 1/8" in 2". Provide a full height 14-gauge hinge rail reinforcement channel, or individual 7-gauge hinge reinforcements.

   c. All doors must conform to ANSI-A250.4 Level "A" criteria and shall be tested to 1,000,000 operating cycles and 23 twist tests. Certification of Level "A" doors is to be submitted with approval drawings by supplier upon request.

   d. Fire doors shall be labeled showing the name of the manufacturer or other identification readily traceable back to the manufacturer, the name or trademark of the third-party inspection agency, the fire protection rating and, the maximum transmitted temperature end point.

   e. Fire door rating: 1.5 hour minimum.

2.4 STANDARD HOLLOW METAL FRAMES

A. General: Provide hollow metal frames for doors and other openings, of types and styles as shown on the drawings. Conceal fastenings unless otherwise noted.

B. Exterior Frames: Level 3, 14-gauge.
   1. Amweld 400 Series.
   2. Ceco: SF Series.
   3. Curries: M Series.
   4. Republic: ME Series.

C. Fabricate frames with mitered or coped corners. Fully weld the face joints, grind smooth, and re-prime the welded areas. Finish product must be smooth and flat, with a neatly filed corner. Frames that are excessively ground or "dished", or that do not have neatly filed edges at the inside corner will be rejected.

D. Provide minimum 7-gauge hinge reinforcements, 14-gauge lock strike reinforcing, and 12-gauge closer reinforcing.

E. Provide temporary shipping bars.

F. Except on weatherstripped frames, drill stops to receive three (3) silencers on strike jambs of single frames and two (2) silencers on heads of double frames.

G. Provide minimum 0.0179" thick steel plaster guards or mortar boxes at back of hardware cutouts.

H. Provide a minimum of six (6) loose jamb anchors per frame. Provide anchor types to suit the indicated wall construction. Provide welded base anchors for attaching the frames to the floor.

I. Fire door frames shall be labeled showing the names of the manufacturer and third-party inspection agency.

J. Fire door frame rating: 1.5 hour minimum.

2.5 HARDWARE

A. Hinges: Butts and Hinges: BHMA A156.1.

B. Locks and Latches

1. Latches and Locks for Fire Rated Doors: Comply with NFPA 80. Fire doors shall be latching and self- or automatic-closing. Single side-hinged swinging fire doors shall be provided with an active latch bolt that will secure the door when it is closed.
2. Lock Trim:
3. Levers: Cast.
4. Escutcheons (Roses): Wrought.
5. Lockset Designs: Match existing
6. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:
7. Mortise Locks: Minimum 3/4-inch (19-mm) latchbolt throw.
8. Deadbolts: Minimum 1-inch bolt throw.
9. Backset: 2-3/4 inches, unless otherwise indicated.
10. Strikes: Manufacturer's standard strike with strike box for each latchbolt or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, and as follows:
11. Strikes for Mortise Locks and Latches: BHMA A156.13.
12. Coordinate cylinder and keying with Rebuild.

C. Closers

1. Door Closers for Fire Rated Doors: Comply with NFPA 80.
2. Size of Units: Unless otherwise indicated, comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.
3. Surface Closers: BHMA A156.4, Grade 1. Provide type of arm required for closer to be located on inside of door, unless otherwise indicated.
4. Manufacturers:

    a. LCN Closers; an Ingersoll-Rand Company (LCN).
    b. Norton Door Controls; an ASSA ABLOY Group company (NDC).

c. SARGENT Manufacturing Company; an ASSA ABLOY Group company (SGT).
d. Yale Commercial Locks and Hardware; an ASSA ABLOY Group company (YAL).

D. Door Gasketing

1. Standard: BHMA A156.22.Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
2. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.
3. Gasketing Materials: ASTM D 2000 and AAMA 701/702.
4. Manufacturers:

a. Pemko Manufacturing Co. (PEM).
b. Reese Enterprises (RE).
c. Zero International (ZRO).

E. Thresholds

1. Standard: BHMA A156.21.
2. Thresholds for Means of Egress Doors: Comply with NFPA 80.
3. Manufacturers:

a. Pemko Manufacturing Co. (PEM).
b. Reese Enterprises (RE).
c. Zero International (ZRO).

2.6 FABRICATION

A. Fabricate steel door and frame units to be rigid, net in appearance, and free from defects, warp, or buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment to assure proper assembly at the project site. Comply with the requirements of ANSI-A250.8.

B. Fabricate exterior doors and frames of A60 galvannealed or G60 galvanized steel.

C. Clearances: No more than 1/8" at jambs and heads, and not more than 3/4" at the bottom of the doors.

D. Fabricate exposed faces of doors and panels, from only cold-rolled steel sheet.

E. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.

F. Fabricate concealed stiffeners, reinforcement, edge channels from either cold- or hot-rolled steel sheet.

G. Unless otherwise indicated, provide exposed fasteners with countersunk flat or oval heads for exposed screws and bolts.

H. Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI-A250.6.

I. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at the Project Site. Provide internal reinforcements for all doors to receive door closers and exit devices. The use of through bolts to install surface-applied hardware is not acceptable.

J. Locate hardware as indicated on Shop Drawings or, if not indicated, according to the Door and Hardware Institute's (DHI) "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

K. Exterior Hollow Metal Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.

L. Stops and Moldings: Provide stops and moldings. Form corners of stops and moldings with butted or mitered hairline joints.

1. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
2. Provide loose stops and moldings on inside of hollow metal work.

2.7 STEEL FINISHES

A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:

1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.

C. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11.

1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

a. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
b. Install door silencers in frames before grouting.
c. Remove temporary braces necessary for installation only after frames have been properly set and secured.
d. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
e. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.

a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

   a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
   b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
   c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
   d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Hollow Metal Doors: Fit hollow metal doors accurately in frames as required to comply with NFPA 80 and ANSI-A250.8.

D. Except for frames located in existing concrete, masonry or gypsum board assembly construction, place frames before constructing enclosing walls and ceilings.

E. In masonry construction, install at least three (3) wall anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Acceptable anchors include masonry wire anchors and masonry T-shaped anchors.

F. At existing concrete or masonry construction, install at least four (4) completed opening anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Set frames and secure to adjacent construction with bolts and masonry anchorage devices.

G. In metal-stud partitions, install at least three (3) wall anchors per jamb at hinge and strike levels. In steel-stud partitions, attach wall anchors to studs with screws.

H. Install fire-rated frames according to NFPA 80.

3.4 DOOR HARDWARE SETS

A. Set 1

3	Hinge (heavy weight)	T4A3386 NRP 4-1/2" x 4-1/2"	US32D	MK
1	Mortise Lock (privacy)	AUR 8802FL	626	YA
1	Rim Cylinder	1E-72	626	BE
1	Surface Closer	4430	689	YA
1	Kick Plate	K1050 10" x 2 " LDW 4BE	US32D	RO
1	Threshold	2005AT x LAR MSES25SS		PEM
1	Gasketing	303AS (Head & Jambs)		PEM
1	Sweep	3452CNB x LAR		PEM

3.5 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

END OF SECTION 08 1100

SECTION 099113 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes surface preparation and the application of paint systems on the following exterior substrates:

1. Hollow metal doors and frames.
2. Roof #6 canopy steel framing, inclusive of all beams& columns.
3. Roof #6 canopy roof leader.

B. Related Requirements:

1. Division 081100 “Steel Doors and Frames” for stair tower hollow metal door & frame assemblies.

1.3 ACTION SUBMITTALS

Product Data: For each type of product. Include preparation requirements and application instructions.

1. Indicate VOC content.

B. Samples for Initial Selection: For each type of topcoat product.

C. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

1.5 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system.

a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
b. Other Items: Architect will designate items or areas required.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 PAINT, GENERAL

A. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

B. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction.

C. Colors: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

C. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:

1. SSPC-SP 2.
2. SSPC-SP 3.
3. SSPC-SP 7/NACE No. 4.
4. SSPC-SP 11.

E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

G. Aluminum Substrates: Remove loose surface oxidation.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
4. Paint entire exposed surface of window frames and sashes.
5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
6. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

A. Galvanized-Steel Substrates:

1. Protective Steel Coating: Andek (800-800-2844)

   a. Primer / Sealer: Andek Polaprime 21 solvent-based, single component polyurethane primer.
   b. Base Coating: Andek Polaroof RAC single-component urethane.
   c. Protective Coat 1: Andek Wearcoat 44 solvent-based cyclo-aliphatic urethane

2. Alternate Protective Steel Coating: Sherwin Williams

   a. Primer: MacroPoxy 646 @ 5.0-10 .0 mils dft
   b. Intermediate Coat: Acrolon 218 Polyurethane @ 3.0-5.0 mils dft
   c. Finish Coat: Acrolon 218 Polyurethane @ 3.0-5.0 mils dft

B. Prefinished Aluminum Substrates:

1. Sherwin Williams:

   a. Prime Coat: ProIndustrial Pro-Cryl Universal Primer.
   b. Intermediate Coat: DTM Acrylic, Semi-gloss
   c. Topcoat: DTM Acrylic, Semi-gloss.

END OF SECTION 099113