CENTER FOR INSTRUCTION (CI) RE-ROOF AND BUILDING ENVELOPE IMPROVEMENTS

TEXAS A&M CORPUS CHRISTI

October 23, 2020

PREPARED BY:

fresch
FREEMAN SCHROEDER ARCHITECTS
TABLE OF CONTENTS

DIVISION 02 - EXISTING CONDITIONS
   02 4100    Demolition

DIVISION 03 - CONCRETE
   03 0140.51  Cleaning of Cast Stone Coping
   03 0140.61  Resealing of Cast Stone Coping

DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES
   06 1053    Miscellaneous Rough Carpentry

DIVISION 07 - THERMAL AND MOISTURE PROTECTION
   07 0150    Preparation for Reroofing
   07 2500    Weather Barriers
   07 4113.07  Metal Roof Panels, Standing Seam
   07 4113    Formed Metal Wall Panels
   07 5216.12.1 SBS Modified Bituminous Membrane Roofing, Torch Applied – Concrete Deck
   07 5216.12.2 SBS Modified Bituminous Membrane Roofing, Torch Applied – Metal Deck
   07 5600.11  Fluid Applied Membrane Roofing
   07 5910    Membrane Roofing Preparation
   07 6200    Sheet Metal Flashing and Trim
   07 7129    Manufactured Roof Expansion Joints
   07 7200    Roof Accessories
   07 9200    Joint Sealers

DIVISION 08 - OPENINGS
   08 1113    Hollow Metal Doors and Frames
   08 4315    Aluminum Framed Storefronts
   08 7100    Door Hardware
   08 8000    Glazing
   08 9100    Louvers

DIVISION 26 - ELECTRICAL
   26 4100    Lightning Protection System
SECTION 02 4100 - DEMOLITION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Selective demolition of building elements for alteration purposes.

1.2 REFERENCE STANDARDS


PART 2 - PRODUCTS -- NOT USED

PART 3 - EXECUTION

3.1 SCOPE

A. Remove existing roof and supporting structure as indicated.

B. Remove other items indicated for salvage.

3.2 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.

   1. Obtain required permits.
   2. Comply with applicable requirements of NFPA 241.
   3. Provide, erect, and maintain temporary barriers and security devices.
   4. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
   5. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
   6. Do not close or obstruct roadways or sidewalks without permit.
   7. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
   8. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.
   9. Comply with applicable requirements and obtain applicable FAA and Naval Air Station Corpus Christi permits for all work on site.
B. Do not begin removal until receipt of notification to proceed from Owner.

C. Do not begin removal until built elements to be salvaged or relocated have been removed.

D. Protect existing structures and other elements that are not to be removed.
   1. Provide bracing and shoring.
   2. Prevent movement or settlement of adjacent structures.
   3. Stop work immediately if adjacent structures appear to be in danger.

E. Minimize production of dust due to demolition operations; do not use water if that will result in flooding, sedimentation of public waterways or storm sewers, or other pollution.

F. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB’s, and mercury.

G. Contractor is responsible for keeping dust and debris associated with the work from falling from the building or leaving the area of work. This includes the control of windborne dust and debris. A debris containment and mitigation plan shall be established by the contractor and maintained through the remainder of the work.

3.3 EXISTING UTILITIES

A. Protect existing utilities to remain from damage.

B. Do not disrupt public utilities without permit from authority having jurisdiction.

C. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.

D. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.

3.4 SELECTIVE DEMOLITION FOR ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as shown.
   2. Report discrepancies to Architect before disturbing existing installation.
   3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

B. Separate areas in which demolition is being conducted from other areas that are still occupied.
C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.

D. Remove existing work as indicated and as required to accomplish new work.
   1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.
   2. Remove items indicated on drawings.

E. Services (Including but not limited to HVAC and Electrical): Remove existing systems and equipment as indicated.
   1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
   2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
   3. Verify that abandoned services serve only abandoned facilities before removal.
   4. Remove abandoned pipe, ducts, conduits, and equipment; remove back to source of supply where possible, otherwise cap stub and tag with identification.

F. Protect existing work to remain.
   1. Prevent movement of structure; provide shoring and bracing if necessary.
   2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
   3. Repair adjacent construction and finishes damaged during removal work.
   4. Patch as specified for patching new work.

3.5 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION 02 4100
SECTION 03 0140.51 – CLEANING OF CAST STONE COPING

PART 1 - GENERAL

1.1 SECTION INCLUDES
A. Rough opening framing for roof openings.

1.2 RELATED REQUIREMENTS
A. Section 03 0140.51 – Resealing of Cast Stone Coping
B. Section 07 9200 – Joint Sealers

1.3 REFERENCE STANDARDS
A. ASTM E1575-12 Standard Practice for Pressure Water Cleaning and Cutting.

1.4 ADMINISTRATION REQUIREMENTS
A. Preinstallation Meeting:
   1. Review preparation and installation procedures and coordinating and scheduling required
      with related work.
   2. Representatives of the Owner, Architect, and Installer shall be present at pre-installation
      conference.
B. Test a minimum 4 ft. by 4 ft. area on each type of masonry. Use manufacturer’s application
   instructions. Let the test panel dry 3 to 7 days before inspection. Keep test panels available
   for comparison throughout the cleaning project.

PART 2 - PRODUCTS

2.1 SURFACE CLEANER
A. Cleaner basis of design product: Prosoco Enviro Klean 2010 All Surface Cleaner
B. Product description: mildly alkaline degreasing agent for light-to-heavily soiled stone,
   tile, and masonry.
C. Technical data:
   1. FORM: Clear Green liquid
   2. TOTAL SOLIDS: N/A
   3. SPECIFIC GRAVITY: 1.070
   4. pH: 10.5 Typical Rinse water 7.8 - 8.2
   5. WT./GAL.: 8.90 lbs.
   6. FLASH POINT: > 200 degrees F (> 93 degrees C) ASTM D 3278
   7. FREEZE POINT: 32 degrees F (0 degrees C) PART 3 – EXECUTION
3.1 PREPARATION

A. Before application, read “Preparation” and “Safety Information” sections in the Manufacturer’s Product Data Sheet for 2010 All Surface Cleaner. Use in concentrate or dilute 2010 All Surface Cleaner concentrate with 1-10 parts water. Refer to Product Data Sheet for recommended dilution for intended use.

3.2 INSTALLATION - GENERAL

A. Working from bottom to top, pre-wet the surface with clean water.
B. Apply the diluted cleaning solution to the masonry surface using a brush or low-pressure sprayer.
C. Let the cleaner stay on the surface 1-10 minutes, based on testing. Gently scrub heavily soiled areas.
D. Working from bottom to top, rinse the surface thoroughly with clean water. The best combination of rinsing pressure and water volume is provided by masonry washing equipment generating 400-1000 psi with a water flow rate of 6-8 gallons per minute delivered through a 15-45 degree fan spray tip. Equipment should be adjustable to reduce water flow rate and rinsing pressure as required for controlled cleaning of more sensitive surfaces. See also “Equipment” section of the Product Data Sheet.
E. Repeat steps 1 through 4 as required.
F. Do not allow cleaning solution to dry on surface. If drying occurs, lightly wet surfaces with fresh water and reapply the cleaner in a gentle scrubbing manner.

END OF SECTION 03 0140.51
SECTION 03 0140.61 – RESEALING OF CAST STONE COPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Rough opening framing for roof openings.

1.2 RELATED REQUIREMENTS

A. Section 03 0140.61 – Cleaning of Cast Stone Coping
B. Section 07 9200 – Joint Sealers

1.3 ADMINISTRATION REQUIREMENTS

A. Preinstallation Meeting:
   1. Review preparation and installation procedures and coordinating and scheduling required with related work.
   2. Representatives of the Owner, Architect, and Installer shall be present at pre-installation conference.

B. Test a minimum 4 ft. by 4 ft. area on each type of masonry. Use manufacturer’s application instructions. Let test area protective treatment cure before inspection. Keep test panels available for comparison throughout the protective treatment project.

PART 2 - PRODUCTS

2.1 PENETRATING SEALER

A. Sealer basis of design product: Tremco Decktite WDS
B. Product description: water dispersed, low odor, penetration concrete sealer.
C. Technical data:
   1. Color: clear amber
   2. Solvent: none in concentrate, dispersed with water only
   3. VOC Content: ASTM D5095-90 <350
   4. Water Screening Water Weight Gain: Alberta Transportation Test 9.1%
   5. Alkali Resistance After Abrasion: Alberta Transportation Test 89.7%

PART 3 - EXECUTION

3.1 PREPARATION

A. Before application, read “Preparation” and “Safety Information” sections in the Manufacturer’s Product Data Sheet for Weather Seal Siloxane PD. Refer to the Product Data Sheet for additional information about application of Weather Seal Siloxane PD. Do not dilute or alter.

3.2 INSTALLATION - GENERAL
Apply per manufacturer’s recommendations.

Apply protective treatment “wet-on-wet” to a visibly dry and absorbent surfaces.

**Spray:** Saturate from the bottom up, creating a 4-inch to 8-inch (15 to 20 centimeters) rundown below the spray contact point. Let the first application penetrate for 5 to 10 minutes. Re-saturate. Less will be needed for the second application.

**Brush or Roller:** Saturate uniformly. Let protective treatment penetrate for 5 to 10 minutes. Brush out heavy runs and drips that don’t penetrate.

**Dense Surface Application Instructions**
Apply in a single, saturating application with no run down. Back roll all runs and drips to ensure uniform appearance. **DO NOT OVER APPLY.** One application is normally enough. Always test.

**Horizontal Application Instructions**
1. Saturate in a single application. Use enough to keep the surface wet for 2 to 3 minutes before penetration.
2. Broom out puddles until they soak in.

**Drying Time**
Treated surfaces dry to touch in 1 hour. Protect surfaces from rainfall for 6 hours following treatment. Protect from foot and vehicle traffic until visibly dry. Siloxane PD gains its water repellency properties in 72 hours.

**Cleanup**
Clean tools, equipment and over spray with soap and warm water.

END OF SECTION 03 0140.61
SECTION 06 1053 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Rooftop equipment bases and support curbs.
2. Wood blocking, cants, and nailers.

1.3 ACTION SUBMITTAGS

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

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.

2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.

3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.

4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.4 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

1. Preservative-treated wood.
1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.6 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 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.

B. Maximum Moisture Content of Lumber: 14% unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.

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.

D. Application: treat all miscellaneous carpentry unless otherwise indicated.
2.3 MISCELLANEOUS LUMBER

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

1. Blocking.
2. Nailers.
3. Rooftop equipment bases and support curbs.

B. For items of dimension lumber size, provide Construction or No. 2 grade lumber of any species.

C. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

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.

2.4 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.


D. Wood Screws: ASME B18.6.1.

E. Screws for Fastening to Metal Framing: length as recommended by screw manufacturer for material being fastened. ASTM C 954

F. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).

G. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.

H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

2.5 MISCELLANEOUS MATERIALS

A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch (0.6 mm).

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, 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. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels.

E. Do not splice structural members between supports unless otherwise indicated.

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

G. 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.

H. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
   1. Use inorganic boron for items that are continuously protected from liquid water.
   2. Use copper naphthenate for items not continuously protected from liquid water.

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

J. Use steel common 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. Drive nails snug but do not countersink nail heads unless otherwise indicated.
3.2 WOOD BLOCKING, AND NAILER INSTALLATION

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

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

3.3 PROTECTION

A. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous 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 07 0150 - PREPARATION FOR REROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 Specification Sections, apply to this Section.

1.2 SUMMARY
A. Section Includes:
   1. Full tear-off of entire roof system.
   2. Re-cover preparation of entire roof area.
   4. Temporary roofing.

1.3 DEFINITIONS
A. EPS: Molded (expanded) polystyrene.
B. Full Roof Tear-off: Removal of existing roofing system down to existing concrete fill at Performance Hall and down to metal roof deck at Mechanical building.
C. OSB: Oriented strand board.
D. Roofing Terminology: Definitions in ASTM D1079 and glossary of NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to work of this Section.

1.4 PREINSTALLATION MEETINGS
A. Preliminary Roofing Conference: Before starting existing roofing removal Work, Owner shall require a pre-construction conference at on-campus location and time to be determined by ODR.
   1. Meet with Owner, ODR, Architect, Owner’s insurer, testing and inspecting agency representative, roofing Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
   2. Review methods and procedures related to roofing tear-off, including, but not limited to, the following:
      a. Reroofing preparation, including roofing system manufacturer’s written instructions.
      b. Temporary protection requirements for existing roofing system components that are to remain.
c. Existing roof drains and roof drainage during each stage of reroofing, and roof-drain plugging and plug removal.
d. Construction schedule and availability of materials, Installer's personnel, equipment, and facilities needed to avoid delays.
e. Existing roof deck conditions requiring Architect notification.
f. Condition and acceptance of existing roof deck and base flashing substrate for reuse.
g. Structural loading limitations of roof deck during reroofing.
h. Base flashings, special roofing details, drainage, penetrations, equipment curbs, and condition of other construction that affect reroofing.
i. Governing regulations and requirements for insurance and certificates if applicable.
j. Existing conditions that may require Architect notification before proceeding.

1.5 INFORMATIONAL SUBMITTALS

A. Photographs or Videotape: 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.
   1. Submit before Work begins.

B. Landfill Records: Indicate receipt and acceptance of demolished roofing materials and hazardous wastes, if applicable, by a landfill facility licensed to accept them.

1.6 QUALITY ASSURANCE

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

1.7 FIELD CONDITIONS

A. Existing Roofing System: The Existing roof system to be removed is believed to be APP-modified bituminous, or SBS-modified bituminous roofing. Contractor is responsible for visiting the project site and confirming the specific make-up of the modified roof system if necessary prior to demolition.

B. Owner will continuously occupy the entire building during the re-roofing process.
   1. Conduct reroofing so Owner's operations within the project building, in adjacent buildings, and on the surrounding campus are not disrupted.
   2. Provide Owner with not less than 72 hours' written notice of activities that may affect Owner's operations.
   3. Coordinate work activities daily with Owner. It is presumed by the Owner that this project will be executed without need to suspend regular activities. Should any so Owner has adequate advance notice to place protective dust and water-leakage covers
over sensitive equipment and furnishings, shut down HVAC and fire-alarm or detection equipment if needed, and evacuate occupants from below work area.

4. Should Contractor uncover any roof deck appearing to be structurally compromised, all work on the roof shall be immediately suspended and the Owner and building occupants notified shall be notified of the concern.

   a. Architect and ODR shall be notified of findings prior to proceeding with work in any areas.

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

D. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.

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

   1. Construction Drawings for existing roofing system are available for Contractor's convenience and information, but they are not a warranty of existing conditions. They are intended to supplement rather than serve in lieu of Contractor's own investigations. Contractor is responsible for conclusions derived from existing documents.

F. Limit construction loads on existing roof areas to remain, and existing roof areas scheduled to be reroofed to 1000 pounds for rooftop equipment wheel loads and 20 pounds per square foot for uniformly distributed loads.

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

   1. Remove only as much roofing in one day as can be made watertight in the same day.

H. Hazardous Materials: It is not expected that hazardous materials, such as asbestos-containing materials, will be encountered in the Work.

   1. Hazardous materials will be removed by Owner before start of the Work.
   2. Existing roof will be left no less watertight than before removal.
   3. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner.

   a. Hazardous materials will be removed by Owner under a separate contract.

PART 2 - PRODUCTS

2.1 TEMPORARY ROOFING MATERIALS

A. Design and selection of materials for temporary roofing are Contractor's responsibilities.
2.2 INFILL AND REPLACEMENT MATERIALS

A. Use infill materials matching existing roofing system materials unless otherwise indicated.
   1. Infill materials are specified in Section 075216 "Styrene-Butadiene-Styrene (SBS) Modified Bituminous Membrane Roofing" unless otherwise indicated.

B. Wood blocking, curbs, and nailers are specified in Section 06 1000 “Rough Carpentry.”

C. Parapet Sheathing: At areas requiring replacement of parapet sheathing replace with one of two materials indicated below that is most similar to the existing material.
   1. ASTM C1177/C1177M or ASTM C1278/C1278M water-resistant gypsum substrate 1/2 inch thick.
   2. Exterior fire-retardant-treated plywood wall sheathing, 19/32 inch thick,

D. Fasteners: Factory-coated steel fasteners with metal or plastic plates listed in FM Approvals' RoofNav, and acceptable to new roofing system manufacturer.

2.3 AUXILIARY REROOFING MATERIALS

A. General: Use auxiliary reroofing preparation materials recommended by roofing system manufacturer for intended use and compatible with components of new roofing system.

PART 3 - EXECUTION

3.1 PREPARATION

A. Seal or isolate windows that may be exposed to airborne substances created in removal of existing materials.

B. Prevent debris from entering mechanical louvers and intakes without restricting airflow to same louvers and intakes.

C. Shut off rooftop utilities and service piping before beginning the Work.

D. Test existing roof drains to verify that they are not blocked or restricted.
   1. Immediately notify Architect of any blockages or restrictions.

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

F. Maintain roof drains in functioning condition to ensure roof drainage at end of each workday.
   1. Prevent debris from entering or blocking roof drains and conductors.
      a. Use roof-drain plugs specifically designed for this purpose.
b. 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 roofing system, provide alternative drainage method to remove water and eliminate ponding.
   a. Do not permit water to enter into or under existing roofing system components that are to remain.

3.2 ROOF TEAR-OFF

A. Full Roof Tear-off: Remove existing roofing and other roofing system components down to the existing concrete fill.
   1. Remove any and all substrate board, vapor retarder, roof insulation, and, cover board.
   2. Remove base flashings and counter flashings.
   3. Remove perimeter edge flashing and gravel stops.
   4. Remove copings.
   5. Remove expansion-joint covers.
   6. Remove flashings at pipes, curbs, mechanical equipment, and other penetrations.
   7. Remove all roof drain clamp rings and strainer baskets.
   8. Remove wood blocking, curbs, and nailers if split, rotted or otherwise structurally deteriorated condition.
   9. Remove fasteners from deck or cut fasteners off slightly above deck surface.

3.3 DECK PREPARATION

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

B. If broken or loose fasteners that secure deck panels to one another or to structure are observed, or if deck appears or feels inadequately attached, immediately notify Architect.
   1. Do not proceed with installation until directed by Architect.

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

D. Provide additional deck securement as indicated on Drawings.

E. Replace steel deck as indicated on Drawings.

F. Replace steel deck as directed by Architect.
   1. Deck replacement will be paid for by adjusting the Contract Sum according to unit prices included in the Contract Documents.
G. Prepare and paint steel deck surface.
   1. Painting and preparation for painting is specified in Section 099113 "Exterior Painting."

H. Replace plywood roof sheathing as indicated on Drawings.

I. Replace plywood roof sheathing as directed by Architect.
   1. Roof sheathing replacement will be paid for by adjusting the Contract Sum according to unit prices included in the Contract Documents.

3.4 INFILL MATERIALS INSTALLATION

A. Immediately after roof tear-off, and inspection and repair, if needed, of deck, fill in tear-off areas to match existing roofing system construction.
   1. Installation of infill materials is specified in Section 07 5216 Styrene-Butadiene-Styrene (SBS) Modified Bituminous Membrane Roofing.
   2. Installation of wood blocking, curbs, and nailers is specified in Section 06 1000 Rough Carpentry.

B. Install new roofing patch over roof infill area.
   1. If new roofing is installed the same day tear-off is made, roofing patch is not required.

3.5 TEMPORARY ROOFING

A. Install approved temporary roofing over area to be reroofed.

B. Install temporary roofing over area to be reroofed.
   1. Install two glass-fiber felts or Mechanically fasten base sheet and install a glass-fiber felt, lapping each sheet 19 inches over preceding sheet.
   2. Embed glass-fiber felt in a solid mopping of hot roofing asphalt applied within equiviscous temperature range.
   3. Glaze-coat completed surface with hot roofing asphalt.

C. Remove temporary roofing before installing new roofing.

D. Prepare temporary roof to receive new roofing according to approved temporary roofing proposal.
   1. Restore temporary roofing to watertight condition.
   2. Obtain approval for temporary roof substrate from roofing manufacturer and Architect before installing new roof.
3.6 ROOF RE-COVER PREPARATION

A. Remove blisters, ridges, buckles, mechanically attached roofing fastener buttons projecting above roofing, and other substrate irregularities from existing roofing that inhibit new recover boards from conforming to substrate.

1. Remove loose aggregate from aggregate-surfac ed, built-up bituminous roofing with a power broom.
2. Scarify surface of sprayed polyurethane foam as necessary to achieve a sufficiently uniform plane to receive new recover boards.
3. Broom clean existing substrate.
4. Coordinate with Owner's inspector to schedule times for tests and inspections.
5. Verify that existing substrate is dry.
   a. Spot check substrates with an electrical capacitance moisture-detection meter.
6. Remove materials that are wet or damp.
   a. Removal will be paid for by adjusting the Contract Sum according to unit prices included in the Contract Documents.

B. Remove blisters, ridges, buckles, mechanically attached roofing fastener buttons projecting above roofing, and other substrate irregularities from existing roofing that inhibit new recover boards or roofing from conforming to substrate.

1. Remove loose aggregate from aggregate-surfaced, built-up bituminous roofing with a power broom.
2. Shave surface of sprayed polyurethane foam as necessary to achieve a sufficiently uniform plane to receive new recover boards or roofing.
3. Broom clean existing substrate.
4. Coordinate with Owner's inspector to schedule times for tests and inspections.
5. Verify that existing substrate is dry before proceeding with installation.
   a. Spot check substrates with an electrical capacitance moisture-detection meter.
6. Remove materials that are wet and damp.
   a. Removal will be paid for by adjusting the Contract Sum according to unit prices included in the Contract Documents.

C. Remove blisters and areas of roofing not fully adhered.

D. Remove mechanically attached roofing fastener buttons projecting above roofing and other substrate irregularities that inhibit new recover boards from conforming to substrate.

1. Remove loose aggregate from aggregate-surfaced, built-up bituminous roofing with a power broom.
2. Clean substrate of contaminants, such as dirt, debris, oil, and grease that can affect adhesion of coated foamed roofing.
3. Power vacuum the existing roof surface.
a. If recommended by foam manufacturer, prime dried surface at recommended rate with recommended primer.

4. Scarify surface of coated polyurethane roofing as necessary to achieve a suitable substrate for new roofing.

5. Provide additional uplift securement for existing roofing system with new screws and plates applied as required to each roof zone indicated in the drawings.

6. Verify that surface is dry by pressing litmus paper to surface areas most likely to retain moisture, such as shaded areas and low spots.
   a. If paper changes color, surface is too wet to apply foam.

7. Build up isolated low spots on existing roofing with sprayed foam specified in Section 075700 "Coated Foamed Roofing" to prevent ponding.

3.7 BASE FLASHING REMOVAL

A. Remove existing base flashings.
   1. Clean substrates of contaminants, such as asphalt, sheet materials, dirt, and debris.

B. Do not damage metal counterflashings that are to remain.
   1. Replace metal counterflashings damaged during removal with counterflashings specified in Section 07 6200 "Sheet Metal Flashing and Trim."

C. Inspect parapet sheathing, wood blocking, curbs, and nailers for deterioration and damage.
   1. If parapet sheathing, wood blocking, curbs, or nailers have deteriorated, immediately notify Architect.

D. Remove existing parapet sheathing and replace with new parapet sheathing to comply with Section 061600 "Sheathing."
   1. If parapet framing, wood blocking, curbs, or nailers have deteriorated, immediately notify Architect.

E. When directed by Architect, replace parapet framing, wood blocking, curbs, and nailers to comply with Section 06 1000 "Rough Carpentry."

3.8 FASTENER PULL-OUT TESTING

A. Perform fastener pull-out tests according to SPRI FX-1, and submit test report to Architect and roofing manufacturer before installing new roofing system.
   1. Obtain roofing manufacturer's and FM Global approval to proceed with specified fastening pattern.
Texas A&M University Corpus Christi
CI Re-Roof and Building Envelope Improvements

a. Roofing manufacturer and/or FM Global may furnish revised fastening pattern commensurate with pull-out test results.

3.9 DISPOSAL

A. Collect demolished materials and place in containers.
   1. Promptly dispose of demolished materials.
   2. Do not allow demolished materials to accumulate on-site.
   3. Storage or sale of demolished items or materials on-site is not permitted.

B. Transport and legally dispose of demolished materials off Owner's property.

END OF SECTION 07 0150
SECTION 07 2500 - WEATHER BARRIERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Water-Resistive Barrier: Under exterior wall cladding, over sheathing or other substrate not air tight or vapor retardant.

1.2 DEFINITIONS

A. Weather Barrier: Assemblies that form either water-resistive barriers, air barriers, or vapor retarders.
B. Vapor Retarder: Air tight barrier made of material that is relatively water vapor impermeable, to the degree specified, with sealed seams and with sealed joints to adjacent surfaces.
   1. Water Vapor Permeance: For purposes of conversion, \(57.2 \text{ ng/}(\text{Pa s sq m}) = 1\) perm.
C. Water-Resistive Barrier: Water-shedding barrier made of material that is moisture resistant, to the degree specified, intended to be installed to shed water without sealed seams.

1.3 REFERENCE STANDARDS

C. ASTM E 1677 - Specification for Air Retarder Material or System for Framed Building Walls

1.4 SUBMITTALS

A. Product Data: Provide data on material characteristics.
B. Manufacturer's Installation Instructions: Indicate preparation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

B. Other Acceptable Manufacturers:
5. Henry Company; www.us.henry.com

2.2 WEATHER BARRIER

A. Single-component, low VOC, synthetic polymer fluid-applied vapor permeable product providing resistance to air flow, bulk water and wind driven rain.

B. Performance:
   1. Air Penetration Resistance (Material): 0.0002 cfm/ft2 at 75 Pa, ASTM E2178
   2. Air Penetration Resistance (System / Assembly):
      a. = 0.01 cfm/ft2 at 75 Pa, ASTM E 2357.
      b. $0.01$ cfm/ft2 at 75 Pa, Type I Air Barrier, ASTM E1677
   4. Water Penetration Resistance:
      a. Greater than 1000 cm, AATCC Test Method 127.
      b. No leakage at 15 psf, ASTM E331.

C. Accessories:
   1. Sealants, Tapes, and Accessories for Sealing Weather Barrier and Sealing Weather Barrier to Adjacent Substrates: As specified or as recommended by weather barrier manufacturer.
   2. Thinners and Cleaners: As recommended by material manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces and conditions are ready to accept the work of this section.
B. Surfaces shall be clean and free of frost, oil, grease, mold and efflorescence prior to
application of fluid-applied weather barrier system.

3.2 PREPARATION

A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.

B. Mask and protect any adjacent finished surfaces from fluid-applied weather barrier material.

C. Substrate: Prepare substrate in manner recommended by coating manufacturer; treat joints in substrate and between dissimilar materials as recommended by manufacturer.

D. Complete surface preparation, priming, flashing and detailing of openings, cracks, and material transitions prior to beginning installation of fluid-applied weather barrier system.

3.3 INSTALLATION

A. Install materials in accordance with manufacturer's instructions.

B. Install vapor permeable fluid-applied elastomeric flashing at openings.

C. Allow Fluid-Applied Flashing, Joint Compound and Sealant to cure for minimum 24 hours before coating with Fluid-applied Weather Barrier.

D. Install fluid-applied weather barrier over exterior face of required exterior wall substrates in accordance with weather barrier manufacturer recommendations and instructions.

3.4 FIELD QUALITY CONTROL

A. Notify weather barrier manufacturer’s designated representative to obtain [required] periodic observations of weather barrier system installation.

B. Do not cover installed weather barriers until required inspections have been completed.

C. Obtain approval of installation procedures by the weather barrier manufacturer based on a mock-up installed in place, prior to proceeding with remainder of installation.

D. Take digital photographs of each portion of the installation prior to covering up.

3.5 PROTECTION

A. Protect installed weather barrier system from damage during construction prior to cladding installation.

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

END OF SECTION 07 2500
SECTION 07 4113.07 - METAL ROOF PANELS, STANDING SEAM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Architectural standing-seam metal roof panels.
2. Metal roof accessories.
3. Removal of all abandoned piping, equipment and supports as required and patching or repair of the existing deck, structure and interior as required.
4. All existing roof penetration flashings will be replaced with new roof penetration flashings; including but not limited to lead plumbing vent flashings, heater vents, gravity vents, and any other miscellaneous roof penetration flashings.

B. Related Sections:

1. Division 07 Section "Metal Wall Panels" for factory-formed metal wall and soffit panels.
2. Division 07 Section "Sheet Metal Flashing and Trim" for field- or shop-formed fasciae, copings, flashings, roof drainage systems, and other sheet metal work not part of metal roof panel assemblies.

C. Allowances: Refer to Division 01 Section "Allowances" for description of Work in this Section affected by allowances.

D. Unit Prices: Refer to Division 01 Section "Unit Prices" for description of Work in this Section affected by unit prices.

1.2 DEFINITIONS

A. Metal Roof Panel Assembly: Metal roof panels, attachment system components, miscellaneous metal framing, thermal insulation, and accessories necessary for a complete weathertight roofing system.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, metal roof panel Installer, metal roof panel manufacturer's representative, substrate Installer, and installers whose work interfaces with or affects metal roof panels including installers of roof accessories and roof-mounted equipment.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

3. Review methods and procedures related to metal roof panel installation, including manufacturer's written instructions.

4. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.

5. Review temporary protection requirements for metal roof panel assembly during and after installation.

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 for each type of roof panel and accessory.

B. Shop Drawings: Show fabrication and installation layouts of metal roof panels; details of edge conditions, side-seam and endlap joints, panel profiles, corners, anchorages, trim, flashings, closures, and accessories; and special details specific to project, signed and sealed by the qualified professional engineer responsible for their preparation. Distinguish between factory- and field-assembled work.

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

1. Metal Roof Panels: Color samples

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer, Installer, professional engineer, and manufacturer's technical representative.

1. Submit Installer qualifications in the form of an original letter on manufacturer's letterhead signed by authorized manufacturer representative.

B. Sample Warranties: Unexecuted sample copies for special warranties.

1.6 CLOSEOUT SUBMITTALS

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

B. Warranties: Executed copies of warranties.

1.7 SUBSTITUTIONS

A. General:
1. ONLY Substitutions approved in writing by the Owner or Owner’s Representative prior to the scheduled bid date will be considered.

2. Notification of approvals will be issued at least five (5) days before the scheduled bid date.

3. Architect/Owner reserves the right to be final authority on acceptance or rejection of any substitution request.

B. When a particular make or trade name is specified, it shall be indicative of standard required. Bidders proposing substitutes shall submit the following ten (10) days prior to bid date to the Owner or Owner’s Representative; requests received after that time will not be considered.

1. Written application with explanation of why it should be considered.

2. Independent laboratory certification providing written confirmation that the physical and performance characteristics of the substitute material/system will meet the physical and performance characteristics of the specified materials and system.

C. Submit five copies of request for substitution. Items to be included in the request:

1. Complete data substantiating compliance of proposed substitution.

2. Product identification, including manufacturer’s literature and manufacturer’s name.

3. Current certificate from an accredited testing laboratory comparing the physical and performance attributes of the proposed material with those of the specified materials. Test results must be dated, notarized, and on testing laboratory stationary.

4. Material Safety Data Sheets providing all pertinent data as to flammability, combustibility.

5. List of at least (5) five jobs as described under the requirements where the proposed alternate material was used under similar conditions. These jobs must be available for inspection by the Owner or Owner’s Representative. Names and phone numbers are required for verification. Submit a minimum of 200,000 square feet for review. Submitted projects must be a minimum of (5) years old.

6. Notarized statement from the Roof System Manufacturer, signed by a corporate officer of the corporation stating that:

   a. All Documents have been reviewed and are approved.

   b. The Project site has been inspected.

   c. The Roofing System Manufacturer will provide two (2) field inspections weekly; during, and until all construction work is complete and accepted by the owner. A full time employee of the manufacturer must perform inspections.
d. Provide documentation of the proposed alternate system passing the specified regulatory requirements. Documentation must be on the specified regulatory requirements letterhead or approval guide. No third party testing will be accepted.

D. In making substitution request, Bidder/Contractor represents:

1. He has personally investigated proposed product or method, and determined that it is equal or superior in all respects to that specified. Additionally, he will have a technical service representative of the proposed manufacturer attend the pre-bid meeting.

2. He will provide the same guarantee for substitution as for those specified.

3. He will coordinate installation of accepted substitution in work, making such changes as may be required for work to be completed in all respects.

4. Advise the owner of any credit savings or additional costs as opposed to the system type specified.

E. Substitutions will not be considered if:

1. Product or method to be considered does not have a minimum of (5) five years of successful performance in roofing and re-roofing of similar applications.

2. Any discrepancies in the test data, or if the tests or submittals are incomplete.

3. They are indicated or implied on Shop Drawings or Project Data Submittals without formal request submitted in accordance with the specification document.

4. Acceptance requires significant revision of documents.

5. Only substitutes approved in writing by prior to scheduled cutoff date will be considered.

6. Notification of approvals will be mailed at least 3 days before bid opening.

7. The Owner will not incur any additional costs for design or construction costs.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer of plant-fabricated metal roof panel systems listed in this Section and meeting performance requirements, with a minimum of five years' experience providing metal roof panel systems for projects of similar type and scope, offering engineering, warranty, technical inspection, and maintenance inspection services specified.

B. Installer Qualifications: An employer of workers trained and certified by manufacturer, including a full-time on-site supervisor with a minimum of five years' experience installing similar work, able to communicate verbally with Contractor, Architect, and employees, and qualified by the manufacturer to furnish warranty of type specified.
1. Manufacturer's On-Site Roll Former Operators: Experienced full-time employees of metal roof panel manufacturer.

2. Installer must provide (2) manufacturer inspections each week while associated work is ongoing. Noncompliance may result in an $850 per day fee for missing inspections.

C. Roofing Inspector Qualifications: A technical representative of manufacturer not engaged in the sale of products and experienced in the installation and maintenance of the specified roofing system, qualified to perform roofing observation and inspection specified in Field Quality Control Article, to determine Installer's compliance with the requirements of this Project, and approved by the manufacturer to issue warranty certification. The Roofing Inspector shall be one of the following:

1. An authorized full-time technical employee of the manufacturer.

D. Random Sampling

1. During course of work, the Architect may secure samples according to ASTM D140-93 of materials being used from containers at job site and submit them to an independent laboratory for comparison to specified material.

2. Should test results prove that material is not equal to specified material:
   a. Contractor shall pay for all testing.
   b. Roofing installed and found not to comply with the specifications shall be removed and replaced with no change in the contract price.

3. Installation quality control
   a. The roofing inspector shall provide written and photographic reports, to be submitted to the architect, owner, roof system installation contractor, appraising the installation of the roof system at each of the project progress stages. The installation contractor shall make all necessary corrections, additions or remedial actions to resolve any issues raised in the reports.
   b. The roofing inspector shall have the authority to have any and all roofing work corrected, as required, to insure the proper installation and weather-tightness of the roof system, in accordance with the manufacturer's specifications.

E. Professional Engineer Qualification: A qualified professional engineer licensed in the project state, and experienced in metal roof panel system design similar to that required for Project.

F. 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.

G. Source Limitations: Obtain metal roof panels and accessories from a single source supplied or approved by metal roof panel manufacturer.
1.9 DELIVERY, STORAGE, AND HANDLING

A. 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.

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

C. 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.

D. Protect strippable protective covering on metal roof panels from exposure to sunlight and high humidity, except to extent necessary for period of metal roof panel 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 according to manufacturer's written instructions and warranty requirements.

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 substrate, parapets, walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.12 WARRANTY

A. Manufacturer: Manufacturer's standard warranty form, covering work of this Section 15, in which manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within warranty period.

1. Warranty Period: 15 years from date of completion.

B. Extended Roof System Components: Warranties specified in this Section include the following components and systems specified in other sections supplied by the roofing system Manufacturer, and installed by the roofing system Installer, except where separate warranty terms and conditions appear in the referenced section.

1. Section 074113 "Metal Roof Panels": Metal roof panels.
2. Section 074213 "Metal Wall Panels": Metal wall panels.

3. Section 076200 "Sheet Metal Flashing and Trim": Shop formed sheet metal flashing items including roof penetration flashings.

C. Installer Warranty: Installer's warranty signed by Installer, covering the Work of this Section, on form acceptable to Roofing Manufacturer and Owner.

1. Warranty Period: 2 years from date of completion.

D. Manufacturer Inspection and Preventive Maintenance Service: To report maintenance responsibilities necessary for preservation of Owner's warranty rights and to perform periodic routine maintenance required, as described in Manufacturer's standard form. The cost of manufacturer's inspections and preventive maintenance is included in the Contract Sum.

1. Inspections to occur in following years: 2, 5, 10, following completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Manufacturers/Products: Subject to compliance with requirements, provide products by one of the following manufacturers comparable to the Basis of Design product specified:


2.2 PERFORMANCE REQUIREMENTS

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. Delegated Design: Design metal roof panel assembly, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

C. Structural Performance: Provide metal roof panel assemblies withstanding the effects of the following loads, based on testing according to ASTM E 1592:

1. Wind Loads: As indicated on Drawings. Verify fastening patterns, roof zones, and additional requirements with project windstorm engineer prior to installation.

2. Other Design Loads: As indicated on Drawings.

D. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.

1. Uplift Rating: UL 90.
E. Hail Resistance: Provide metal roof panel assemblies listed with UL as Class 4 hail resistant panels.

F. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 1646 at the following test-pressure difference:
   1. Test-Pressure Difference: 20.00 lbf/sq. ft. (958 Pa).

G. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E 2140.

H. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.3 ARCHITECTURAL STANDING-SEAM METAL ROOF PANELS

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 weathertight installation.
   1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1514.

B. Vertical-Rib, Seamed-Joint, Standing-Seam Metal Roof Panels: Factory-formed symmetrical panels with vertical ribs at panel edges and flat pan between ribs; designed for sequential installation in either direction by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels, and mechanically seaming panels together utilizing a seam cap, and configured to enable future replacement of individual panels without disturbing adjacent panels.
   2. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 50 (Class AZM150 coating designation, Grade 340), prepainted by the coil-coating process to comply with ASTM A 755/A 755M; structural quality.
      a. Thickness: 0.0236-inch/24 ga. (0.71-mm) minimum thickness.
      b. Surface: Smooth, flat finish.
      c. Exposed Coil-Coated Finish: 2-Coat Extra Thick Coat Fluoropolymer.
      d. Color: Coastal Regal Blue.
3. Clips: Low-movement floating clips to accommodate thermal movement; fixed clips where design permits; intermittent or continuous clips as required to meet performance requirements; and with clip bearing plate where required.
   a. Material: 0.064-inch- (1.63-mm-) nominal thickness, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.

4. Joint Type: Field mechanically seamed, with continuous factory-applied sealant.

5. Seam Cap: Match panel material and finish; provide with two rows of integral factory hot-applied sealant.


7. Panel Seam Height: Not less than 2-3/8 inch (60.3 mm).


2.4 METAL ROOF ACCESSORIES

A. Metal Roof Accessories, General: Provide components approved by roof panel manufacturer and as required for a complete metal roof panel assembly including trim, copings, fasciae, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.

   1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal roof panels.

   2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

B. Flashing and Trim: Formed from same material as roof panels, prepainted with coil coating, minimum 0.028 inch (0.71 mm) thick. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal roof panels.

C. Pipe Penetration Flashings: Flexible boot type, with stainless steel compression ring, and stainless steel pipe strap. Use silicone-type boot at hot pipes.

D. Gutters: Formed from same material roof panels. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch- (2400-mm-) long sections, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Furnish gutter supports spaced a maximum of 36 inches (900 mm) o.c., fabricated from same metal as gutters. Provide wire ball strainers of compatible metal at outlets. Finish gutters to match metal roof panels.
E. Downspouts: Formed from same material as roof panels. Fabricate in 10-foot- (3-m-) long sections, complete with formed elbows and offsets, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Finish downspouts to match gutters.

F. Pipe Penetration Flashing: Premolded EPDM pipe collar with flexible aluminum ring bonded to base and stainless steel pipe clamp to secure collar to pipe.

G. Roof Curbs: Fabricated from aluminum sheet, minimum 0.080 inch (1.2 mm) thick; with bottom of skirt profiled to match roof panel profiles, and welded top box, integral internal fastener flange, and water diverter. Fabricate curb subframing of minimum 0.0598-inch- (1.5-mm-) thick, angle-, C-, or Z-shaped galvanized steel sheet. Fabricate curb and subframing to withstand indicated loads, of size and height indicated. Finish roof curbs to match metal roof panels.

1. Insulate roof curb with 1-inch- (25-mm-) thick, rigid insulation.

2.5 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet: 30 to 40 mils (0.76 to 1.0 mm) thick minimum, consisting of slip-resisting, polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.


2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F (29 deg C); ASTM D 1970.

3. Available Manufacturers
   a. Tremco
   b. McElroy

2.6 MISCELLANEOUS MATERIALS

A. Panel Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal roof panels by means of plastic caps or factory-applied coating. Provide EPDM, PVC, or neoprene sealing washers.

2.7 FABRICATION

A. Fabricate and finish metal roof panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes and as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.
B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.

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

D. Fabricate metal roof panel side laps with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will seal weathertight and minimize noise from movements within panel assembly.

E. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the 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. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.

3. Fabricate cleats and attachment devices of size and metal thickness recommended by SMACNA's "Architectural Sheet Metal Manual" or by metal roof panel manufacturer for application, but not less than thickness of metal being secured.

2.8 FINISHES

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.

D. Steel Panels and Accessories:

1. Two-Coat Extra-Thick-Coat Fluoropolymer Coastal Finish: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat, over nominal 2.40-mil-thick urethane primer. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

2. Concealed Finish: Apply pretreatment and 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 (0.013 mm).
PART 3 -

3.1 EXAMINATION

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

1. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.

2. Examine solid roof substrate to verify that substrate joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.

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

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

3.2 PREPARATION

A. Clean substrates of substances harmful to underlayment, including removing projections capable of interfering with underlayment installation if applicable.

3.3 UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated below, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Extend underlayment into gutter trough. Roll laps with roller. Cover underlayment within 14 days.

1. Apply over entire roof surface.

B. Apply slip sheet over underlayment before installing metal roof panels.

C. Install flashings to cover underlayment to comply with requirements specified in Division 07 Section "Sheet Metal Flashing and Trim."

3.4 METAL ROOF PANEL INSTALLATION, GENERAL

A. Provide metal roof panels of full length from eave to ridge unless otherwise indicated or restricted by shipping limitations.
B. Thermal Movement. Rigidly fasten metal roof panels to structure at one and only one location for each panel. Allow remainder of panel to move freely for thermal expansion and contraction. Predrill panels for fasteners.

1. Point of Fixity: Fasten each panel along a single line of fixing located at ridge.
2. Avoid attaching accessories through roof panels in a manner that will inhibit thermal movement.

C. Install metal roof panels as follows:

1. Commence metal roof panel installation and install minimum of 300 sq. ft. (27.8 sq. m) in presence of factory-authorized representative.
2. Field cutting of metal panels by torch or abrasive saw is not permitted.
3. Locate and space fastenings in uniform vertical and horizontal alignment.
4. Provide metal closures at rake edges, rake walls, and each side of ridge and hip caps.
5. Flash and seal metal roof panels with weather closures at eaves, rakes, and perimeter of all openings.
6. Install ridge and hip caps as metal roof panel work proceeds.
7. Install metal flashing to allow moisture to run over and off metal roof panels.

D. Fasteners:

1. Steel Roof Panels: Use stainless-steel fasteners for surfaces exposed to the exterior and galvanized-steel fasteners for surfaces exposed to the interior.

E. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.

F. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.

1. Use slip sheet where roof panels will contact wood, ferrous metal, or cementitious construction.

G. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal roof panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal roof panel manufacturer.

1. Seal metal roof panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal roof panel manufacturer.
2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."

3.5 METAL ROOF PANEL INSTALLATION

A. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended by manufacturer.

1. Install clips to supports with self-tapping fasteners. Install clips at 18” centers or closer as directed by project windstorm engineer from eave to ridge. Secure clip to metal deck below wood decking and insulation at even spacing as directed by windstorm engineer.

2. Erection Tolerances: Shim and align metal roof panel units within installed tolerance of 1/4 inch in 20 feet (1:960) on slope and location lines as indicated and within 1/8 inch (3 mm) offset of splices and alignment of matching profiles.

3. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.

4. Watertight Installation:
   a. Provide sealant or tape between panels and protruding equipment, vents, and accessories.

3.6 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting

1. Install components required for a complete metal roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

B. Flashing and Trim: Comply with performance requirements and manufacturer's written installation instructions. Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Form trim and transition joints using compressed joints with captive butyl sealant capable of resisting static water pressure. Cleated joints and exposed joint sealants do not meet this requirement.

2. Install exposed flashing and trim that is without excessive oil canning, 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 result in waterproof and weather-resistant performance.

3. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches.
(600 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

C. Gutters: Join sections with riveted and soldered or lapped, riveted, and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 36 inches (914 mm) o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

D. Downspouts: Join sections with telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch (25 mm) away from walls; locate fasteners at top and bottom and at approximately 60 inches (1500 mm) o.c. in between.
   1. Provide elbows at base of downspouts to direct water away from building.
   2. Connect downspouts to underground drainage system indicated.

E. Roof Curbs: Install curbs at locations indicated on Drawings. Install flashing around bases where they meet metal roof panels.

F. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

3.7 FIELD QUALITY CONTROL

A. Manufacturer’s Technical Representative: Engage a qualified manufacturer’s technical representative acceptable to Owner on site to perform substrate examination, interim observations, and final roof inspections, and to prepare reports.

B. Remove and replace applications of metal roof panels where inspections indicate that they do not comply with specified requirements.

C. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.8 CLEANING

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

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

END OF SECTION 07 4113.07
SECTION 07 4213 - FORMED METAL WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Concealed-fastener, lap-seam metal wall panels.

B. Related Sections:

1. Division 07 Section "Metal Roof Panels" for factory-formed metal roof panels.
2. Division 07 Section "Sheet Metal Flashing and Trim" for field- or shop-formed fasciae, copings, flashings, roof drainage systems, and other sheet metal work not part of metal roof panel assemblies.

C. Allowances: Refer to Division 01 Section "Allowances" for description of Work in this Section affected by allowances.

D. Unit Prices: Refer to Division 01 Section "Unit Prices" for description of Work in this Section affected by unit prices.

1.2 DEFINITION

A. Metal Wall Panel Assembly: Metal wall panels, attachment system components, miscellaneous metal framing, thermal insulation, and accessories necessary for a complete weathertight wall system.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, metal wall panel Installer, metal wall panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal wall panels, including installers of doors, windows, and louvers.

2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

3. Review methods and procedures related to metal wall panel installation, including manufacturer's written instructions.

4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
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 for each type of wall panel and accessory.

B. Shop Drawings: Show fabrication and installation layouts of metal wall panels; details of edge conditions, side-seam and endlap joints, panel profiles, corners, anchorages, trim, flashings, closures, and accessories; and special details specific to project. Distinguish between factory- and field-assembled work.

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

1. Metal Roof Panels: Color samples

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer, Installer, and manufacturer's technical representative.

1. Submit Installer qualifications in the form of an original letter on manufacturer's letterhead signed by authorized manufacturer representative.

B. Material Certificates: For thermal insulation, from manufacturer.

C. Warranties: Unexecuted sample copies for special warranties.

1.6 CLOSEOUT SUBMITTALS

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

B. Warranties: Executed copies of warranties.

1.7 SUBSTITUTIONS

A. General:

1. ONLY Substitutions approved in writing by the Owner or Owner’s Representative prior to the scheduled bid date will be considered.

2. Notification of approvals will be issued at least five (5) days before the scheduled bid date.

3. Architect/Owner reserves the right to be final authority on acceptance or rejection of any substitution request.

B. When a particular make or trade name is specified, it shall be indicative of standard required. Bidders proposing substitutes shall submit the following ten (10) days prior to bid date to the Owner or Owner’s Representative; requests received after that time will not be considered.

1. Written application with explanation of why it should be considered.
2. Independent laboratory certification providing written confirmation that the physical and performance characteristics of the substitute material/system will meet the physical and performance characteristics of the specified materials and or system.

C. Submit five copies of request for substitution. Items to be included in the request:

1. Complete data substantiating compliance of proposed substitution.

2. Product identification, including manufacturer’s literature and manufacturer’s name.

3. Current certificate from an accredited testing laboratory comparing the physical and performance attributes of the proposed material with those of the specified materials. Test results must be dated, notarized, and on testing laboratory stationary.

4. Material Safety Data Sheets providing all pertinent data as to flammability, combustibility.

5. List of at least (5) five jobs as described under the requirements where the proposed alternate material was used under similar conditions. These jobs must be available for inspection by the Owner or Owner’s Representative. Names and phone numbers are required for verification. Submit a minimum of 200,000 square feet for review. Submitted projects must be a minimum of (5) years old.

6. Notarized statement from the Roof System Manufacturer, signed by a corporate officer of the corporation stating that:

   a. All Documents have been reviewed and are approved.

   b. The Project site has been inspected.

   c. The Roofing System Manufacturer will provide two (2) field inspections weekly; during, and until all construction work is complete and accepted by the owner. A full time employee of the manufacturer must perform inspections.

   d. Provide documentation of the proposed alternate system passing the specified regulatory requirements. Documentation must be on the specified regulatory requirements letterhead or approval guide. No third party testing will be accepted.

D. In making substitution request, Bidder/Contractor represents:

1. He has personally investigated proposed product or method, and determined that it is equal or superior in all respects to that specified. Additionally, he will have a technical service representative of the proposed manufacturer attend the pre-bid meeting.

2. He will provide the same guarantee for substitution as for those specified.

3. He will coordinate installation of accepted substitution in work, making such changes as may be required for work to be completed in all respects.

4. Advise the owner of any credit savings or additional costs as opposed to the system type specified.
E. Substitutions will not be considered if:

1. Product or method to be considered does not have a minimum of (5) five years of successful performance in roofing and re-roofing of similar applications.

2. Any discrepancies in the test data, or if the tests or submittals are incomplete.

3. They are indicated or implied on Shop Drawings or Project Data Submittals without formal request submitted in accordance with the specification document.

4. Acceptance requires significant revision of documents.

5. Only substitutes approved in writing by prior to scheduled cutoff date will be considered.

6. Notification of approvals will be mailed at least 3 days before bid opening.

7. The Owner will not incur any additional costs for design or construction costs.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer of plant-fabricated metal wall panel systems listed in this Section and meeting performance requirements, with a minimum of five years' experience providing metal wall panel systems for projects of similar type and scope, offering warranty and technical inspection specified.

B. Installer Qualifications: An employer of workers trained and certified by manufacturer, including a full-time on-site supervisor with a minimum of five years' experience installing similar work, able to communicate verbally with Contractor, Architect, and employees, and qualified by the manufacturer to furnish warranty of type specified.

1. Installer must provide (2) manufacturer inspections each week that associated work is underway. Noncompliance may result in an $850 per day fee for missing inspections.

C. Random Sampling

1. During course of work, the Architect may secure samples according to ASTM D140-93 of materials being used from containers at job site and submit them to an independent laboratory for comparison to specified material.

2. Should test results prove that material is not equal to specified material:

a. Contractor shall pay for all testing.

b. Roofing installed and found not to comply with the specifications shall be removed and replaced with no change in the contract price.

3. Installation quality control

a. The roofing inspector shall provide written and photographic reports, to be submitted to the architect, owner, roof system installation contractor, appraising the installation of the roof system at each of the project progress stages. The
installation contractor shall make all necessary corrections, additions or remedial actions to resolve any issues raised in the reports.

b. The roofing inspector shall have the authority to have any and all roofing work corrected, as required, to insure the proper installation and weather-tightness of the roof system, in accordance with the manufacturer's specifications.

D. Professional Engineer Qualification: A qualified professional engineer licensed in the project state, and experienced in metal roof panel system design similar to that required for Project.

E. Manufacturer's Technical Representative Qualifications: An authorized full-time employee representative of manufacturer experienced in the installation and maintenance of the specified wall panel system and qualified to determine Installer's compliance with the requirements of this Project.

F. Source Limitations: Obtain metal wall panels and accessories and metal roof panels and accessories from a single source supplied or approved by metal wall panel manufacturer.

1.9 DELIVERY, STORAGE, AND HANDLING

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

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

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

D. Retain strippable protective covering on metal wall panel for period of metal wall panel installation.

E. Protect foam-plastic insulation as follows:

1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.

2. Protect against ignition at all times. Do not deliver foam-plastic insulation materials to Project site before installation time.

3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

1.10 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal wall panels to be performed according to manufacturers' written instructions and warranty requirements.
B. Field Measurements: Verify locations of structural members and wall opening dimensions by field measurements before metal wall panel fabrication, and indicate measurements on Shop Drawings.

1.11 COORDINATION

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

1.12 WARRANTY

A. Refer to warranty requirements of Division 07 Section 075216.12 for terms and conditions of warranties covering work of this Section.

B. Manufacturer: Manufacturer's standard warranty form, covering work of this Section and extended system components indicated, in which manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within warranty period.

1. Warranty Period: 15 years from date of completion.

C. Extended Roof System Components: Warranties specified in this Section include the following components and systems specified in other sections supplied by the roofing system Manufacturer, and installed by the roofing system Installer, except where separate warranty terms and conditions appear in the referenced section.

1. Section 074113 "Metal Roof Panels": Metal roof panels.

2. Section 074213 "Metal Wall Panels": Metal wall panels.

3. Section 076200 "Sheet Metal Flashing and Trim": Shop formed sheet metal flashing items including roof penetration flashings.

D. Installer Warranty: Installer's warranty signed by Installer, covering the Work of this Section, on form acceptable to Roofing Manufacturer and Owner.

1. Warranty Period: 2 years from date of completion.

E. Metal Panel Finishes: Written warranty in which Manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes under normal atmospheric conditions within specified warranty period. Deterioration includes, but is not limited to, the following.


2. Chalking, ASTM D 4214: Greater than a No. 8 rating.

3. Finish breakdown: Cracking, checking, peeling, or adhesive failure.

4. Finish Warranty Period: 15 years from date of Substantial Completion.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Manufacturers/Products: Subject to compliance with requirements, provide products by one of the following manufacturers comparable to the Basis of Design product specified:


2.2 PERFORMANCE REQUIREMENTS

A. General Performance: Metal wall panel assemblies shall comply with performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.

B. Structural Performance: Provide metal wall panel assemblies capable of withstanding the effects the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 1592:

1. Wind Loads: Determine loads based on the following minimum design wind pressures:
   a. Uniform pressure as indicated on Drawings. Verify pressure as and installation requirements of panels with project engineer.

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

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.3 FASTENER, LAP-SEAM METAL WALL PANELS

A. General: Provide factory-formed metal wall panels designed to be field assembled by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners at side laps only. Include accessories required for weathertight installation.

B. Canceled-Fastener Metal Wall Panels: Hook and cleat interlocking panel, Asymmetrical horizontal ribs used on wall applications.


2. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 50 (Class AZM150 coating designation, Grade 340) structural quality. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
   a. Minimum Thickness: 0.0236-inch/24 ga. (0.71-mm).
   b. Surface: Smooth, flat finish.
c. Exposed Coil-Coated Finish: Two Coat Extra Thick Fluoropolymer for coastal environments

d. Color: Coastal Regal Blue.

3. Rib Spacing: 4 inch 12 inches (305 mm)

4. Panel Coverage: 16 inch x up to 48 ft in length 35.375 inches (898 mm).

5. Panel Height: 16 inch 1.187 inches (30.1 mm).

2.4 METAL LINER PANELS (where applicable)

A. General: Provide factory-formed metal liner panels designed for interior side of metal wall panel assemblies and field assembled 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 a complete installation.

B. Flush-Profile Metal Liner Panels: Solid panels formed with vertical panel edges and flat pan between panel edges; with flush joint between panels. Provide only where applicable at areas visible from interior.

1. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 50 (Class AZM150 coating designation, Grade 340); structural quality. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

2. Minimum Thickness: 24 ga./0.028-inch (0.71-mm).
   a. Exposed Finish: 2 coat extra thick fluoropolymer coastal
   b. Color: Coastal Regal Blue.

3. Panel Coverage: 12 inches (305 mm).

4. Panel Height: 1.0 inches (25 mm).

2.5 ACCESSORIES

A. Panel Accessories: Provide components required for a complete metal panel assembly including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels, unless otherwise indicated.

1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal wall panels.

2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

3. Closure Strips: Where applicable. Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick,
flexible closure strips; cut or premolded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

B. Flashing and Trim: Formed from 0.018-inch (0.46-mm) minimum thickness, aluminum-zinc alloy-coated steel sheet prepainted with coil coating. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, end walls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal wall panels.

1. Basis of Design Product: Tremco, TremLock Sheet

2.6 MISCELLANEOUS METAL FRAMING

A. Miscellaneous Metal Framing, General: ASTM C 645, cold-formed metallic-coated steel sheet, ASTM A 653/A 653M, G60 (Z180) Stainless steel or coating with equivalent corrosion resistance unless otherwise indicated.

B. Subgirts: Manufacturer's standard C- or Z-shaped sections, 0.064-inch (1.63-mm) nominal thickness.

C. Zee Clips: 0.079-inch (2.01-mm) nominal thickness.

D. Base or Sill Angles and Channels: 0.079-inch (2.01-mm) nominal thickness.

E. Cold-Rolled Furring Channels: Minimum 1/2-inch- (13-mm-) wide flange.

   1. Nominal Thickness: 0.064 inch (1.63 mm).
   2. Depth: 3/4 inch (19 mm).
   3. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with 0.040-inch (1.02-mm) nominal thickness.

F. Z-Shaped Furring: With slotted or non-slotted web, face flange of 1-1/4 inches (32 mm), wall attachment flange of 7/8 inch (22 mm), and depth required to fit insulation thickness indicated.

   1. Nominal Thickness: 0.025 inch (0.64 mm).

G. Stainless Fasteners for Miscellaneous Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten miscellaneous metal framing members to substrates.

2.7 MISCELLANEOUS MATERIALS

A. Stainless steel Panel Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal wall panels by means of plastic caps or factory-applied coating. Provide EPDM sealing washers.

B. Underlayment Materials
1. Self-Adhering, High-Temperature Sheet: 30 to 40 mils (0.76 to 1.0 mm) thick minimum, consisting of slip-resisting, polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
   b. Low-Temperature Flexibility: Passes after testing at minus 20 deg F (29 deg C) ; ASTM D 1970.
   c. Available Manufacturers
      1) Tremco
      2) McElroy

2.8 FABRICATION

A. General: Fabricate and finish metal wall panels and accessories at the factory to greatest extent possible, 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.

1. Site-rolled fabrication of panels or shop-rolling of panels using fixed equipment designed for site-rolling applications does not meet the requirements of this Section.

B. Fabricate metal wall panels in a manner that eliminates condensation on interior side of panel and with joints between panels designed to form weathertight seals.

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

D. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the 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.


3. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.

4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.

5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended by metal wall panel manufacturer.
a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

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

2.10 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 the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Aluminum Panels and Accessories:
   1. Two-Coat extra thick Fluoropolymer Coastal: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

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

   1. Examine sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.

B. Examine roughing-in for components and systems penetrating metal wall panels to verify actual locations of penetrations relative to seam locations of metal wall panels before metal wall panel installation.
C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Framing: Install subgirts, base angles, sills, furring, and other miscellaneous wall panel support members and anchorages according to ASTM C 754 and metal wall panel manufacturer's written recommendations.

3.3 UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated below, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). [Extend underlayment into gutter trough.] Roll laps with roller. Cover underlayment within 14 days.

1. Apply over entire wall panel surface

B. Install wall panels and flashings to cover underlayment to comply with requirements specified in Division 07 Section "Sheet Metal Flashing and Trim"

3.4 METAL WALL PANEL INSTALLATION

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

1. Commence metal wall panel installation and install minimum of 300 sq. ft. (27.8 sq. m.) in presence of factory-authorized representative.

2. Shim or otherwise plumb substrates receiving metal wall panels.

3. Flash and seal metal wall panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until weather barrier and flashings that will be concealed by metal wall panels are installed.

4. Install screw fasteners in predrilled holes where applicable. Make all attempts to ensure panels fastening points are concealed.

5. Locate and space fastenings in uniform vertical and horizontal alignment.

6. Install flashing and trim as metal wall panel work proceeds.

7. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition where applicable.

8. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete and elsewhere as indicated or, if not indicated, as necessary for waterproofing.
9. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.

10. Provide weathertight escutcheons for pipe and conduit penetrating exterior walls.

B. Fasteners:

1. Galvalume Panels: Use 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 will contact each other or corrosive substrates, protect against galvanic action as recommended by metal wall panel manufacturer.

D. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weathertight performance of metal wall panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal wall panel manufacturer.

1. Seal metal wall panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal wall panel manufacturer.

2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."

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

1. Lap ribbed or fluted sheets one full rib corrugation. Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.

2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal wall 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. Ensure every effort is made to conceal all fasteners.

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.

5. Provide sealant tape at lapped joints of metal wall panels and between panels and protruding equipment, vents, and accessories.

6. Apply a continuous ribbon of sealant tape to weather-side surface of fastenings on end laps; on side laps of nesting-type panels; on side laps of corrugated nesting-type, ribbed, or fluted panels; and elsewhere as needed to make panels weathertight.

7. At panel splices, nest panels with minimum 6-inch (152-mm) end lap, sealed with butyl-rubber sealant and fastened together by interlocking clamping plates.
F. Zee Clips: Provide Zee clips of size indicated or, if not indicated, as required to act as standoff from subgirts for thickness of insulation indicated. Attach to subgirts with fasteners.

G. Metal Liner Panels: Install panels on exterior side of girts with girts exposed to the interior.

3.5 ACCESSORY INSTALLATION

A. General: 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 wall panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without excessive oil canning, 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 result in waterproof and weather-resistant performance.

2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (605 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

3.6 FIELD QUALITY CONTROL

A. Remove and replace metal wall panels where inspections indicate that they do not comply with specified requirements.

B. Additional tests and inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.7 CLEANING AND PROTECTION

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

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

C. Replace metal wall panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.
END OF SECTION 074213
SECTION 07 5216.12.1 - SBS MODIFIED BITUMINOUS MEMBRANE ROOFING, TORCH-APPLIED (Concrete Deck)

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. Styrene-butadiene-styrene (SBS) modified bituminous membrane roofing system on concrete deck, including but not limited to:

   a. Roof insulation.

      1) Polysiocyanurate roofing insulation (as indicated on plans), with slope in structure or tapered insulation at various locations as required to provide positive drainage with NO PONDING”.

      2) Polysiocyanurate roofing insulation crickets & saddles (as indicated on plans), 1/2” per foot slope or as required to provide positive drainage with NO PONDING.

      3) One (1) layer of 1/2” thick high performance cement based roof cover board

      4) All insulations are adhered to the concrete deck with specified adhesive per wind uplift requirements.

   b. Roof membrane and membrane base flashings.

      1) One (1) ply of fire rated, high performance, fiberglass reinforced, SBS modified bitumen membrane with ultra-white surfacing, torch-applied.

      2) Two (2) plies of fiberglass reinforced modified base sheet torch applied to insulated substrate.

2. Removal of all abandoned piping, equipment and supports as required and patching or repair of the existing deck, structure and interior as required.

3. All existing roof penetration flashings will be replaced with new roof penetration flashings; including but not limited to lead plumbing vent flashings, heater vents, gravity vents, pitch pans, and any other miscellaneous roof penetration flashings.

4. Install proper pipe supports under all pipes and conduit on the roof. Install proper pads under all pipe supports.
B. Related Sections:
   1. Division 06 carpentry section for wood nailers, wood cants, curbs, and blocking.
   2. Division 07 Section "Preparation for Re-Roofing" for existing roofing tearoff, patching, and substrate preparation for rehabilitation of roofing membrane.
   3. Division 07 Section "Sheet Metal Flashing and Trim" for custom metal roof penetration flashings, flashings, and counter flashings.

C. Alternates: Refer to Division 01 Section "Alternates" for description of Work in this Section affected by alternates.

D. Allowances: Refer to Division 01 Section "Allowances" for description of Work in this Section affected by allowances.

E. Unit Prices: Refer to Division 01 Section "Unit Prices" for description of Work in this Section affected by unit prices.

1.3 FIRE WATCH

A. Provide fire watch during torch application and continue for two hours after torch work has been completed. All roof areas worked on should be checked for hot spots and signs of smoldering. If available, infrared roof scanners should be used. The inside of the building should also be inspected for signs of fire and smoke.

B. When torch applied materials are installed the Contractor shall provide a fire watch.

C. Provide fire watch during torch application and continue for one hour after torch work has been completed. All roof areas worked on should be checked for hot spots and signs of smoldering. If available, infrared roof scanners should be used. The inside of the building should also be inspected for signs of fire and smoke.

D. Provide at least two 10lb (4.5 kg) multipurpose dry chemical portable extinguisher within 20 ft. (6.1 m) horizontal travel distance of torch-applied roofing equipment.

E. No full-time torch shall be used under any circumstances.

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.

1.5 ACTION SUBMITTALS

A. All Submittals to be in electronic format.

B. Product Data: For each type of product indicated.
C. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work. Provide roof plan showing orientation and types of roof deck, orientation of membrane roofing, and fastening spacings and patterns for mechanically fastened components.

1. Crickets, saddles, and tapered edge strips, including slopes.

1.6 INFORMATIONAL SUBMITTALS

A. All submittals to be in electronic format.

B. Qualification Data: For Installer, Manufacturer, and Roofing Inspector.

1. Include letter from Manufacturer written for this Project indicating approval of Installer.

C. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in “Performance Requirements” Article.

1. Submit evidence of compliance with performance requirements, for wind uplift.

2. Indicate that proposed system components are compatible.

D. Warranties: Unexecuted sample copies of special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: To include in maintenance manuals.

B. Warranties: Executed copies of warranties.

1.8 SUBSTITUTIONS

A. General:

1. ONLY Substitutions approved in writing by the Owner or Owner’s Representative prior to the scheduled bid date will be considered.

2. Notification of approvals will be issued at least five (5) days before the scheduled bid date.

3. Architect/Owner reserves the right to be final authority on acceptance or rejection of any substitution request.

B. When a particular make or trade name is specified, it shall be indicative of standard required. Bidders proposing substitutes shall submit the following ten (10) days prior to bid date to the Owner or Owner’s Representative; requests received after that time will not be considered.

1. Written application with explanation of why it should be considered.

2. Independent laboratory certification providing written confirmation that the physical and performance characteristics of the substitute material/system will meet the physical and performance characteristics of the specified materials and or system.
C. Submit five copies of request for substitution. Items to be included in the request:

1. Complete data substantiating compliance of proposed substitution.
2. Product identification, including manufacturer’s literature and manufacturer’s name.
3. Current certificate from an accredited testing laboratory comparing the physical and performance attributes of the proposed material with those of the specified materials. Test results must be dated, notarized, and on testing laboratory stationary.
4. Material Safety Data Sheets providing all pertinent data as to flammability, combustibility.
5. List of at least (5) five jobs as described under the requirements where the proposed alternate material was used under similar conditions. These jobs must be available for inspection by the Owner or Owner’s Representative. Names and phone numbers are required for verification. Submit a minimum of 200,000 square feet for review. Submitted projects must be a minimum of (5) years old.
6. Notarized statement from the Roof System Manufacturer, signed by a corporate officer of the corporation stating that:
   a. All Documents have been reviewed and are approved.
   b. The Project site has been inspected.
   c. The Roofing System Manufacturer will provide two (2) field inspections weekly; during, and until all construction work is complete and accepted by the owner. A full time employee of the manufacturer must perform inspections.
   d. Provide documentation of the proposed alternate system passing the specified regulatory requirements. Documentation must be on the specified regulatory requirements letterhead or approval guide. No third party testing will be accepted.

D. In making substitution request, Bidder/Contractor represents:

1. He has personally investigated proposed product or method, and determined that it is equal or superior in all respects to that specified. Additionally, he will have a technical service representative of the proposed manufacturer attend the pre-bid meeting.
2. He will provide the same guarantee for substitution as for those specified.
3. He will coordinate installation of accepted substitution in work, making such changes as may be required for work to be completed in all respects.
4. Advise the owner of any credit savings or additional costs as opposed to the system type specified.

E. Substitutions will not be considered if:
1. Product or method to be considered does not have a minimum of (5) five years of successful performance in roofing and re-roofing of similar applications.

2. Any discrepancies in the test data, or if the tests or submittals are incomplete.

3. They are indicated or implied on Shop Drawings or Project Data Submittals without formal request submitted in accordance with the specification document.

4. Acceptance requires significant revision of documents.

5. Only substitutes approved in writing by prior to scheduled cutoff date will be considered.

6. Notification of approvals will be mailed at least 3 days before bid opening.

7. The Owner will not incur any additional costs for design or construction costs.

1.9 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and certified by manufacturer, including a full-time on-site supervisor with a minimum of five years’ experience installing products comparable to those specified, able to communicate verbally with Contractor, Architect, and employees, and qualified by the manufacturer to install manufacturer's product and furnish warranty of type specified.

1. For torch-applied applications, employ workers certified under NRCA's Certified Roofing Torch Applicator (CERTA) program.

2. Installer must provide (2) manufacturer inspections each week. Noncompliance may result in an $850 per day fee for missing inspections.

B. Manufacturer Qualifications: Approved manufacturer with UL listed roofing systems comparable to those specified for this Project, with minimum five years' experience in manufacture of comparable products in successful use in similar applications, and able to furnish warranty with provisions matching specified requirements.

C. Roofing Inspector Qualifications: A technical representative of manufacturer not engaged in the sale of products and experienced in the installation and maintenance of the specified roofing system, qualified to perform roofing observation and inspection specified in Field Quality Control Article, to determine Installer's compliance with the requirements of this Project, and approved by the manufacturer to issue warranty certification. The Roofing Inspector shall be one of the following:

1. An authorized full-time technical employee of the manufacturer.

D. Random Sampling

1. During course of work, the Architect may secure samples according to ASTM D140-93 of materials being used from containers at job site and submit them to an independent laboratory for comparison to specified material.

2. Should test results prove that material is not equal to specified material:
Texas A&M University Corpus Christi
CI Re-Roof and Building Envelope Improvements

a. Contractor shall pay for all testing.

b. Roofing installed and found not to comply with the specifications shall be removed and replaced with no change in the contract price.

3. Installation quality control

a. The roofing inspector shall provide written and photographic reports, to be submitted to the architect, owner, roof system installation contractor, appraising the installation of the roof system at each of the project progress stages. The installation contractor shall make all necessary corrections, additions or remedial actions to resolve any issues raised in the reports.

b. The roofing inspector shall have the authority to have any and all roofing work corrected, as required, to insure the proper installation and weather-tightness of the roof system, in accordance with the manufacturer's specifications.

E. Manufacturer's Installation Instructions: Obtain and maintain on-site access to manufacturer's written instructions for installation of products.

F. Preinstallation Roofing Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.

2. Review drawings and specifications.

3. Review methods and procedures related to roofing installation, including manufacturer's written instructions.

4. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

5. Examine substrate conditions and finishes for compliance with requirements, including flatness and fastening.

6. Review structural loading limitations of roof deck during and after roofing.

7. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.

8. Review governing regulations and requirements for insurance and certificates if applicable.

9. Review temporary protection requirements for roofing system during and after installation.

10. Review roof observation and repair procedures after roofing installation.
1.10 DELIVERY, STORAGE, AND HANDLING

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

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
   1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

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

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

1.11 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. Daily Protection: Coordinate installation of roofing so insulation and other components of roofing system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.
   1. Provide tie-offs at end of each day's work to cover exposed roofing and insulation with a course of roofing sheet securely in place with joints and edges sealed.
   2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing.
   3. Remove temporary plugs from roof drains at end of each day.
   4. Remove and discard temporary seals before beginning work on adjoining roofing.

1.12 WARRANTY

A. Warranty, General: Warranties specified shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

B. Manufacturer's Warranty: Manufacturer's standard or customized form, in which manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.
1. Manufacturer's warranty includes roofing membrane, base flashings, fasteners, roofing membrane accessories and other components of roofing system specified in this Section.

2. Warranty Period: 15 years from date of Substantial Completion.

C. Installer'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 roofing system such as roofing membrane, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, and walkway products, for the following warranty period:

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

D. Extended Roof System Warranty: Warranties specified in this Section include the following components and systems specified in other sections supplied by the roofing system Manufacturer, and installed by the roofing system Installer:

1. Sheet metal flashing and trim, including roof penetration flashings.

E. Manufacturer Inspection and Preventive Maintenance Requirement: By manufacturer's technical representative, to report maintenance responsibilities to Owner necessary for preservation of Owner's warranty rights. The cost of manufacturer's inspections and preventive maintenance is included in the Contract Sum.

1. Inspections to occur in the following years subsequent to completion: 2, 5 and 10.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain components for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer. Obtain components for roofing system compatible with specified approved assembly.

2.2 PERFORMANCE REQUIREMENTS

A. General Performance: Roofing shall withstand exposure to weather without failure or leaks due to defective manufacture or installation.

1. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.

2. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272.

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. Wind uplift Compliance: Provide roofing membrane, base flashing, and component materials that comply with the requirements to acquire a certificate of wind storm from the State of
IT IS THE BIDDERS RESPONSIBILITY TO READ AND UNDERSTAND THE TESTED ASSEMBLY. IF NEEDED A COPY OF THE TESTED CONSTRUCTION ASSEMBLY LISTED ABOVE CAN BE OBTAINED FROM THE SYSTEM MANUFACTURER.

D. Roofing System Design: Provide roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency in accordance with ANSI/FM 4474, UL 580, or UL 1897, and to resist uplift pressures.

1. All Zones (Corner, Perimeter, and Field-of-Roof) Uplift Pressures: As indicated on Drawings. Verify system is acceptable and complies with uplift requirements with project engineer prior to installation.

E. SPRI Wind Design Standard: Manufacture and install copings and roof edge flashings tested according to SPRI ES-1 and capable of resisting the following design pressures:

1. Design Pressure: As indicated on Drawings. Verify sheet metal installation complies with windstorm requirements of project engineer prior to installation.

F. Flashings and Fastening: Comply with requirements of Division 07 Sections "Sheet Metal Flashing and Trim" and "Roof Specialties." Provide base flashings, perimeter flashings, detail flashings and component materials and installation techniques that comply with requirements and recommendations of the following:

1. FM Global 1-49: Loss Prevention Data Sheet for Perimeter Flashings.
2. FM Global 1-29: Loss Prevention Data Sheet for Above Deck Roof Components.
3. NRCA Roofing Manual (Sixth Edition) for construction details and recommendations.

G. 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.

H. Solar Reflectance Index: Not less than 78 when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.

2.3 ROOFING MEMBRANE MATERIALS

A. Base Ply Sheet:

1. ASTM D 6163 Type I Grade S SBS/SIS/SEBS-modified asphalt-coated glass-fiber reinforced sheet, smooth surfaced, designed for heat-welded applications.


   b. Tensile Strength at 73 deg. F (23 deg. C), minimum, ASTM D 5147: 70 lbf/in (12.3 kN/m) machine direction; 50 lbf/in (8.8 kN/m) cross-machine direction.
c. Tear Strength at 73 deg. F (23 deg. C), minimum, ASTM D 5147: 100 lbf (445 N) machine direction; 80 lbf (400 N) machine direction.


f. Thickness, ASTM D 5147: 0.118 inch (3.0 mm).

B. SBS Modified Bituminous Membrane Ply Sheets:

1. ASTM D 6163 Type I Grade S SBS/SIS/SEBS-modified asphalt-coated glass-fiber reinforced sheet, smooth surfaced, designed for heat-welded applications.


   b. Tensile Strength at 73 deg. F (23 deg. C), minimum, ASTM D 5147: 70 lbf/in (12.3 kN/m) machine direction; 50 lbf/in (8.8 kN/m) cross-machine direction.

   c. Tear Strength at 73 deg. F (23 deg. C), minimum, ASTM D 5147: 100 lbf (445 N) machine direction; 80 lbf (400 N) machine direction.


   f. Thickness, ASTM D 5147: 0.118 inch (3.0 mm).

C. SBS Modified Bituminous Cap Sheet:

1. ASTM D 6163 Type I Grade G SBS-modified asphalt-coated glass-fiber-reinforced sheet, designed for heat welded application, granular surfaced with a factory applied white reflective granule; CRRC listed and California Title 24 Energy Code compliant.


   b. Exterior Fire-Test Exposure, ASTM E 108: Class A.

   c. Tensile Strength at 73 deg. F (23 deg. C), minimum, ASTM D 5147: Machine direction 70 lbf/in (12.0 kN/m); Cross machine direction 50 lbf/in (8.8 kN/m).

   d. Tear Strength at 73 deg. F (23 deg. C), minimum, ASTM D 5147: Machine direction, 100 lbf (445 N); Cross machine direction 90 lbf (400 N).

   e. Elongation at 73 deg. F (23 deg. C), minimum, ASTM D 5147: Machine direction 4 percent; Cross machine direction 4 percent.


   g. Thickness, minimum, ASTM D 5147: 0.165 inch (4.2 mm).

D. Base Flashing Backer Sheet:

1. ASTM D 6162 Type III Grade S SBS/SIS/SEBS-modified asphalt-coated composite polyester and glass-fiber reinforced sheet, smooth surfaced, designed for heat-welded applications.
   b. Tensile Strength at 73 deg. F (23 deg. C), minimum, ASTM D 5147: 275 lbf/in (48 kN/m).
   d. Elongation at 73 deg. F (23 deg. C), minimum, ASTM D 5147: 3 percent.
   f. Thickness, ASTM D 5147: 0.090 inch (2.3 mm).

2. ASTM D 6162 Type III Grade S SBS/SIS/SEBS-modified asphalt-coated composite polyester and glass-fiber reinforced sheet, smooth surfaced, designed for heat-welded applications.
   b. Tensile Strength at 73 deg. F (23 deg. C), minimum, ASTM D 5147: 275 lbf/in (48 kN/m).
   d. Elongation at 73 deg. F (23 deg. C), minimum, ASTM D 5147: 3 percent.
   f. Thickness, ASTM D 5147: 0.090 inch (2.3 mm).

E. Base Flashing Sheet:

1. ASTM D 6163 Type I Grade G SBS-modified asphalt-coated glass-fiber-reinforced sheet, designed for heat welded application, granular surfaced with a factory applied white reflective granule; CRRC listed and California Title 24 Energy Code compliant.
   b. Exterior Fire-Test Exposure, ASTM E 108: Class A.
   c. Tensile Strength at 73 deg. F (23 deg. C), minimum, ASTM D 5147: Machine direction 70 lbf/in (12.0 kN/m); Cross machine direction 50 lbf/in (8.8 kN/m).
d. Tear Strength at 73 deg. F (23 deg. C), minimum, ASTM D 5147: Machine direction, 100 lbf (445 N); Cross machine direction 90 lbf (400 N).

e. Elongation at 73 deg. F (23 deg. C), minimum, ASTM D 5147: Machine direction 4 percent; Cross machine direction 4 percent.


g. Thickness, minimum, ASTM D 5147: 0.165 inch (4.2 mm).


2.4 ASPHALT MATERIALS

A. Asphalt primer, water-based, polymer modified.

1. Basis of design product: Tremco, TREMprime WB.

2. Volatile Organic Compounds (VOC), maximum, ASTM D 3960: 2 g/L.

B. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required by roofing system manufacturer for application.

2.5 AUXILIARY ROOFING 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.

B. Metal Flashing Sheet: Metal flashing sheet is specified in Division 07 Section "Sheet Metal Flashing and Trim."

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

1. Elastomeric Roofing Mastic, Low-Volatile: One-part, trowel-grade, elastomeric roof mastic specially formulated for compatibility and use with specified roofing membranes and flashings.

   a. Basis of design product: Tremco, POLYroof LV.

   b. Volatile Organic Compounds (VOC), maximum, ASTM D 3960: 300 g/L.


   d. Recovery from 500 percent Elongation, minimum, ASTM D 412: 500 percent.

   e. Flexibility at -40 deg. F (-40 deg. C), ASTM D 3111: No cracking.
2. Asphalt mastic for miscellaneous sealing and waterproofing:
   a. An asphalt-based, heavily fibrated, asbestos free mastic.
   b. Basis of Design: Tremco ELS.
3. Pitch pan mastic:
   a. High performance single component roof elastomer.
   b. Basis of Design: Tremco POLYroof LV
   c. CHEM CURBS ARE NOT ACCEPTABLE
4. Metal Joint Sealant:
   a. Asbestos-free. Moisture cured, one-component polyurethane sealant.
   b. Basis of Design: TremSEAL Pro
5. Reglet Joint Sealant
   a. One-part, bituminous polyurethane sealant.
6. Vents and/or Stacks:
   a. Stainless: Type 316, No 3 Polish.
   b. Gage: Twenty-four (24).
   c. Solder: ASTM B32-89, alloy grade 60A. Neutralize flux after soldering.
7. Termination Bar for top edge of all base flashings:
   a. Extruded aluminum, pre-punched 8” o.c.
8. Primary Scuppers and Overflow Scuppers:
   a. Stainless Steel, Type 316, No 3 Polish Finish (all locations except those designated as copper): Twenty-four (24) gauge minimum, stainless steel; commercial quality, Fed. Spec. QQ-S-775, Type I, Class D or ASTM A 526 or lock forming quality ASTM A 527.
9. Fascia, Coping, Collector Heads, Gutters, Downspouts and other Visible Sheet Metal Flashing:
   a. Stainless Steel, Type 316, No 3 Polish Finish (all locations except those designated as copper): Twenty-four (24) gauge minimum, stainless steel; commercial quality,
Fed. Spec. QQ-S-775, Type I, Class D or ASTM A 526 or lock forming quality
ASTM A 527

10. Counter flashing, slip flashing:
   a. Stainless Steel, Type 316, No 3 Polish Finish (all locations except those designated as copper): Twenty-four (24) gauge minimum, stainless steel; commercial quality, Fed. Spec. QQ-S-775, Type I, Class D or ASTM A 526 or lock forming quality ASTM A 527

11. Pitch pans with hoods:
   a. Stainless Steel, Type 316 No 3 Polish: Twenty-four (24) gauge minimum, stainless steel; commercial quality, Fed. Spec. QQ-S-775, Type I, Class D or ASTM A 526 or lock forming quality ASTM A 527, G90 coating in accordance with ASTM A 525

12. Walkway Pads for all access panels at all A/C units:
   a. Mineral-surfaced asphaltic composition panels, factory formed, nonporous, with a slip-resisting surface texture, manufactured specifically for adhering to built-up roofing as a protection course for foot traffic:
      1) Thickness: 1/2 inch
   b. Basis of Design: Tremco TremTred.

13. Pipe Supports:
   a. Pipe supports for small pipes and conduit:
      1) Pipe or Conduit size: 1/4” to 1.5” ID
      2) Rubber triangle pipe blocks extruded from 100% EPDM rubber.
   b. Basis of Design: Rubber Triangle Pipe Blocks by Tremco or pre-approved substitution.

14. Pipe Supports for large pipes and conduit:
   a. Pipe or Conduit size: 1.5” or larger ID
   b. Galvanized roller pipe supports.
   c. Basis of Design: SS8-R or RB-18 as applicable by PHP Pipe supports of Houston, TX or approved equal.

15. Primer:
   a. An asbestos free, modified water-based asphalt primer
b. 2. Basis of Design: Tremco Tremprime WB.

16. Flashing tape for top edge of base flashing
   a. A flexible, non-drying, butyl-based, gasket-forming sealant tape.
   b. Basis of design: Tremco TF Tape

17. Reinforcement membrane:
   a. A non-shrinking, non-rotting, vinyl coated, woven glass mesh.
   b. Basis of Design: Tremco Burmesh - 6”.

2.6 INSULATION ADHESIVES

A. Two-Part Urethane Insulation Adhesive (UIA) is a two-component polyurethane adhesive used for attaching insulation boards to the roof deck or to other insulation boards

1. Basis of design product: Tremco LRF
   a. Tremco: LRF
      1) Tremco LRF
      2) Royal: Millennium PG-1

2.7 ROOF INSULATION

A. Roof Insulation, 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 Global-approved roof insulation.

1. Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches (1:48) unless otherwise indicated.

2. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

B. Roof Insulation:

1. Polyisocyanurate board insulation, ASTM C 1289 Type II Class 1 CFC- and HCFC- free, with recycled content glass-fiber mat facer on both major surfaces.
   c. Available Manufacturers
      1) Tremco: Trisotech
2) Atlas: AC Foam II, AC Foam III

C. Roof Insulation Cover board
   1. Cement based, water durable, mold resistant, non combustible, Class A unlimited slope, ASTM E84
   2. Basis of Design: USG Cement Roof Board

D. Wood Cant Strips: Comply with requirements in Division 06 carpentry section

E. Tapered Edge Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.

2.8 WALKWAYS

A. Walkway pads, ceramic-granule-surfaced reinforced asphaltic composition slip-resisting pads, manufactured as a traffic pad for foot traffic, 1/2 inch (13 mm) thick minimum.
   2. Flexural Strength at max. load, minimum, ASTM C 203: 210 psi (1.5 kPa).
   5. Pad Size: 36 by 48 inch (914 by 1220 mm).

2.9 WALL TREATEMENT AND COATING MATERIALS (Where applicable)

A. Primer for previously coated walls above roof membrane:
   1. Acrylic polymer emulsion, stain resistant, fast drying, flexible base primer for elastomeric latex coatings.

B. Coating for previously coated walls above roof membrane:
   1. Acrylic polymer emulsion wall coating with fiber reinforcement.
   2. Tinted to match existing.
   3. Basis of Design: Tremco Solargard HY-BUILD
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:

1. Verify that roof openings and penetrations are in place and curbs are set and braced and that roof drain bodies are securely clamped in place.

2. Verify that, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation. wood cants

3. Concrete Roof Deck:
   a. Verify that minimum concrete drying period recommended by roofing manufacturer has passed.
   b. Verify that concrete substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
   c. Verify that concrete curing compounds that will impair adhesion of roofing components to roof deck have been removed.

4. Verify that existing insulation and substrate is sound and dry.

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

3.2 PREPARATION

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

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

3.3 INSTALLATION, GENERAL

A. Install roofing system in accordance with manufacturer's recommendations.

B. Install wood cants, blocking, curbs, and nailers in accordance with requirements of Division 06 carpentry section.

C. Install roofing system in accordance with the following NRCA Manual Plates and NRCA recommendations; modify as required to comply with requirements of FM Global references above:

1. Metal Parapet Cap (Coping) and Base Flashing: Plates MB-1 and MB-1S.
2. Surface-Mounted Counterflashing for Concrete Walls (at Parapet Wall): Plates MB-4 and MB-4S.
3. Base Flashing for Wall-supported Deck: Plates MB-5 and MB-5S.
4. Base Flashing for Non-wall-supported deck (Movement Joint): Plates MB-6 and MB-6S.
5. Base and Surface-mounted Counterflashing: Plates MB-4 and MB-4S.
6. Base Flashing for Vented Base Sheet: Plates MB-5A and MB-5AS.
7. Raised Perimeter Edge with Metal Flashing (Fascia Cap): Plates MB-2 and MB-2S.
8. Embedded Edge Metal Flashing Edge (Gravel-stop): Plates MB-3 and MB-3S.
10. Gutter at Draining Edge: Plates MB-22 and MB-22S.
11. Expansion Joint with Metal Cover: Plates MB-7 and MB-7S and Division 07 Section "Sheet Metal Flashing and Trim."
12. Expansion Joint with Premanufactured Cover: Plates MB-7A and MB-7AS and Division 07 Section "Roof Expansion Assemblies."
13. Area Divider in Roof System: Plates MB-8 and MB-8S.
14. Equipment Support Curb: Plates MB-9 and MB-9S.
17. Raised Curb Detail at Rooftop HVAC Units, Premanufactured: Plates MB-12 and MB-12S and Division 7 Section "Roof Accessories."
18. Raised Curb Detail at Rooftop HVAC Units (Job site constructed wood curb): Plates MB-13 and MB-13S and Division 06 Section "Miscellaneous Rough Carpentry."
19. Skylight, Scuttle (Roof Hatch), and Smoke Vents: Plates MB-14 and MB-14S and Division 07 Section "Roof Accessories."
20. Penetration, Structural Member through Roof Deck: Plates MB-15 and MB-15S.
21. Penetration, Sheet Metal Enclosure for Piping Through Roof Deck: Plates MB-16 and MB-16S
22. Penetration, Isolated Stack Flashing: Plates MB-17 and MB-17S.
23. Penetration, Isolated Stack Flashing: Plates MB-17A and MB-17AS.
24. Penetration, Plumbing Vent: Plates MB-18 and MB-18S.

25. Penetration, Pocket: Plates MB-19 and MB-19S.

26. Roof Drain: Plates MB-20 and MB-20S.

27. Roof Drain: Plates MB-20A and MB-20AS.

28. Guide for Clearances between Pipes / Walls / Curbs - Table 4

29. Guide for Crickets and Saddles - Table 5

30. Guide for Edge Scuppers with Tapered Saddles - Table 6

3.4 INSULATION INSTALLATION

A. Comply with built-up roofing manufacturer's written instructions for installing roof insulation.

B. Cant Strips: Install and secure preformed 45-degree cant strips at junctures of built-up roofing with vertical surfaces or angle changes greater than 45 degrees.

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

D. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch (6 mm) with insulation.

1. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.

E. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inch (70 mm) or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (150 mm) in each direction.

1. Install insulation at minimum thickness of 2.5 inches (64 mm).

F. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.

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

H. Adhered Insulation: Install each layer of insulation and adhere to substrate as follows:

1. Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.

2. Install adhered insulation using minimum of 3/4” wide bead of adhesive at 12” on center minimum spacing. Special care to be given to perimeter edge to avoid soft spots in insulation.
I. Cover Board Installation: Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches (150 mm) in each direction. Loosely butt cover boards together. Tape joints if required by roofing manufacturer.

   1. Set cover boards in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
   
   2. Install adhered insulation using minimum of 3/4” wide bead of adhesive at 12” on center minimum spacing. Special care to be given to perimeter edge to avoid soft spots in insulation.

3.5 TORCH-APPLIED 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" and as follows:

   1. Deck Type: Concrete deck.
   
   2. Base Sheet: One.
      
   
   3. Inner Membrane Sheet: One.
      
   
   4. Granular-Surfaced SBS-Modified Asphalt Cap Sheet:
      

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

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

D. Coordinate installation of 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 forecast.

   1. Provide tie-offs at end of each day's work configured as recommended by NRCA Roofing Manual Appendix: Quality Control Guidelines - Insulation to protect new and existing roofing.
   
   2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing.
   
   3. Remove temporary plugs from roof drains at end of each day.
4. Remove and discard temporary seals before beginning work on adjoining roofing.

3.6 BASE-PLY SHEET INSTALLATION

A. Loosely lay one course of, lapping edges and ends a minimum of 2 inches and 6 inches (50 mm and 150 mm), respectively.

B. Install lapped base-sheet course, extending sheet over and terminating beyond cants. Attach base sheet as follows:
   1. Torch-apply to substrate.

3.7 SBS-MODIFIED BITUMINOUS MEMBRANE INSTALLATION

A. Install modified bituminous roofing membrane sheet and cap sheet according to roofing manufacturer's written instructions, starting at low point of roofing system. Extend roofing membrane sheets over and terminate beyond cants, installing as follows:
   1. Unroll roofing membrane sheets and allow them to relax for minimum time period required by manufacturer.
   2. Torch apply to substrate in accordance with manufacturer's written instructions and NRCA CERTA guidelines.

B. Laps: Accurately align roofing membrane sheets, without stretching, and maintain uniform side and end laps. Stagger end laps. Install roofing membrane sheets so side and end laps shed water. Completely bond and seal laps, leaving no voids.
   1. Repair tears and voids in laps and lapped seams not completely sealed.
   2. Apply roofing granules to cover exuded bead at laps while bead is hot.

3.8 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. Extend base flashing up walls or parapets a minimum of 12 inches (300 mm) above built-up roofing and 6 inches (150 mm) onto field of roof membrane.
   2. Prime substrates with asphalt primer if required by roofing system manufacturer.
   4. Flashing Sheet Application: Adhere flashing sheet to substrate in cold-applied adhesive at rate required by roofing system manufacturer. Seal joints in flashing sheet. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing.
5. Flashing Sheet Application: Torch-apply flashing sheet to substrate.


B. Seal top termination of base flashing with a metal termination bar.

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

D. Roof Drains: Set 30 by 30 inch (760 by 760 mm) 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.

3.9 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. Sweep away loose aggregate surfacing.

2. Set walkway pads in cold-applied adhesive.

3.10 WALL TREATMENT AND COATING INSTALLATION

A. Wall coating at previously coated walls above the roof membrane:

1. Pressure wash and clean masonry wall to be coated.

2. Provide repairs to cracks in masonry wall larger than 1/8” with urethane caulk.

3. Masonry walls are to be primed with specified primer. Refer to product data for coverage rates.

4. Apply three (3) coats of the specified elastomeric wall coating as recommended by the manufacturer in owner selected color.

3.11 FIELD QUALITY CONTROL

A. Roofing Inspector: Owner will engage a qualified roofing inspector to perform roof tests and inspections and to prepare test reports.

B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation at commencement and upon completion.

1. Notify Architect and Owner 48 hours in advance of date and time of inspection.
C. Repair or remove and replace components of built-up roofing where test results or inspections indicate that they do not comply with specified requirements.

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

3.12 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove 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 075216.12
SECTION 07 5216.12.2 - SBS MODIFIED BITUMINOUS MEMBRANE ROOFING, TORCH-APPLIED (Steel Deck)

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. Styrene-butadiene-styrene (SBS) modified bituminous membrane roofing system on concrete deck, including but not limited to:

   a. Roof insulation.
      1) Polyisocyanurate roofing insulation (as indicated on plans), with slope in structure or tapered insulation at various locations as required to provide positive drainage with NO PONDING”.
      2) Polyisocyanurate roofing insulation crickets & saddles (as indicated on plans), 1/2” per foot slope or as required to provide positive drainage with NO PONDING.
      3) One (1) layer of 1/2” thick high performance cement based roof cover board
      4) Mechanically fastened insulation to the metal deck per FM 1-29 pre-securement requirements.
      5) Mechanically fastened base sheet to the metal deck along with specified striping in adhesive.

   b. Roof membrane and membrane base flashings.
      1) One (1) ply of fire rated, high performance, fiberglass reinforced, SBS modified bitumen membrane with ultra-white surfacing, torch-applied.
      2) Two (2) plies of fiberglass reinforced modified base sheet torch applied to mechanically fastened base sheet.

B. Related Sections:

1. Division 06 carpentry section for wood nailers, wood cants, curbs, and blocking.
2. Division 07 Section "Preparation for Re-Roofing" for existing roofing tearoff, patching, and substrate preparation for rehabilitation of roofing membrane.
3. Division 07 Section "Sheet Metal Flashing and Trim" for custom metal roof penetration flashings, flashings, and counter flashings.

C. Alternates: Refer to Division 01 Section "Alternates" for description of Work in this Section affected by alternates.

D. Allowances: Refer to Division 01 Section "Allowances" for description of Work in this Section affected by allowances.

E. Unit Prices: Refer to Division 01 Section "Unit Prices" for description of Work in this Section affected by unit prices.

1.3 FIRE WATCH

A. Provide fire watch during torch application and continue for two hours after torch work has been completed. All roof areas worked on should be checked for hot spots and signs of smoldering. If available, infrared roof scanners should be used. The inside of the building should also be inspected for signs of fire and smoke.

B. When torch applied materials are installed the Contractor shall provide a fire watch.

C. Provide fire watch during torch application and continue for one hour after torch work has been completed. All roof areas worked on should be checked for hot spots and signs of smoldering. If available, infrared roof scanners should be used. The inside of the building should also be inspected for signs of fire and smoke.

D. Provide at least two 10lb (4.5 kg) multipurpose dry chemical portable extinguisher within 20 ft. (6.1 m) horizontal travel distance of torch-applied roofing equipment.

E. No full-time torch shall be used under any circumstances.

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.

1.5 ACTION SUBMITTALS

A. All Submittals to be in electronic format.

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

C. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work. Provide roof plan showing orientation and types of roof deck, orientation of membrane roofing, and fastening spacings and patterns for mechanically fastened components.

1. Crickets, saddles, and tapered edge strips, including slopes.
1.6 INFORMATIONAL SUBMITTALS
A. Contractor’s Product Certificate: Submit notarized certificate, indicating products intended for Work of this Section, including product names and numbers and manufacturers’ names, with statement indicating that products to be provided meet the requirements of the Contract Documents.
B. Qualification Data: For Installer, Manufacturer, and Roofing Inspector.
   1. Include letter from Manufacturer written for this Project indicating approval of Installer.
C. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in “Performance Requirements” Article.
   1. Submit evidence of compliance with performance requirements, including FM Global system approval.
   2. Indicate that proposed system components are compatible.
D. Warranties: Unexecuted sample copies of special warranties.

1.7 CLOSEOUT SUBMITTALS
A. Maintenance Data: To include in maintenance manuals.
B. Warranties: Executed copies of warranties.

1.8 SUBSTITUTIONS
A. General:
   1. ONLY Substitutions approved in writing by the Owner or Owner’s Representative prior to the scheduled bid date will be considered.
   2. Notification of approvals will be issued at least five (5) days before the scheduled bid date.
   3. Architect/Owner reserves the right to be final authority on acceptance or rejection of any substitution request.
B. When a particular make or trade name is specified, it shall be indicative of standard required. Bidders proposing substitutes shall submit the following ten (10) days prior to bid date to the Owner or Owner’s Representative; requests received after that time will not be considered.
   1. Written application with explanation of why it should be considered.
   2. Independent laboratory certification providing written confirmation that the physical and performance characteristics of the substitute material/system will meet the physical and performance characteristics of the specified materials and or system.
C. Submit five copies of request for substitution. Items to be included in the request:
1. Complete data substantiating compliance of proposed substitution.

2. Product identification, including manufacturer’s literature and manufacturer’s name.

3. Current certificate from an accredited testing laboratory comparing the physical and performance attributes of the proposed material with those of the specified materials. Test results must be dated, notarized, and on testing laboratory stationary.

4. Material Safety Data Sheets providing all pertinent data as to flammability, combustibility.

5. List of at least (5) five jobs as described under the requirements where the proposed alternate material was used under similar conditions. These jobs must be available for inspection by the Owner or Owner’s Representative. Names and phone numbers are required for verification. Submit a minimum of 200,000 square feet for review. Submitted projects must be a minimum of (5) years old.

6. Notarized statement from the Roof System Manufacturer, signed by a corporate officer of the corporation stating that:
   a. All Documents have been reviewed and are approved.
   b. The Project site has been inspected.
   c. The Roofing System Manufacturer will provide two (2) field inspections weekly; during, and until all construction work is complete and accepted by the owner. A full time employee of the manufacturer must perform inspections.
   d. Provide documentation of the proposed alternate system passing the specified regulatory requirements. Documentation must be on the specified regulatory requirements letterhead or approval guide. No third party testing will be accepted.

D. In making substitution request, Bidder/Contractor represents:

   1. He has personally investigated proposed product or method, and determined that it is equal or superior in all respects to that specified. Additionally, he will have a technical service representative of the proposed manufacturer attend the pre-bid meeting.

   2. He will provide the same guarantee for substitution as for those specified.

   3. He will coordinate installation of accepted substitution in work, making such changes as may be required for work to be completed in all respects.

   4. Advise the owner of any credit savings or additional costs as opposed to the system type specified.

E. Substitutions will not be considered if:

   1. Product or method to be considered does not have a minimum of (5) five years of successful performance in roofing and re-roofing of similar applications.
2. Any discrepancies in the test data, or if the tests or submittals are incomplete.

3. They are indicated or implied on Shop Drawings or Project Data Submittals without formal request submitted in accordance with the specification document.

4. Acceptance requires significant revision of documents.

5. Only substitutes approved in writing by prior to scheduled cutoff date will be considered.

6. Notification of approvals will be mailed at least 3 days before bid opening.

7. The Owner will not incur any additional costs for design or construction costs.

1.9 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and certified by manufacturer, including a full-time on-site supervisor with a minimum of five years' experience installing products comparable to those specified, able to communicate verbally with Contractor, Architect, and employees, and qualified by the manufacturer to install manufacturer's product and furnish warranty of type specified.

1. For torch-applied applications, employ workers certified under NRCA's Certified Roofing Torch Applicator (CERTA) program.

2. Installer must provide (2) manufacturer inspections each week. Noncompliance may result in an $850 per day fee for missing inspections.

B. Manufacturer Qualifications: Approved manufacturer with UL listed roofing systems comparable to those specified for this Project, with minimum five years' experience in manufacture of comparable products in successful use in similar applications, and able to furnish warranty with provisions matching specified requirements.

C. Roofing Inspector Qualifications: A technical representative of manufacturer not engaged in the sale of products and experienced in the installation and maintenance of the specified roofing system, qualified to perform roofing observation and inspection specified in Field Quality Control Article, to determine Installer's compliance with the requirements of this Project, and approved by the manufacturer to issue warranty certification. The Roofing Inspector shall be one of the following:

1. An authorized full-time technical employee of the manufacturer.

D. Random Sampling

1. During course of work, the Architect may secure samples according to ASTM D140-93 of materials being used from containers at job site and submit them to an independent laboratory for comparison to specified material.

2. Should test results prove that material is not equal to specified material:
   a. Contractor shall pay for all testing.
b. Roofing installed and found not to comply with the specifications shall be removed and replaced with no change in the contract price.

3. Installation quality control
   a. The roofing inspector shall provide written and photographic reports, to be submitted to the architect, owner, roof system installation contractor, appraising the installation of the roof system at each of the project progress stages. The installation contractor shall make all necessary corrections, additions or remedial actions to resolve any issues raised in the reports.
   
   b. The roofing inspector shall have the authority to have any and all roofing work corrected, as required, to insure the proper installation and weather-tightness of the roof system, in accordance with the manufacturer's specifications.

E. Manufacturer's Installation Instructions: Obtain and maintain on-site access to manufacturer's written instructions for installation of products.

F. Preinstallation Roofing Conference: Conduct conference at Project site.
   1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
   2. Review drawings and specifications.
   3. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
   4. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   5. Examine substrate conditions and finishes for compliance with requirements, including flatness and fastening.
   6. Review structural loading limitations of roof deck during and after roofing.
   7. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
   8. Review governing regulations and requirements for insurance and certificates if applicable.
   9. Review temporary protection requirements for roofing system during and after installation.
   10. Review roof observation and repair procedures after roofing installation.
1.10 DELIVERY, STORAGE, AND HANDLING

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

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

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

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

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

1.11 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. Daily Protection: Coordinate installation of roofing so insulation and other components of roofing system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.

   1. Provide tie-offs at end of each day's work to cover exposed roofing and insulation with a course of roofing sheet securely in place with joints and edges sealed.

   2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing.

   3. Remove temporary plugs from roof drains at end of each day.

   4. Remove and discard temporary seals before beginning work on adjoining roofing.

1.12 WARRANTY

A. Warranty, General: Warranties specified shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

B. Manufacturer's Warranty: Manufacturer's standard or customized form, in which manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.
1. Manufacturer's warranty includes roofing membrane, base flashings, fasteners, roofing membrane accessories and other components of roofing system specified in this Section.

2. Warranty Period: 15 years from date of Substantial Completion.

C. Installer'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 roofing system such as roofing membrane, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, and walkway products, for the following warranty period:

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

D. Extended Roof System Warranty: Warranties specified in this Section include the following components and systems specified in other sections supplied by the roofing system Manufacturer, and installed by the roofing system Installer:

1. Sheet metal flashing and trim, including roof penetration flashings.

E. Manufacturer Inspection and Preventive Maintenance Requirement: By manufacturer's technical representative, to report maintenance responsibilities to Owner necessary for preservation of Owner's warranty rights. The cost of manufacturer's inspections and preventive maintenance is included in the Contract Sum.

1. Inspections to occur in the following years subsequent to completion: 2, 5 and 10.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain components for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer. Obtain components for roofing system compatible with specified approved assembly.

2.2 PERFORMANCE REQUIREMENTS

A. General Performance: Roofing shall withstand exposure to weather without failure or leaks due to defective manufacture or installation.

1. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.

2. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272.

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. Wind uplift Compliance: Provide roofing membrane, base flashing, and component materials that comply with the requirements to acquire a certificate of wind storm from the State of

IT IS THE BIDDERS RESPONSIBILITY TO READ AND UNDERSTAND THE TESTED ASSEMBLY. IF NEEDED A COPY OF THE TESTED CONSTRUCTION ASSEMBLY LISTED ABOVE CAN BE OBTAINED FROM THE SYSTEM MANUFACTURER.

D. Roofing System Design: Provide roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency in accordance with ANSI/FM 4474, UL 580, or UL 1897, and to resist uplift pressures.

1. All Zones (Corner, Perimeter, and Field-of-Roof) Uplift Pressures: As indicated on Drawings. Verify system is acceptable and complies with uplift requirements with project engineer prior to installation.

E. SPRI Wind Design Standard: Manufacture and install copings and roof edge flashings tested according to SPRI ES-1 and capable of resisting the following design pressures:

1. Design Pressure: As indicated on Drawings. Verify sheet metal installation complies with windstorm requirements of project engineer prior to installation.

F. Flashings and Fastening: Comply with requirements of Division 07 Sections "Sheet Metal Flashing and Trim" and "Roof Specialties." Provide base flashings, perimeter flashings, detail flashings and component materials and installation techniques that comply with requirements and recommendations of the following:

1. FM Global 1-49: Loss Prevention Data Sheet for Perimeter Flashings.
2. FM Global 1-29: Loss Prevention Data Sheet for Above Deck Roof Components.
3. NRCA Roofing Manual (Sixth Edition) for construction details and recommendations.

G. 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.

H. Solar Reflectance Index: Not less than 78 when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.

2.3 ROOFING MEMBRANE MATERIALS

A. Base Sheet:

1. ASTM D 6163 Type I Grade S SBS/SIS/SEBS-modified asphalt-coated glass-fiber reinforced sheet, smooth surfaced, designed for heat-welded applications.
   b. Tensile Strength at 73 deg. F (23 deg. C), minimum, ASTM D 5147: 70 lbf/in (12.3 kN/m) machine direction; 50 lbf/in (8.8 kN/m) cross-machine direction.
Texas A&M University Corpus Christi
CI Re-Roof and Building Envelope Improvements

B. SBS Modified Bituminous Membrane Ply Sheets:

1. ASTM D 6163 Type I Grade S SBS/SIS/SEBS-modified asphalt-coated glass-fiber reinforced sheet, smooth surfaced, designed for heat-welded applications.

   
   b. Tensile Strength at 73 deg. F (23 deg. C), minimum, ASTM D 5147: 70 lbf/in (12.3 kN/m) machine direction; 50 lbf/in (8.8 kN/m) cross-machine direction.
   
   c. Tear Strength at 73 deg. F (23 deg. C), minimum, ASTM D 5147: 100 lbf (445 N) machine direction; 80 lbf (400 N) machine direction.
   
   
   
   f. Thickness, ASTM D 5147: 0.118 inch (3.0 mm).

C. SBS Modified Bituminous Cap Sheet:

1. ASTM D 6163 Type I Grade G SBS-modified asphalt-coated glass-fiber-reinforced sheet, designed for heat welded application, granular surfaced with a factory applied white reflective granule; CRRC listed and California Title 24 Energy Code compliant.

   
   b. Exterior Fire-Test Exposure, ASTM E 108: Class A.
   
   c. Tensile Strength at 73 deg. F (23 deg. C), minimum, ASTM D 5147: Machine direction 70 lbf/in (12.0 kN/m); Cross machine direction 50 lbf/in (8.8 kN/m).
   
   d. Tear Strength at 73 deg. F (23 deg. C), minimum, ASTM D 5147: Machine direction, 100 lbf (445 N); Cross machine direction 90 lbf (400 N).
   
   e. Elongation at 73 deg. F (23 deg. C), minimum, ASTM D 5147: Machine direction 4 percent; Cross machine direction 4 percent.
   
   
   g. Thickness, minimum, ASTM D 5147: 0.165 inch (4.2 mm).

D. Base Flashing Backer Sheet:

1. ASTM D 6162 Type III Grade S SBS/SIS/SEBS-modified asphalt-coated composite polyester and glass-fiber reinforced sheet, smooth surfaced, designed for heat-welded applications.
   b. Tensile Strength at 73 deg. F (23 deg. C), minimum, ASTM D 5147: 275 lbf/in (48 kN/m).
   d. Elongation at 73 deg. F (23 deg. C), minimum, ASTM D 5147: 3 percent.
   f. Thickness, ASTM D 5147: 0.090 inch (2.3 mm).

2. ASTM D 6162 Type III Grade S SBS/SIS/SEBS-modified asphalt-coated composite polyester and glass-fiber reinforced sheet, smooth surfaced, designed for heat-welded applications.
   b. Tensile Strength at 73 deg. F (23 deg. C), minimum, ASTM D 5147: 275 lbf/in (48 kN/m).
   d. Elongation at 73 deg. F (23 deg. C), minimum, ASTM D 5147: 3 percent.
   f. Thickness, ASTM D 5147: 0.090 inch (2.3 mm).

E. Base Flashing Sheet:

1. ASTM D 6163 Type I Grade G SBS-modified asphalt-coated glass-fiber-reinforced sheet, designed for heat welded application, granular surfaced with a factory applied white reflective granule; CRRC listed and California Title 24 Energy Code compliant.
   b. Exterior Fire-Test Exposure, ASTM E 108: Class A.
   c. Tensile Strength at 73 deg. F (23 deg. C), minimum, ASTM D 5147: Machine direction 70 lbf/in (12.0 kN/m); Cross machine direction 50 lbf/in (8.8 kN/m).
d. Tear Strength at 73 deg. F (23 deg. C), minimum, ASTM D 5147: Machine direction, 100 lbf (445 N); Cross machine direction 90 lbf (400 N).

e. Elongation at 73 deg. F (23 deg. C), minimum, ASTM D 5147: Machine direction 4 percent; Cross machine direction 4 percent.


g. Thickness, minimum, ASTM D 5147: 0.165 inch (4.2 mm).


2.4 ASPHALT MATERIALS

A. Asphalt primer, water-based, polymer modified.

1. Basis of design product: Tremco, TREMprime WB.

2. Volatile Organic Compounds (VOC), maximum, ASTM D 3960: 2 g/L.

B. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required by roofing system manufacturer for application.

2.5 AUXILIARY ROOFING 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.

B. Metal Flashing Sheet: Metal flashing sheet is specified in Division 07 Section "Sheet Metal Flashing and Trim."

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

1. Elastomeric Roofing Mastic, Low-Volatile: One-part, trowel-grade, elastomeric roof mastic specially formulated for compatibility and use with specified roofing membranes and flashings.

   a. Basis of design product: Tremco, POLYroof LV.

   b. Volatile Organic Compounds (VOC), maximum, ASTM D 3960: 300 g/L.


   d. Recovery from 500 percent Elongation, minimum, ASTM D 412: 500 percent.

   e. Flexibility at -40 deg. F (-40 deg. C), ASTM D 3111: No cracking.
2. Asphalt mastic for miscellaneous sealing and waterproofing:
   a. An asphalt-based, heavily fibrated, asbestos free mastic.
   b. Basis of Design: Tremco ELS.

3. Pitch pan mastic:
   a. High performance single component roof elastomer.
   b. Basis of Design: Tremco POLYroof LV
   c. CHEM CURBS ARE NOT ACCEPTABLE

4. Metal Joint Sealant:
   a. Asbestos-free. Moisture cured, one-component polyurethane sealant.
   b. Basis of Design: TremSEAL Pro

5. Reglet Joint Sealant
   a. One-part, bituminous polyurethane sealant.

6. Vents and/or Stacks:
   a. Stainless; Type 316, No 3 Polish.
   b. Gage: Twenty-four (24).
   c. Solder: ASTM B32-89, alloy grade 60A. Neutralize flux after soldering.

7. Termination Bar for top edge of all base flashings:
   a. Extruded aluminum, pre-punched 8” o.c.

8. Primary Scuppers and Overflow Scuppers:
   a. Stainless Steel, Type 316, No 3 Polish Finish (all locations except those designated as copper): Twenty-four (24) gauge minimum, stainless steel; commercial quality, Fed. Spec. QQ-S-775, Type I, Class D or ASTM A 526 or lock forming quality ASTM A 527.

9. Fascia, Coping, Collector Heads, Gutters, Downspouts and other Visible Sheet Metal Flashing:
   a. Stainless Steel, Type 316, No 3 Polish Finish (all locations except those designated as copper): Twenty-four (24) gauge minimum, stainless steel; commercial quality,
Fed. Spec. QQ-S-775, Type I, Class D or ASTM A 526 or lock forming quality ASTM A 527

10. Counter flashing, slip flashing:

   a. Stainless Steel, Type 316, No 3 Polish Finish (all locations except those designated as copper): Twenty-four (24) gauge minimum, stainless steel; commercial quality, Fed. Spec. QQ-S-775, Type I, Class D or ASTM A 526 or lock forming quality ASTM A 527

11. Pitch pans with hoods:

   a. Stainless Steel, Type 316 No 3 Polish: Twenty-four (24) gauge minimum, stainless steel; commercial quality, Fed. Spec. QQ-S-775, Type I, Class D or ASTM A 526 or lock forming quality ASTM A 527, G90 coating in accordance with ASTM A 525

12. Walkway Pads for all access panels at all A/C units:

   a. Mineral-surfaced asphaltic composition panels, factory formed, nonporous, with a slip-resisting surface texture, manufactured specifically for adhering to built-up roofing as a protection course for foot traffic:

      1) Thickness: 1/2 inch

   b. Basis of Design: Tremco TremTred.

13. Pipe Supports:

   a. Pipe supports for small pipes and conduit:

      1) Pipe or Conduit size: 1/4” to 1.5” ID

      2) Rubber triangle pipe blocks extruded from 100% EPDM rubber.

   b. Basis of Design: Rubber Triangle Pipe Blocks by Tremco or pre-approved substitution.

14. Pipe Supports for large pipes and conduit:

   a. Pipe or Conduit size: 1.5” or larger ID

   b. Galvanized roller pipe supports.

   c. Basis of Design: SS8-R or RB-18 as applicable by PHP Pipe supports of Houston, TX or approved equal.

15. Primer:

   a. An asbestos free, modified water-based asphalt primer
b. 2. Basis of Design: Tremco Tremprime WB.

16. Flashing tape for top edge of base flashing
   a. A flexible, non-drying, butyl-based, gasket-forming sealant tape.
   b. Basis of design: Tremco TF Tape

17. Reinforcement membrane:
   a. A non-shrinking, non-rotting, vinyl coated, woven glass mesh.
   b. Basis of Design: Tremco Burmesh - 6”.

2.6 BASE SHEET LAP & CENTER FASTENER ROW STRIPING ADHESIVE

A. Two-Part Urethane Insulation Adhesive (UIA) is a two-component polyurethane adhesive used for attaching insulation boards to the roof deck or to other insulation boards

   1. Basis of design product: Tremco LRF
      a. Tremco: LRF
         1) Tremco LRF

2.7 ROOF INSULATION

A. Roof Insulation, 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 Global-approved roof insulation.

   1. Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches (1:48) unless otherwise indicated.
   2. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

B. Roof Insulation:

   1. Polyisocyanurate board insulation, ASTM C 1289 Type II Class 1 CFC- and HCFC- free, with recycled content glass-fiber mat facer on both major surfaces.
      c. Available Manufacturers
         1) Tremco:Trisotech
         2) Atlas: AC Foam II, AC Foam III
Texas A&M University Corpus Christi
CI Re-Roof and Building Envelope Improvements

C. Roof Insulation Cover board
   1. Cement based, water durable, mold resistant, non combustible, Class A unlimited slope, ASTM E84
   2. Basis of Design: USG Cement Roof Board

D. Wood Cant Strips: Comply with requirements in Division 06 carpentry section

E. Tapered Edge Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.

F. Substrate Joint Tape: Minimum 6 inch (150 mm) wide, coated, glass-fiber joint tape.

2.8 MECHANICAL FASTENERS
   A. Fasteners Engineered to secure insulation, cover boards, base sheets and single ply roofing membrane systems to corrugated steel substrate
      1. Tremco; #15 EHD with Tremco 2.4 inch barbed Seam Plates
      2. Trufast; #15 EHD with Trufast 2.4 inch barbed Seam Plates

2.9 WALKWAYS
   A. Walkway pads, ceramic-granulesurfaced reinforced asphaltic composition slip-resisting pads, manufactured as a traffic pad for foot traffic, 1/2 inch (13 mm) thick minimum.
      2. Flexural Strength at max. load, minimum, ASTM C 203: 210 psi (1.5 kPa).
      5. Pad Size: 36 by 48 inch (914 by 1220 mm).

2.10 WALL TREATMENT AND COATING MATERIALS (Where applicable)
   A. Primer for previously coated walls above roof membrane:
      1. Acrylic polymer emulsion, stain resistant, fast drying, flexible base primer for elastomeric latex coatings.

   B. Coating for previously coated walls above roof membrane:
      1. Acrylic polymer emulsion wall coating with fiber reinforcement.
2. Tinted to match existing.

3. Basis of Design: Tremco Solargard HY-BUILD

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:

1. Verify that roof openings and penetrations are in place and curbs are set and braced and that roof drain bodies are securely clamped in place.

2. Verify that, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation, wood cants

3. Steel Roof Deck:
   a. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Division 05 Section "Steel Decking."
   b. 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.

4. Verify that existing insulation and substrate is sound and dry.

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

3.2 PREPARATION

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

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

3.3 INSTALLATION, GENERAL

A. Install roofing system in accordance with manufacturer's recommendations.

B. Install wood cants, blocking, curbs, and nailers in accordance with requirements of Division 06 carpentry section.

C. Install roofing membrane, base flashings, and component materials in compliance with requirements in FM Global 4470 as part of a membrane roofing system as listed in FM Global's "Approval Guide" for fire/windstorm classification indicated. Comply with recommendations in FM Global Loss Prevention Data Sheet 1-49, including requirements for wood nailers and cants.
D. Install roofing system in accordance with the following NRCA Manual Plates and NRCA recommendations; modify as required to comply with requirements of FM Global references above:

1. Metal Parapet Cap (Coping) and Base Flashing: Plates MB-1 and MB-1S.
2. Surface-Mounted Counterflashing for Concrete Walls (at Parapet Wall): Plates MB-4 and MB-4S.
3. Base Flashing for Wall-supported Deck: Plates MB-5 and MB-5S.
4. Base Flashing for Non-wall-supported deck (Movement Joint): Plates MB-6 and MB-6S.
5. Base and Surface-mounted Counterflashing: Plates MB-4 and MB-4S.
6. Base Flashing for Vented Base Sheet: Plates MB-5A and MB-5AS.
7. Raised Perimeter Edge with Metal Flashing (Fascia Cap): Plates MB-2 and MB-2S.
8. Embedded Edge Metal Flashing Edge (Gravel-stop): Plates MB-3 and MB-3S.
10. Gutter at Draining Edge: Plates MB-22 and MB-22S.
11. Expansion Joint with Metal Cover: Plates MB-7 and MB-7S and Division 07 Section "Sheet Metal Flashing and Trim."
12. Expansion Joint with Premanufactured Cover: Plates MB-7A and MB-7AS and Division 07 Section "Roof Expansion Assemblies."
13. Area Divider in Roof System: Plates MB-8 and MB-8S.
14. Equipment Support Curb: Plates MB-9 and MB-9S.
17. Raised Curb Detail at Rooftop HVAC Units, Premanufactured: Plates MB-12 and MB-12S and Division 7 Section "Roof Accessories."
18. Raised Curb Detail at Rooftop HVAC Units (Job site constructed wood curb): Plates MB-13 and MB-13S and Division 06 Section "Miscellaneous Rough Carpentry."
19. Skylight, Scuttle (Roof Hatch), and Smoke Vents: Plates MB-14 and MB-14S and Division 07 Section "Roof Accessories."
20. Penetration, Structural Member through Roof Deck: Plates MB-15 and MB-15S.
21. Penetration, Sheet Metal Enclosure for Piping Through Roof Deck: Plates MB-16 and MB-16S
22. Penetration, Isolated Stack Flashing: Plates MB-17 and MB-17S.
23. Penetration, Isolated Stack Flashing: Plates MB-17A and MB-17AS.
24. Penetration, Plumbing Vent: Plates MB-18 and MB-18S.
25. Penetration, Pocket: Plates MB-19 and MB-19S.
26. Roof Drain: Plates MB-20 and MB-20S.
27. Roof Drain: Plates MB-20A and MB-20AS.
28. Guide for Clearances between Pipes / Walls / Curbs - Table 4
29. Guide for Crickets and Saddles - Table 5
30. Guide for Edge Scuppers with Tapered Saddles - Table 6

3.4 INSULATION INSTALLATION

A. Comply with built-up roofing manufacturer's written instructions for installing roof insulation.
B. Cant Strips: Install and secure preformed 45-degree cant strips at junctures of built-up roofing with vertical surfaces or angle changes greater than 45 degrees.
C. Install tapered insulation under area of roofing to conform to slopes indicated.
D. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch (6 mm) with insulation.
  1. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.
E. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inch (70 mm) or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (150 mm) in each direction.
  1. Install insulation at minimum thickness of 2.5 inches. Match Existing total thickness at specific areas.
F. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
G. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.
H. Mechanically Fastened Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

1. Loose lay all polyisocyanurate roofing insulations including crickets and saddles over metal deck.

I. Cover Board Installation: Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches (150 mm) in each direction. Loosely butt cover boards together. Tape joints if required by roofing manufacturer.

1. Fasten cover boards to resist uplift pressure at corners, perimeter, and field of roof. Gang Fasten all insulations through cover board to metal deck per wind uplift assembly. Follow FM Data Sheet 1-29, Table 6 for Presecurement fastening requirements (1 fastener per 5.33 sq ft)

3.5 TORCH-APPLIED 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" and as follows:

1. Deck Type: Metal deck.
2. Base Sheet: One.
3. Number of Smooth-Surfaced SBS-Modified Asphalt Sheets: Two.
4. Granular-Surfaced SBS-Modified Asphalt Cap Sheet:

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

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

D. Coordinate installation of 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 forecast.

1. Provide tie-offs at end of each day's work configured as recommended by NRCA Roofing Manual Appendix: Quality Control Guidelines - Insulation to protect new and existing roofing.
2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing.

3. Remove temporary plugs from roof drains at end of each day.

4. Remove and discard temporary seals before beginning work on adjoining roofing.

3.6 BASE-SHEET INSTALLATION

A. Loose lay base sheet, allowing for a minimum of 5" shingle lap and a 6" end laps. Mechanically fasten base sheet to substrate at lap with specified mechanical fasteners at 6" on center. Allow for additional row of fasteners at center of sheet 6" on center. Adhere lap with specified Low rise Foam adhesive at lap. Provide for 6" wide strip of base sheet adhered over center row fasteners with specified Low Rise Foam Adhesive. Roll base sheet into adhesive with 6" wide roller.

B. Install lapped base-sheet course, extending sheet over and terminating beyond cants. Attach base sheet as follows:

1. Mechanically fasten to substrate.

3.7 SBS-MODIFIED BITUMINOUS MEMBRANE INSTALLATION

A. Install modified bituminous roofing membrane sheet and cap sheet according to roofing manufacturer's written instructions, starting at low point of roofing system. Extend roofing membrane sheets over and terminate beyond cants, installing as follows:

1. Unroll roofing membrane sheets and allow them to relax for minimum time period required by manufacturer.

2. Torch apply to substrate in accordance with manufacturer's written instructions and NRCA CERTA guidelines.

B. Laps: Accurately align roofing membrane sheets, without stretching, and maintain uniform side and end laps. Stagger end laps. Install roofing membrane sheets so side and end laps shed water. Completely bond and seal laps, leaving no voids.

1. Repair tears and voids in laps and lapped seams not completely sealed.

2. Apply roofing granules to cover exuded bead at laps while bead is hot.

3.8 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. Extend base flashing up walls or parapets a minimum of 12 inches (300 mm) above built-up roofing and 6 inches (150 mm) onto field of roof membrane.

2. Prime substrates with asphalt primer if required by roofing system manufacturer.

4. Flashing Sheet Application: Adhere flashing sheet to substrate in cold-applied adhesive at rate required by roofing system manufacturer. Seal joints in flashing sheet. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing.

5. Flashing Sheet Application: Torch-apply flashing sheet to substrate.


B. Seal top termination of base flashing with a metal termination bar.

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

D. Roof Drains: Set 30 by 30 inch (760 by 760 mm) 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.

3.9 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. Sweep away loose aggregate surfacing.

2. Set walkway pads in cold-applied adhesive.

3.10 WALL TREATMENT AND COATING INSTALLATION

A. Wall coating at previously coated walls above the roof membrane:

1. Pressure wash and clean masonry wall to be coated.

2. Provide repairs to cracks in masonry wall larger than 1/8” with urethane caulk.

3. Masonry walls are to be primed with specified primer. Refer to product data for coverage rates.

4. Apply three (3) coats of the specified elastomeric wall coating as recommended by the manufacturer in owner selected color.
3.11 FIELD QUALITY CONTROL

A. Roofing Inspector: Owner will engage a qualified roofing inspector to perform roof tests and inspections and to prepare test reports.

B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation at commencement and upon completion.
   1. Notify Architect and Owner 48 hours in advance of date and time of inspection.

C. Repair or remove and replace components of built-up roofing where test results or inspections indicate that they do not comply with specified requirements.
   1. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.12 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove 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 075216.12
SECTION 075600.11 - FLUID-APPLIED MEMBRANE ROOFING, COATED CONCRETE DECK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Roof coating preparation including preparation of coated concrete deck and substrate to receive fluid-applied flashing.
   a. Priming of new concrete substrate.


B. Related Requirements:

1. Division 07 Section "Sheet Metal Flashing and Trim" for formed metal roof flashings and counter flashings.

1.3 ROOFING CONFERENCES

A. Roofing Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to roofing system.

1. Meet with Owner; roofing materials manufacturer's representative; roofing Installer including project manager and foreman; and installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment.

2. Review drawings and specifications.

3. Review methods and procedures related to roofing preparation, including membrane roofing system manufacturer's written instructions.

4. Review roof drainage during each stage of roofing and review roof drain plugging and plug removal procedures.

5. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

6. Review base flashings, special roofing details, drainage, penetrations, equipment curbs, and condition of other construction that will affect roofing.
7. Review existing conditions that may require notification of Owner before proceeding.

1.4 DEFINITIONS

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

1.5 ACTION SUBMITTALS

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

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, Manufacturer, and Roofing Inspector.

1. Letter written for this Project indicating manufacturer approval of Installer to apply specified products and provide specified warranty.

B. Warranties: Unexecuted sample copies of special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: To include in maintenance manuals.

B. Warranties: Executed copies of approved warranty forms.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and certified by manufacturer, including a full-time on-site supervisor with a minimum of three years' experience installing products comparable to those specified, able to communicate verbally with Contractor, Architect, and employees, and the following:

1. Qualified by the manufacturer to install manufacturer's product and furnish warranty of type specified.

B. Manufacturer Qualifications: Approved manufacturer listed in this Section with minimum five years experience in manufacture of specified products in successful use in similar applications.

1. A qualified manufacturer that can meet the basis of design as established in Part 2-Products

2. Manufacturer shall provide inspections (2) two times each week to verify accuracy of installation and provide a written report to the Contractor for submittal to the architect.

a. Noncompliance may result in a $850.00 per day fee from missing inspections.

C. Roofing Inspector Qualifications: A technical representative of manufacturer not engaged in the sale of products and experienced in the installation and maintenance of the specified roofing system, qualified to perform roofing observation and inspection specified in Field Quality
Control Article, to determine Installer's compliance with the requirements of this Project, and approved by the manufacturer to issue warranty certification. The Roofing Inspector shall be one of the following:

1. An authorized full-time technical employee of the manufacturer.

2. The roofing inspector shall have the authority to have any and all roofing work corrected, as required, to insure the proper installation and weather-tightness of the roof system, in accordance with the manufacturer's specifications.

3. The roofing inspector shall provide written and photographic reports, to be submitted to the Owner, owner, roof system installation contractor, appraising the installation of the roof system at each of the project progress stages. The installation contractor shall make all necessary corrections, additions or remedial actions to resolve any issues raised in the reports.

D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products.

E. Random Sampling.

1. During course of work, the Owner may secure samples according to ASTM D140-93 of materials being used from containers at job site and submit them to an independent laboratory for comparison to specified material.

2. Should test results prove that material is not equal to specified material:
   a. Contractor shall pay for all testing.
   b. Roofing installed and found not to comply with the specifications shall be removed and replaced with no change in the contract price.

1.9 SUBSTITUTIONS

A. Refer to Division 1, Section 01430 - Quality Assurance.

B. Only Substitution's approved in writing by the architect/owner prior to the scheduled bid date will be considered.

C. Notifications of approvals will be issued at least five days before the scheduled bid date.

D. Architect/Owner reserves the right to be final authority on acceptance or rejection of any substitution request.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
B. Handle and store roofing materials, and place equipment in a manner to avoid significant or permanent damage to deck or structural supporting members.

C. Protect materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting.

1.11 PROJECT CONDITIONS

A. Protect building, adjacent buildings, walkways, site improvements, exterior plantings, and landscaping from damage or soiling from roofing operations.

B. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.

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

1. Store all materials prior to application at temperatures between 60 and 90 deg. F.

2. Apply coatings within range of ambient and substrate temperatures recommended by manufacturer. Do not apply materials when air temperature is below 50 or above 110 deg. F.

3. Do not apply roofing in snow, rain, fog, or mist.

D. Daily Protection: Coordinate installation of roofing so insulation and other components of roofing system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.

E. Owner will occupy portions of building immediately below roofing area. Conduct roofing so Owner's operations will not be disrupted. Provide Owner with not less than 72 hours' notice of activities that may affect Owner's operations.

1.12 WARRANTY

A. Manufacturer's Warranty: Manufacturer's standard material or customized form in which manufacturer agrees to replace components of built-up roofing that fail in materials within specified warranty period.

1. Warranty includes roofing membrane, base flashing, roofing membrane accessories, and other components of fluid-applied membrane roofing materials.

2. Qualified Installer Requirement: Installer must meet requirements of Quality Assurance Article.

3. Installation Inspection Requirement: By Roofing Inspector in accordance with requirements of Part 3 Field Quality Control Article.
B. Installer's Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering the Work of this Section and related Sections indicated above, including all components of built-up roofing such as built-up roofing membrane, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, roof pavers, and walkway products, for the following warranty period:

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by a manufacturer meeting qualification requirements in Quality Assurance Article.

B. Basis-of-Design Manufacturer/Product: The roof system specified in this Section is based upon products of Tremco, Inc., Beachwood, OH, (800) 562-2728, www.tremcoroofing.com that are named in other Part 2 articles. Subject to compliance with requirements, provide the named product or an approved comparable product by one of the following:

1. Subject to compliance with requirements, approved alternate manufacturers are:
   a. Refer to substitution requirements.

C. Source Limitations: Obtain components for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer of adjacent roof systems.

2.2 PERFORMANCE REQUIREMENTS

A. General: Provide recoated roofing membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.

1. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.

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

C. Roofing System Design: Provide roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency in accordance with ANSI/FM 4474, UL 580, or UL 1897, and to resist uplift pressures.

1. All Zones (Corner, Perimeter, and Field-of-Roof) Uplift Pressures: As indicated on Drawings.

D. Flashings: Comply with requirements of Division 07 Sections "Sheet Metal Flashing and Trim" and " Manufactured Roof Specialties." Provide base flashings, perimeter flashings, detail
flashings and component materials that comply with requirements and recommendations of the following:

1. Roof system manufacturer's construction details and recommendations.
2. NRCA Roofing Manual (Sixth Edition) for construction details and recommendations.

E. 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.

F. Solar Reflectance Index: Solar reflectance index not less than 90 for not less than 75 percent of the roof surface, when calculated according to ASTM E 408 based on testing identical products by a qualified testing agency.

G. Energy Star Listing: Roofing system shall be listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low-slope roof products.

2.3 MATERIALS

A. General: Roofing materials recommended by roofing system manufacturer for intended use and compatible with components of existing membrane roofing system.

B. Temporary Roofing Materials: Selection of materials and design of temporary roofing is responsibility of Contractor.

C. General: Provide adhesive and sealant materials recommended by roofing manufacturer for intended use and compatible with built-up roofing.

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

2.4 FLUID-APPLIED ROOFING MEMBRANE


1. Polyurethane roof coating system base coat, bio-based, low-odor low-VOC two-part, for use with a compatible top coat.
   b. Combustion Characteristics, UL 790: Class A, for two-coat system.
   c. Volatile Organic Compounds (VOC), maximum, ASTM D3960: 1 g/L.
2. Polyurethane roof coating system top coat, bio-based low-odor low-VOC two-part, for application over compatible base coat.
   a. Basis of design product: Tremco, AlphaGuard BIO Top Coat.
   b. Combustion Characteristics, UL790: Class A, for two-coat system.
   c. Volatile Organic Compounds (VOC), maximum, ASTM D3960: <6 g/L.
   d. Solar Reflectance Index (SRI), ASTM E1980: For white, not less than 103.
   e. Accelerated Weathering, 5000 hours, ASTM G 154: Pass.
   g. Solids, by volume, ASTM D2697: 100 percent.
   h. Bio-Based Content, Minimum: 60 percent.
   i. Minimum Thickness, non-reinforced system: 16 mils (0.40 mm) wet.
   j. Minimum Thickness, Slip-Resistant Coat: 24 mils (0.60 mm) wet.

2.5 AUXILIARY ROOFING MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with existing roofing system and fluid-applied roofing system.

B. Structural Concrete/Masonry Primer: Two-component, 100 percent solids, epoxy penetrating primer for concrete deck surfaces.
   1. Basis of Design Product: Tremco, AlphaGuard C-Prime

C. Metal Surface Primer: Single-component, water based primer to promote adhesion of base coat to metal surfaces.
   1. Basis of Design Product: Tremco, AlphaGuard M-Prime
D. Asphaltic Surfaces Primer: Single-component, multi-substrate primer to promote adhesion of base coat to surfaces recommended by manufacturer.

E. Reinforcing Fabric:
   1. Reinforcing Fabric for Epoxy and Urethane Coatings.

F. Joint Sealants:
      a. Basis of design product: Tremco, TremSEAL Pro.
      b. Volatile Organic Compounds (VOC), maximum, ASTM D 3960: 85 g/L.

G. Perimeter Metal Edging, Coping, Gutters, Downspouts or other Sheet Metal Items:
   1. Stainless Steel, Type 316, No 3 Polish Finish (all locations except those designated as copper): Twenty-four (24) gauge minimum, stainless steel; commercial quality. Fed. Spec. QQ-S-775, Type I, Class D or ASTM A 526 or lock forming quality ASTM A 527

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roofing substrates, with Installer present, for compliance with requirements and for other conditions affecting application and performance of fluid-applied roofing.
   1. Verify that substrates are sound, visibly dry and free of moisture.
   2. Verify that substrates have adequately cured to enable proper bond with base coat.
   3. Application of fluid-applied roofing indicates acceptance of surfaces and conditions.

3.2 PREPARATION, GENERAL

A. Protect existing roofing system that is indicated not to receive fluid-applied roofing, and adjacent portions of building and building equipment.
B. Shut down air intake equipment in the vicinity of the Work in coordination with the Owner. Cover air intake louvers before proceeding with coating work that could affect indoor air quality or activate smoke detectors in ductwork.

1. Verify that rooftop utilities and service piping affected by the Work have been shut off before commencing Work.

2. Prevent dust, vapors, gases, and odors from entering occupied building during roof installation. When shutting down or blocking air intakes, provide makeup air or additional intake air from sources away from the work area.

C. Maintain roof drains in functioning condition to ensure roof drainage at end of each workday. Prevent debris from entering or blocking roof drains and conductors. Use roof-drain plugs specifically designed for this purpose. Remove roof-drain plugs at end of each workday, when no work is taking place, or when rain is forecast.

1. Do not permit water to enter into or under existing membrane roofing system components that are to remain.

3.3 COATED CONCRETE DECK PREPARATION

A. Coated Concrete Deck Preparation, General: Repair, clean, and prepare concrete to sound condition free of grease, oils, coatings, dust, curing compounds and other contaminants.

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.

B. Concrete Repair: Remove defective concrete and repair honeycombs, cavities, joint cracks, voids and other defects by routing to sound material and patching. Patch all unsound or defective concrete with repair mortar recommended for application and approved by Architect.

C. Detergent Cleaning: Remove oil, grease smear and asphalt residue with trisodium phosphate. For oil contaminated surfaces, use steam cleaning in conjunction with a strong emulsifying detergent. Rinse thoroughly with potable water.

D. Prime raw surface of concrete deck with AlphaGuard C primer at a rate of 1 gal./200-250 sq. ft. (0.3 L/sq. m) and allow primer to dry.

E. Existing coated areas: NO PRIMER REQUIRED.

3.4 FLUID-APPLIED FLASHING APPLICATION

A. Fluid-Applied Flashing and Detail Base Coat Application: Complete base coat and fabric reinforcement at parapets, curbs, penetrations, and drains prior to application of field of fluid-applied membrane. Apply base coat in accordance with manufacturer's written instructions.

1. Extend coating minimum of 8 inches up vertical surfaces and 4 inches onto horizontal surfaces.
2. Back roll to achieve minimum wet mil coating thickness of 48 mils unless otherwise recommended by manufacturer; verify thickness of base coat as work progresses.

3. Embed fabric reinforcement into wet base coat at roof drains, cracks, transitions, and other critical areas where reinforcement would be required. Lap adjacent flashing pieces of fabric minimum 3 inches along edges and 6 inches at end laps.


5. Roof Drains: Install base coat onto surrounding membrane surface and metal drain bowl flange. Install target piece of fabric reinforcement immediately into wet base coat and roll to fully embed and saturate fabric. Reinstall clamping ring and strainer following application of top coat. Replace broken drain ring clamping bolts.

6. Allow base coat to cure prior to application of top coat.

7. Following curing of base coat and prior to application of top coat, sand raised or exposed edges of fabric reinforcement.

3.5 FLUID-APPLIED MEMBRANE APPLICATION

A. Surface Priming: Prime surfaces to receive fluid-applied coating using coating manufacturer's recommended product for surface material. Apply at application rate recommended by manufacturer.

1. Ensure primer does not puddle and substrate has complete coverage.

2. Allow to cure completely prior to application of coating.

B. Base Coat: Apply base coat in accordance with manufacturer's written instructions. Back roll to achieve minimum wet mil coating thickness of 48 mils unless otherwise recommended by manufacturer; verify thickness of base coat as work progresses.

1. Apply base coat on prepared and primed surfaces and spread coating evenly.

2. Embed fabric reinforcing fabric into wet base coat. Lap adjacent flashing pieces of fabric minimum 3 inches along edges and 6 inches at end laps.


4. Allow base coat to cure prior to application of top coat.

5. Following curing of base coat and prior to application of top coat, sand raised or exposed edges of fabric reinforcement.

C. Top Coat: Apply top coat uniformly in a complete installation to field of roof and flashings.
1. Prime base coat prior to application of top coat if top coat is not applied within 72 hours of the base coat application, using manufacturer's recommended primer.

2. Apply top coat to flashings extending coating up vertical surfaces and out onto horizontal surfaces 4 inches. Install top coat over field base coat and spread coating evenly.

3. Back roll to achieve wet mil thickness of 32 mils unless otherwise recommended by manufacturer.

4. Avoid foot traffic on new fluid-applied membrane for a minimum of 24 hours.

D. Slip-Resistant Walkway Topcoat: Apply walkway second topcoat following application and curing of top coat. Locate as indicated, or as directed by Owner.

1. Mask walkway location with tape.

2. Prime first top coat prior to application of walkway top coat if walkway top coat is not applied within 72 hours of the first top coat application, using manufacturer's recommended primer.

3. Back roll to achieve wet mil thickness of 20 mils unless otherwise recommended by manufacturer.

4. Broadcast 20 to 30 lbs. per 100 sq. ft. of Slip-Resistant Top Coat Aggregate in wet top coat.

5. Back roll sand and top coat creating even dispersal of sand. Remove masking immediately.

3.6 FIELD QUALITY CONTROL

A. Roofing Inspector: Owner will engage a qualified roofing inspector to perform roof tests and inspections and to prepare test reports.

B. Roof Inspection: Contractor shall engage roofing system manufacturer's technical personnel to inspect roofing installation, and submit report to the Architect. Notify Architect or Owner 48 hours in advance of dates and times of inspections. Inspect work as follows:

1. Upon completion of preparation of first component of work, prior to application of re-coating materials.

2. Following application of re-coating to flashings and application of base coat to field of roof.

3. Upon completion of re-coating but prior to re-installation of other roofing components.

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

3.7 PROTECTING AND CLEANING

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

B. Correct deficiencies in or remove coatings that do not comply with requirements, repair substrates, and reapply coatings.

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

END OF SECTION 075600.11
SECTION 07 5910 - MEMBRANE REROOFING PREPARATION

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. This Section includes the following:
   1. Roof tear-off.
   2. Removal of base flashings.

B. Allowances: Refer to Division 1 Section "Allowances" for description of Work in this Section affected by allowances.

C. Unit Prices: Refer to Division 1 Section "Unit Prices" for description of Work in this Section affected by unit prices.

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 and disposed of legally.

1.4 DEFINITIONS

A. Roofing Terminology: Refer to ASTM D 1079 and glossary in 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 over concrete deck. Contractors are responsible for determining the exact configuration of the existing roofing system(s).

C. Substrate Board: Rigid board or panel products placed over the roof deck that serve as thermal barriers, provide a smooth substrate, or serve as a component of a fire-resistance-rated roofing system.

D. Roof Tear-Off: Removal of existing membrane roofing system from deck.

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

F. 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. Photographs or Videotape: 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.

C. Qualification Data: For Installer including certificate indicating Installer is approved by warrantor of existing roofing system.

1.6 QUALITY ASSURANCE

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

B. Re-roofing Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to roofing system including, but not limited to, the following:

1. Meet with Owner; Architect; Owner's insurer if applicable; testing and inspecting agency representative; roofing system manufacturer's representative; roofing Installer including project manager, superintendent, and foreman; and installers whose work interfaces with or affects reroofing including installers of roof accessories and roof-mounted equipment.

2. Review methods and procedures related to reroofing preparation, including membrane roofing system manufacturer's written instructions.

3. Review temporary protection requirements for existing roofing system that is to remain, during and after installation.

4. Review roof drainage during each stage of reroofing and review roof drain plugging and plug removal procedures.

5. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

6. Review existing deck removal procedures and Owner notifications.

7. Review procedures to determine condition and acceptance of existing deck for reuse.

8. Review structural loading limitations of deck during reroofing.

9. Review base flashings, special roofing details, drainage, penetrations, equipment curbs, and condition of other construction that will affect reroofing.

10. Review HVAC shutdown and sealing of air intakes.

11. Review shutdown of fire-suppression, fire-protection, and fire-alarm and fire-detection systems.

12. Review procedures for asbestos removal or unexpected discovery of asbestos-containing materials.

13. Review governing regulations and requirements for insurance and certificates if applicable.

14. Review existing conditions that may require notification of Architect and Owner before proceeding.
1.7 PROJECT CONDITIONS

A. Owner will occupy portions of building immediately below reroofing area. Conduct reroofing so Owner's operations will not be disrupted. Provide Owner with not less than 72 hours' notice of activities that may affect Owner's operations.
   1. Coordinate work activities daily with Owner so Owner can place protective dust or water leakage covers over sensitive equipment or furnishings, shut down HVAC and fire-alarm or -detection equipment if needed, and evacuate occupants from below the work area if desired.
   2. Before working over structurally impaired areas of deck, notify Owner to evacuate occupants from below the affected area. Verify that occupants below the work area have been evacuated prior to proceeding with work over the impaired deck area.

B. Protect building to be re-roofed, 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. Do not block required exits or path from required exit to public right-of-way. Coordinate with requirements of authorities having jurisdiction.

D. Owner assumes no responsibility for condition of areas to be re-roofed.

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

F. Hazardous Materials: It is not expected that hazardous materials such as asbestos-containing materials will be encountered in the Work.
   1. 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.

PART 2 - PRODUCTS

2.1 AUXILIARY REROOFING MATERIALS

A. General: Auxiliary reroofing preparation materials recommended by roofing system manufacturer for intended use and compatible with components of new membrane roofing system.

B. Metal Flashing Sheet: Metal flashing sheet is specified in Division 7 Section "Sheet Metal Flashing and Trim."
PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate with Owner to shut down air intake equipment in the vicinity of the Work. Cover air intake louvers before proceeding with reroofing work that could affect indoor air quality or activate smoke detectors in the ductwork.

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

C. Maintain roof drains in functioning condition to ensure roof drainage at end of each workday. Prevent debris from entering or blocking roof drains and conductors. Use roof-drain plugs specifically designed for this purpose. Remove roof-drain plugs at end of each workday, when no work is taking place, or when rain is forecast.

1. If roof drains will be 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. Verify that rooftop utilities and service piping have been shut off before commencing Work.

3.2 ROOF TEAR-OFF

A. General: Notify Owner each day of extent of roof tear-off proposed.

B. Remove aggregate ballast from roofing membrane.

C. Roof Tear-Off: Remove existing roofing membrane and other membrane roofing system components down to the existing deck.

1. Remove roof insulation and substrate boards.

2. Remove fasteners from deck or cut fasteners off slightly above deck surface.

3.3 DECK PREPARATION

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

1. Verify that concrete substrate is visibly dry and free of moisture. Do not proceed with roofing work if moisture condenses under the plastic sheet or if asphalt test sample foams or can be easily and cleanly stripped after cooling.

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

3.4 EXISTING BASE FLASHINGS

A. Remove existing base flashings around parapets, curbs, walls, and penetrations.
1. Clean substrates of contaminants such as asphalt, sheet materials, dirt, and debris.

   B. Do not damage metal counterflashings that are to remain. Replace metal counterflashings damaged during removal with counterflashings of same metal, weight or thickness, and finish.

3.5 FASTENER PULL-OUT TESTING (If required)

   A. Perform fastener pull-out tests according to SPRI FX-1, and submit test report to Owner before installing new membrane roofing system.
   1. Furnish detailed proposal to Owner for revised fastening pattern commensurate with pull-out test results.

3.6 DISPOSAL

   A. Coordinate disposal with requirements of Division 1 Section “Construction Waste Disposal.”

   B. Collect and place demolished materials in containers. Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.
   1. Storage or sale of demolished items or materials on-site will not be permitted.

   C. Transport demolished materials off Owner's property and legally dispose of them.

END OF SECTION 07 5910
SECTION 07 6200 - SHEET METAL FLASHING AND TRIM

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. This Section includes the following sheet metal flashing and trim:
   1. Formed roof drainage system.
   2. Formed low-slope roof flashing and trim.
   3. Formed wall flashing and trim.
   4. Formed equipment support and curb flashing.

B. Related Sections include the following:
   1. Division 6 Section "Miscellaneous Carpentry" for wood nailers, curbs, and blocking.
   2. Division 7 Section "Membrane Roofing" for installing sheet metal flashing and trim integral with roofing membrane.

1.3 PERFORMANCE REQUIREMENTS

A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement.

B. Thermal Movements: Provide sheet metal flashing and trim that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing 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 sheet metal and trim thermal movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

C. Water Infiltration: Provide sheet metal flashing and trim that do not allow water infiltration to building interior.

1.4 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: Show layouts of sheet metal flashing and trim, including plans and elevations. Distinguish between shop- and field-assembled work. Include the following:
   1. Identify material, thickness, weight, and finish for each item and location in Project.
   2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
   3. Details for fastening, joining, supporting, and anchoring sheet metal flashing and trim, including fasteners, clips, cleats, and attachments to adjoining work.
   4. Details of expansion-joint covers, including direction of expansion and contraction.

C. Samples for Initial Selection: For each type of sheet metal flashing and trim indicated with factory-applied color finishes.
   1. Include similar Samples of trim and accessories involving color selection.

1.5 QUALITY ASSURANCE

A. Sheet Metal Flashing and Trim Standard: Comply with the following. Conform to dimensions and profiles shown unless more stringent requirements are indicated.
   1. NRCA Roofing and Waterproofing Manual (Fifth Edition) for construction details and recommendations.

B. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
   1. Meet with Owner, Architect, Owner's insurer if applicable, Installer, and installers whose work interfaces with or affects sheet metal flashing and trim including installers of roofing materials, roof accessories, unit skylights, and roof-mounted equipment.
   2. Review methods and procedures related to sheet metal flashing and trim.
   3. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
   4. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver sheet metal flashing materials and fabrications undamaged. Protect sheet metal flashing and trim materials and fabrications during transportation and handling.

B. Unload, store, and install sheet metal flashing materials and fabrications in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack materials on platforms or pallets, covered with suitable weather-tight and ventilated covering. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.
1.7 COORDINATION

A. Coordinate installation of sheet metal flashing and trim with interfacing and adjoining construction to provide a leak-proof, secure, and non-corrosive installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
   1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
   2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 SHEET METALS

A. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 316.
   1. Finish: No. 3 Polish

B. Lead Sheet: ASTM B 749, Type L51121, copper-bearing lead sheet.
   1. Use prefabricated plumbing vent flashings with factory welded and sealed joints at all plumbing vents.
      a. Flange: 4” minimum
      b. Four (4) pounds per square foot minimum.

2.3 UNDERLAYER MATERIALS

A. Self-Adhering Sheet Underlayment, Smooth Surfaced: ASTM D 6163, Type I, Grade S, minimum of 0.080 in. thick; fiberglass reinforced, SBS/SIS modified asphalt; with perforated and split release film backing; cold applied.
   1. Performance requirements:
      a. Thickness: 0.080 in., ASTM D 6163-00
      b. Tensile Strength at 0 deg. F, 70 lbf/in (MD), 70 lbf/in (XD), ASTM D 6163-00
      c. Elongation at 0 deg. F, 1.0% (MD), 1% (XD), ASTM D 6163-00
      d. Tensile Strength at 77 deg. F, 30 lbf/in (MD), 30 lbf/in (XD), ASTM D 6163-00
      e. Elongation at 77 deg. F, 2% (MD), 2% (XD), ASTM D 6163-00
      f. Tear Strength at 77 deg. F, 35 lbf, ASTM D 6163-00
      g. Low Temperature Flexibility, 0 deg. F, ASTM D 6163-00

B. Slip Sheet: Rosin-sized paper, minimum 3 lb/100 sq. ft.
2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.
   2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex washer head.

C. Solder for Lead: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead.

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

E. Burning Rod for Lead: Same composition as lead sheet.

F. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

G. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type non-corrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.


2.5 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with the following recommendations that apply to design, dimensions, metal, and other characteristics of item indicated. Shop-fabricate items where practicable. Obtain field measurements for accurate fit before shop fabrication.
   1. NRCA Roofing and Waterproofing Manual (Fifth Edition) for construction details and recommendations.

B. 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.

C. Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
   1. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
D. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant to comply with NRCA and/or SMACNA recommendations.

E. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with elastomeric sealant concealed within joints.

F. Conceal fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.

G. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, non-corrosive metal.
   1. Thickness: As recommended by the following for application but not less than thickness of metal being secured.
      a. NRCA Roofing and Waterproofing Manual (Fifth Edition) for construction details and recommendations.
      c. ANSI/SPRI ES-1, “Wind Design Standard for Edge Metal Systems Used with Low Slope Roof Systems”.

2.6 ROOF DRAINAGE SHEET METAL FABRICATIONS

A. Hanging Gutters: Fabricate to cross section indicated, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch- long sections. Furnish flat-stock gutter spacers and gutter brackets fabricated from same metal as gutters, of size recommended by NRCA and/or SMACNA but not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, and gutter accessories from same metal as gutters.
   1. Gutter Style: “A” or as shown on plans.
   2. Expansion Joints: Lap type.
   3. Fabricate from the following material:
      a. Stainless Steel: 24 gauge.

B. Downspouts: Fabricate rectangular downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.
   1. Fabricate downspouts from the following material:
      a. Stainless Steel: 24 gauge.

C. Parapet Over-flow Scuppers: Fabricate scuppers of 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.
   1. Fabricate parapet scuppers from the following material:
      a. Stainless Steel: 24 gauge.

D. Supper Escutcheon Plates and Trim: Fabricate scupper escutcheon plates and trim of dimensions required with closure flange trim to exterior.
   1. Fabricate parapet scuppers from the following material:
      a. Stainless Steel: 24 gauge.
2.7 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Roof Edge Flashing (Gravel Stop) and Fascia Caps: Fabricate in minimum 96-inch- long, but not exceeding 10-foot- long, sections. Furnish with 6-inch- wide joint cover plates.
   1. Joint Style: Butt, with 6-inch- wide exposed cover plates.
   2. Fabricate roof edge flashings and fascia caps from the following material:
      a. Stainless Steel: 24 gauge.
   3. Fabricate continuous roof edge flashings and fascia cap anchor cleats form the following:
      a. Stainless Steel: 22 gauge.

B. Copings: Fabricate in minimum 96-inch- long, but not exceeding 10-foot- long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners, seal, and solder or weld watertight.
   1. Joint Style: Butt, with 6-inch wide exposed cover plates.
   2. Optional Joint Style: Double Lock Standing Seam, with minimum 1” high seam.
   3. Fabricate copings from the following material:
      a. Stainless Steel: 24 gauge.
   4. Fabricate continuous coping anchor cleats form the following:
      a. Stainless Steel: 22 gauge.

C. Roof to Roof and Roof to Wall Transition Expansion Joint Cover: Fabricate from the following material:
   1. Stainless Steel: 24 gauge.

D. Counterflashing: Fabricate from the following material:
   1. Stainless Steel: 24 gauge.

E. Flashing Receivers: Fabricate from the following material:
   1. Stainless Steel: 24 gauge.

F. Roof-Penetration Flashing: Fabricate from the following material:
   1. Stainless Steel: 24 gauge.

G. Roof-Drain Flashing: Fabricate from the following material:
   1. Lead Sheet: Four (4) pounds per square foot minimum.

H. Continuous Anchor Cleats: Fabricate from the following material:
   1. Stainless Steel: 22 gauge.

2.8 MISCELLANEOUS SHEET METAL FABRICATIONS

A. Equipment Support Flashing: Fabricate from the following material:
   1. Stainless Steel: 24 gauge.

2.9 FINISHES

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

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of work.
   1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
   2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
   1. Torch cutting of sheet metal flashing and trim is not permitted.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.
   1. Coat underside of sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
   2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene underlayment.

C. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.

D. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and elastomeric sealant.

E. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
   1. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
F. 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 or bayonet-type expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with elastomeric sealant concealed within joints.

G. Fasteners: Use fasteners of sizes that will penetrate substrate not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.
   1. Galvanized or Pre-painted, Metallic-Coated Steel: Use stainless-steel fasteners.
   2. Stainless Steel: Use stainless-steel fasteners.

H. Seal joints with elastomeric sealant as required for watertight construction.
   1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
   2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."

I. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches except where pre-tinned surface would show in finished Work.
   1. Do not solder pre-painted, metallic-coated steel sheet.
   2. Stainless-Steel Soldering: Pre-tin edges of uncoated sheets to be soldered using solder recommended for stainless steel and phosphoric acid flux. Promptly wash off acid flux residue from metal after soldering.
   3. Do not use open-flame torches for soldering. Heat surfaces to receive solder and flow solder into joints. Fill joints completely. Completely remove flux and spatter from exposed surfaces.

3.3 ROOF DRAINAGE SYSTEM INSTALLATION

A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to the following and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.
   1. NRCA Roofing and Waterproofing Manual (Fifth Edition) for construction details and recommendations.

B. Hanging Gutters: Join sections with riveted and soldered joints or with lapped joints sealed with elastomeric sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchored gutter brackets and straps spaced not more than 36 inches apart. Provide end closures and seal watertight with sealant. Slope to downspouts.
   1. Fasten gutter spacers to front and back of gutter.
   2. Loosely lock straps to front gutter bead and anchor to roof deck.
   3. Anchor and loosely lock back edge of gutter to continuous cleat.
4. Anchor back of gutter that extends onto roof deck with cleats spaced not more than 24 inches apart.
5. Install gutter with expansion joints at locations indicated but not exceeding 50 feet apart. Install expansion joint caps.

C. Downspouts: Join sections with 1-1/2-inch telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.
1. Provide elbows at base of downspout to direct water away from building.
2. Connect downspouts to underground drainage system indicated.

D. Parapet Over-flow Scuppers: Install scuppers where indicated through parapet. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
1. Anchor scupper closure trim flange to exterior wall and seal or solder to scupper.
2. The bottom of each over-flow scupper must be placed at least two inches (2") but no more than four inches (4") above the primary roof drains.

E. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated. Lap joints a minimum of 4 inches in direction of water flow.

3.4 ROOF FLASHING INSTALLATION

A. General: Install sheet metal roof flashing and trim to comply with performance requirements and the following. Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight.
1. NRCA Roofing and Waterproofing Manual (Fifth Edition) for construction details and recommendations.

B. Copings: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated.
1. Interlock exterior bottom edge of coping with continuous cleats anchored to substrate at 16-inch centers.
2. Anchor interior leg of coping with screw fasteners and washers at 18-inch centers.

C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.

D. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglet or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints a minimum of 4 inches and bed with elastomeric sealant.
1. Secure in a waterproof manner by means of interlocking folded seam or blind rivets and sealant.

E. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Install flashing as follows:
1. Turn lead flashing down inside vent piping, being careful not to block vent piping with flashing.
2. Seal with elastomeric sealant and clamp flashing to pipes penetrating roof except for lead flashing on vent piping.

3.5 MISCELLANEOUS FLASHING INSTALLATION

A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.

3.6 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 sheet metal flashing and trim are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.
D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 6200
SECTION 07 7129 - MANUFACTURED ROOF EXPANSION JOINTS

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. Flanged bellows-type roof expansion joints.
   2. Extruded bellows roof expansion joints.
   3. Aluminum roof expansion joints.

B. Related Requirements:
   1. Section 06 1000 "Rough Carpentry" for wooden curbs or cants for mounting roof expansion joints.
   2. Section 07 6200 "Sheet Metal Flashing and Trim" for shop- and field-fabricated sheet metal expansion-joint systems, flashing, and other sheet metal items.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For roof expansion joints.
   1. Include plans, elevations, sections, and attachment details.
   2. Include details of splices, intersections, transitions, fittings, method of field assembly, and location and size of each field splice.
   3. Provide isometric drawings of intersections, terminations, changes in joint direction or planes, and transition to other expansion joint systems depicting how components interconnect with each other and adjacent construction to allow movement and achieve waterproof continuity.

C. Samples: For each exposed product and for each color specified, 6 inches (150 mm) in size.
1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For each fire-barrier provided as part of a roof-expansion-joint assembly, for tests performed by a qualified testing agency.

C. Sample Warranties: For special warranties.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Installer of roofing membrane.

1.7 WARRANTY

A. Special Warranty: Manufacturer and Installer agree to repair or replace roof expansion joints and components that leak, deteriorate beyond normal weathering, or otherwise fail in materials or workmanship within specified warranty period.

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

B. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace roof expansion joints 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 five Hunter units when tested according to ASTM D2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
   c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. 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 seals, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

B. Fire-Resistance Rating: Comply with ASTM E1966 or UL 2079; testing by a qualified testing agency to resist the spread of fire and to accommodate building thermal and seismic movements.
without impairing its ability to resist the passage of fire and hot gases. Identify products with appropriate markings of applicable testing agency.

1. Rating: Not less than fire-resistance rating of the roof assembly.
2. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 ALUMINUM ROOF EXPANSION JOINTS

A. Aluminum Roof Expansion Joint: Factory-fabricated, continuous, waterproof, joint cover; consisting of a formed or extruded metal cover secured to extruded aluminum frames, with water-resistant gasketing between cover and frames, and with provision for securing assembly to substrate and sealing assembly to roofing membrane or flashing.

1. Basis of design product: Construction Specialties RJT-200
2. Field Verify existing joint width and configuration.
4. Frame Members: Extruded aluminum configured as indicated in drawings.
7. Corner, Intersection, and Transition Units: Provide factory-fabricated units for corner and joint intersections and horizontal and vertical transitions including those to other building expansion joints.
8. Accessories: Provide splicing units, adhesives, and other components as recommended by roof-expansion-joint manufacturer for complete installation.
9. Secondary Seal: Continuous, waterproof membrane within joint and attached to substrate on sides of joint below the cover.
   a. Drain-Tube Assemblies: Equip secondary seal with drain tubes and seals to direct collected moisture to exterior-wall expansion joint cover.
   b. Thermal Insulation: Fill space above secondary seal with mineral-fiber blanket insulation; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E84.
10. Fire Barrier: Manufacturer's standard fire barrier for fire-resistance-rated expansion joint system.

B. Materials:

1. Aluminum: ASTM B209 (ASTM B209M) for sheet and plate, ASTM B221 (ASTM B221M) for extrusions; alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.
   a. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious or preservative-treated wood materials.
   b. Mill Finish: As manufactured.
   c. Class II, Clear Anodic Finish: Architectural Class II, clear coating 0.010 mm or thicker, complying with AAMA 611.
d. Class I, Clear Anodic Finish: Architectural Class I, clear coating 0.018 mm or thicker, complying with AAMA 611.

e. Class I, Color Anodic Finish: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker, complying with AAMA 611.

f. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

1) Two-Coat Fluoropolymer: System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.

2) Three-Coat Fluoropolymer: System consisting of primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent PVDF resin by weight.

g. Aluminum Finish Color: As selected by Architect from manufacturer's standard range.

2. Stainless-Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304; finish 2B.

2.3 MISCELLANEOUS MATERIALS

A. Adhesives: As recommended by roof-expansion-joint manufacturer.

B. Fasteners: FM Approved Manufacturer's recommended fasteners, suitable for application and designed to withstand design loads.

1. Exposed Fasteners: Stainless Steel Gasketed. Use screws with hex washer heads matching color of material being fastened.


D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joint openings, substrates, and expansion-control joint systems that interface with roof expansion joints, for suitable conditions where roof expansion joints will be installed.

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

3.2 INSTALLATION

A. General: Comply with manufacturer's written instructions for handling and installing roof expansion joints.
1. Anchor roof expansion joints securely in place, with provisions for required movement. Use fasteners, protective coatings, sealants, and miscellaneous items as required to complete roof expansion joints.

2. Install roof expansion joints true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.

3. Provide for linear thermal expansion of roof expansion joint materials.

4. Provide uniform profile of roof expansion joint throughout its length; do not stretch or squeeze membranes.

5. Provide uniform, neat seams.

6. Install roof expansion joints to fit substrates and to result in watertight performance.

B. Directional Changes: Install factory-fabricated units at directional changes to provide continuous, uninterrupted, and watertight joints.

C. Transitions to Other Expansion-Control Joint Assemblies: Coordinate installation of roof expansion joints with other exterior expansion-control joint assemblies specified in Section 079513.16 "Exterior Expansion Joint Cover Assemblies" to result in watertight performance.

D. Splices: Splice roof expansion joints to provide continuous, uninterrupted, and waterproof joints.

1. Install waterproof splices and prefabricated end dams to prevent leakage of secondary-seal membrane.

E. Fire Barrier: Install fire barrier as required by manufacturer to provide continuous, uninterrupted fire resistance throughout length of roof expansion joint, including transitions and end joints.

F. 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.

END OF SECTION 07 7129
SECTION 07 7200 - ROOF ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Roof hatches.

1.2 REFERENCE STANDARDS

1.3 ADMINISTRATIVE REQUIREMENTS
A. Preinstallation Meeting:
   1. Review preparation and installation procedures and coordinating and scheduling required with related work.
   2. Representatives of the Owner, Architect, and Installer shall be present at pre-installation conference.

1.4 SUBMITTALS
A. See Division 01 - Submittal Procedures.
B. Product Data: Manufacturer's data sheets on each product to be used.
   1. Compliance with project FM Requirements.
   2. Preparation instructions and recommendations.
   3. Storage and handling requirements and recommendations.
   4. Installation methods.
   5. Maintenance requirements.
C. Shop Drawings: Submit detailed layout developed for this project. Show dimensioned location and number for each type of roof accessory.
   1. Submit design calculations for loadings and spacings for railings and fall arrest anchors.
   2. Submit shop drawings sealed and signed by a Professional Engineer experienced in design of this type of work and licensed in the State of Hawaii.
D. Warranty Documentation:
   1. Submit manufacturer warranty.
2. Ensure that forms have been completed in State's name and registered with manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.
B. Store products under cover and elevated above grade.

1.6 WARRANTY

A. Correct defective Work within a five year period after Date of Project Acceptance.
B. Provide five year manufacturer warranty for defects in material and workmanship.
C. The Surety shall not be held liable beyond two years from the project acceptance date.

PART 2 PRODUCTS

2.01 ROOFHATCHES

A. Basis of Design: Type L (service stair size), Bilco Company; www.bilco.com/sle.
B. Other Acceptable Manufacturers:
C. Roof Hatches - General: Factory-assembled aluminum frame and cover, complete with operating and release hardware.
   1. Style: Provide flat metal covers unless otherwise indicated.
   2. Mounting: Provide frames and curbs suitable for mounting conditions indicated on the drawings and verified in the field.
   3. For Stair Access: Single leaf; 30 by 96 inches (762 by 2438 mm) – verify size with existing opening.
D. Frames/Curbs: One-piece curb and frame with integral cap flashing to receive roof flashings; extended bottom flange to suit mounting.
   1. Material: Mill finished aluminum, 11 gage, 0.0907 inch (2.3 mm) thick.
   2. Insulation: Manufacturer's standard; 1 inch (25 mm) rigid glass fiber, located on outside face of curb.
   3. Curb Height: As indicated on drawings.
E. Metal Covers: Flush, insulated, hollow metal construction.
   1. Capable of supporting 40 psf (1.92 kPa) live load.
2. Material: Mill finished aluminum; outer cover 11 gage, 0.0907 inch (2.3 mm) thick, liner 0.04 inch (1.0 mm) thick.

3. Insulation: Manufacturer's standard 1 inch (25 mm) rigid glass fiber.


F. Safety Railing System: Manufacturer's standard accessory safety rail system mounted directly to curb.
   3. Gate: Same material as railing; automatic closing with latch.
   4. Finish: Manufacturer's standard; molded in integral safety yellow treated with a UV inhibitor.
   5. Gate Hinges and Post Guides: ASTM B221 (ASTM B221M), 6063 alloy, T5 temper aluminum.
   6. Mounting Brackets: Hot dipped galvanized steel, 1/4 inch (6.4 mm) thick, minimum.
   7. Fasteners: Type 316 stainless steel.

G. Hardware: Steel, zinc coated and chromate sealed, unless otherwise indicated or required by manufacturer. Stainless Steel at all areas exposed to exterior.
   1. Lifting Mechanisms: Compression or torsion spring operator with shock absorbers that automatically opens upon release of latch; capable of lifting covers despite 10 psf (475 kPa) load.
   2. Hinges: Heavy duty pintle type with 3/8” 316 stainless steel hinge pins.
   3. Hold open arm with vinyl-coated handle for manual release.

PART 3 EXECUTION

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

3.2 PREPARATION
   A. Clean surfaces thoroughly prior to installation.
   B. Prepare surfaces using the methods recommended by the manufacturer for
achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION
   A. Install in accordance with manufacturer’s instructions, in manner that maintains roofing weather integrity.

3.4 CLEANING
   A. Clean installed work to like-new condition.

3.5 PROTECTION
   A. Protect installed products until completion of project.
   B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 07 7200
SECTION 07 9200 - JOINT SEALANTS

PART 1  GENERAL

1.1 SECTION INCLUDES

A. Nonsag gunnable joint sealants.
B. Joint backings and accessories.

1.2 REFERENCE STANDARDS


1.3 SUBMITTALS

A. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used that includes the following.
   1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
   2. List of backing materials approved for use with the specific product.
   3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
   4. Substrates the product should not be used on.
   5. Substrates for which use of primer is required.
B. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
B. Field Quality Control Plan:
   1. Visual inspection of entire length of sealant joints.
2. Non-destructive field adhesion testing of sealant joints, except interior acrylic latex sealants.
   a. Test the entire length of every sealant joint.

C. Non-Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Nondestructive Continuous Method.

1.5 WARRANTY
A. Correct defective work within a five year period after Date of Substantial Completion.

B. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.1 MANUFACTURERS


D. Dow Corning Corporation: www.dowcorning.com/construction.


2.2 JOINT SEALANT APPLICATIONS
A. Scope:
   1. Exterior Joints: Seal open joints, whether or not the joint is indicated on the drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
      a. Joints between different exposed materials.

B. Exterior Joints: Use nonsag non-staining silicone sealant, unless otherwise indicated.
   1. Ensure compatibility with adjacent components and materials.
   2. Where specified in other sections utilize manufacturer’s recommended sealant.
2.3 JOINT SEALANTS - GENERAL

2.4 NONSAG JOINT SEALANTS

A. Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
   1. Movement Capability: Plus and minus 50 percent, minimum.
   2. Non-Staining To Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.
   3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
   5. Cure Type: Single-component, neutral moisture curing.

2.5 ACCESSORIES

A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.

B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.

D. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.

E. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that joints are ready to receive work.

B. Verify that backing materials are compatible with sealants.

C. Verify that backer rods are of the correct size.

3.2 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.3 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer.

D. Install bond breaker backing tape where backer rod cannot be used.

E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

F. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

G. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

3.4 FIELD QUALITY CONTROL

A. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.

B. Non-Destructive Adhesion Testing: If there are any failures in first 100 linear feet (30 linear m), notify Architect immediately.

C. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

END OF SECTION 09 9123
SECTION 08 1113 - HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Non-fire-rated steel doors and frames.
B. Thermally insulated steel doors.

1.2 RELATED REQUIREMENTS
A. Section 08 7100 - Door Hardware.
B. Section 09 9001 - Painting: Field painting.

1.3 REFERENCE STANDARDS
B. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.
E. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2014. (ANSI/BHMA A156.115)

1.4 SUBMITTALS
A. See Section 01330 - Submittal Procedures.
B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced grade standard.
C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and identifying location of different finishes, if any.
D. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

1.5 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

B. Maintain at the project site a copy of all reference standards dealing with installation.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store in accordance with NAAMM HMMA 840.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Steel Doors and Frames:

2.2 DOORS AND FRAMES

A. Requirements for All Doors and Frames:
   1. Accessibility: Comply with ICC A117.1 and ADA Standards.
   2. Door Top Closures: Flush with top of faces and edges.
   3. Door Edge Profile: Beveled on both edges.
   5. Force to Open and Close and Latch: Not more than 5 lbs (22.2 N).
   6. Hardware Preparation: In accordance with BHMA A156.115, with reinforcement welded in place, in addition to other requirements specified in door grade standard.
   7. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A60/ZF180 coating thickness
   8. Finish: Factory primed, for field finishing.

B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with all the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.3 STEEL DOORS

A. Typical Metal Doors:
   1. Grade: ANSI/SDI A250.8 (SDI-100); Level 3 - Extra Heavy-Duty, Physical Performance Level A, Model 2 - Seamless.
   2. Core: Kraftpaper honeycomb.
4. Weatherstripping: Separate, see Section 08 7100.

2.4 STEEL FRAMES
A. General:
   1. Comply with the requirements of grade specified for corresponding door.
   2. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
B. Exterior Door Frames: Face welded, seamless with joints filled.
   1. Weatherstripping: Separate, see Section 08 7100.

2.5 ACCESSORY MATERIALS
A. Mechanical Fasteners for Concealed Metal-to-Metal Connections: Self-drilling, self-tapping, steel with electroplated zinc finish.
B. Grout for Frames: Portland cement grout of maximum 4-inch slump for hand troweling; thinner pumpable grout is prohibited.
C. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.
D. Temporary Frame Spreaders: Provide for all factory- or shop-assembled frames.

2.6 FINISH MATERIALS
A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

PART 3 EXECUTION

3.1 EXAMINATION
A. Verify existing conditions before starting work.
B. Verify that opening sizes and tolerances are acceptable.
C. Verify that finished walls are in plane to ensure proper door alignment.

3.2 PREPARATION
A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.3 INSTALLATION
A. Install in accordance with the requirements of the specified door grade standard and NAAMM HMMA 840.
B. Coordinate frame anchor placement with wall construction.
C. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
D. Coordinate installation of hardware.
E. Coordinate installation of glazing.
F. Touch up damaged factory finishes.

3.4 TOLERANCES
A. Clearances Between Door and Frame: As indicated in ANSI/SDI A250.8 (SDI-100).
B. Maximum Diagonal Distortion: 1/16 in measured with straight edge, corner to corner.

3.5 ADJUSTING
A. Adjust for smooth and balanced door movement.
B. Adjust sound control doors so that seals are fully engaged when door is closed.
C. Test sound control doors for force to close, latch, and unlatch; adjust as necessary in compliance with requirements.

END OF SECTION
SECTION 08 4315 - ALUMINUM-FRAMED STOREFRONTS

PART 1   GENERAL

1.1   SECTION INCLUDES
   A. Aluminum-framed storefront, with vision glass.

1.2   RELATED REQUIREMENTS
   A. Section 07 2500 - Weather Barriers: Sealing framing to weather barrier installed on adjacent construction.
   B. Section 07 9200 - Joint Sealants: Sealing joints between frames and adjacent construction.
   C. Section 08 8000 - Glazing: Glass and glazing accessories.

1.3   REFERENCE STANDARDS
   A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.

1.4   ADMINISTRATIVE REQUIREMENTS
   A. Coordinate with installation of other components that comprise the exterior
enclosure.

B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.5 SUBMITTALS

A. See Section 01300 - Submittals for submittal procedures.

B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, internal drainage details.

C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.

D. Verification Samples: Two samples, minimum size of 2 inch by 3 inch (51 mm by 76 mm), representing actual material and finish of exposed metal.

E. Design Data: Provide framing member structural and physical characteristics, engineering calculations, and dimensional limitations.

1.6 QUALITY ASSURANCE

A. Designer Qualifications: Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State of Texas.

B. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

C. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Handle products of this section in accordance with AAMA CW-10.

B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.8 WARRANTY

A. Correct defective Work within a five year period after Date of Substantial Completion.

B. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.

C. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

D. The Surety shall not be held liable beyond two years from the project acceptance date.

PART 2 PRODUCTS
2.1 BASIS OF DESIGN -- FRAMING FOR INSULATING GLAZING

A. Front-Set Style, Thermally-Broken:
   2. Vertical Mullion Dimensions: 2 inches wide by 6-1/2 inches deep (50 mm wide by 155 mm deep).

B. Other Manufacturers: Provide either the product identified as "Basis of Design" or an equivalent product of one of the manufacturers listed below:
   1. Oldcastle Building Envelope; www.obe.com
   4. EFCO Corporation

2.2 STOREFRONT

A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
   1. Glazing Rabbet: For 1 inch (25 mm) insulating glazing.
   2. Finish: Superior performing organic coatings.
      a. Factory finish all surfaces that will be exposed in completed assemblies.
      b. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.
   4. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
   6. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
   7. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F (95 degrees C) over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
8. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.

9. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.

B. Performance Requirements:

1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
   a. Design Wind Loads: As indicated in drawings.
   b. Member Deflection: Limit member deflection to 1/175 in any direction, with full recovery of glazing materials.

2. Movement: Accommodate the following movement without damage to components or deterioration of seals:
   a. Expansion and contraction caused by 180 degrees F (82 degrees C) surface temperature.
   b. Expansion and contraction caused by cycling temperature range of 170 degrees F (77 degrees C) over a 12 hour period.
   c. Movement of storefront relative to perimeter framing.
   d. Deflection of structural support framing, under permanent and dynamic loads.

3. Water Penetration Resistance: No uncontrolled water on interior face, when tested in accordance with ASTM E331 at pressure differential of 12 psf (575 Pa).

4. Air Leakage: Maximum of 0.06 cu ft/min sq ft (0.3 L/sec sq m) of wall area, when tested in accordance with ASTM E283 at 6.27 psf (300 Pa) pressure differential across assembly.

5. Thermal Requirements: as indicated.

2.3 COMPONENTS

A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
   1. Cross-Section: As indicated on drawings.
   2. Structurally Reinforced Members: Extruded aluminum with internal reinforcement of structural steel member as required.

B. Glazing: As specified in Section 08 8000.

2.4 MATERIALS

C. Fasteners: Stainless steel or aluminum as recommended by manufacturer.
D. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air...
infiltration requirements.

2.5 FINISHES

A. Superior Performing Organic Coatings: AAMA 2605 multiple coat, thermally cured polyvinylidene fluoride (PVDF) system.
   1. Polyvinylidene fluoride (PVDF) multi-coat thermoplastic fluoropolymer coating system, including minimum 70 percent PVDF color topcoat and minimum total dry film thickness of 0.9 mil (0.023 mm); color and gloss as indicated on drawings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify dimensions, tolerances, and method of attachment with other work.
B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.
C. Separate all dissimilar metals from other metals susceptible to galvanic action and non-ferrous metals from contact with concrete or masonry by applying a bituminous coating, self-adhering rubberized asphalt sheet, or other approved permanent method.

3.2 INSTALLATION

A. Install wall system in accordance with manufacturer's instructions.
B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
C. Provide alignment attachments and shims to permanently fasten system to building structure.
D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
E. Provide thermal isolation where components penetrate or disrupt building insulation.
F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.
H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
1. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.3 TOLERANCES

A. Maximum Variation from Plumb: 0.06 inches every 3 ft (1.5 mm/m) non-cumulative or 1/16 inches per 10 ft (1.5 mm/3 m), whichever is less.

B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch (0.8 mm).

3.4 CLEANING

A. Remove protective material from pre-finished aluminum surfaces.

B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

C. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with AAMA 609 & 610.

3.5 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION 08 4314
SECTION 08 7100 - DOOR HARDWARE

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Hardware for hollow metal doors.

1.2 REFERENCE STANDARDS

1.3 ADMINISTRATIVE REQUIREMENTS
A. Coordinate the manufacture, fabrication, and installation of products that door hardware will be installed upon.

1.4 SUBMITTALS
A. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project.
B. Hardware Schedule: Detailed listing of each item of hardware to be installed on each door. Use door numbering scheme as included in the Contract Documents. Identify electrically operated items and include power requirements.
C. Keying Schedule: Submit for approval of University.
D. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
   1. Submit manufacturer's parts lists and templates.
   2. Bitting List: List of combinations as furnished.

PART 2 PRODUCTS

2.1 DOOR HARDWARE - GENERAL
A. Match existing hardware in type, material, and quality.
B. Provide items of a single type of the same model by the same manufacturer.
C. Provide products that comply with the following:
   1. Applicable provisions of federal, state, and local codes.
   3. Hardware on Fire-Rated Doors, Except Hinges: Listed and classified by UL as suitable for the purpose specified and indicated.
D. Finishes: Match existing.
2.2 LOCKS AND LATCHES

A. Locks: Provide a lock for every door, unless specifically indicated as not requiring locking.
   1. If no hardware set is indicated for a swinging door provide an office lockset.
   2. Trim: Provide lever handle or pull trim on outside of all locks unless specifically stated to have no outside trim.
   3. Lock Cylinders: Provide key access on outside of all locks unless specifically stated to have no locking or no outside trim.

B. Lock Cylinders: Manufacturer’s standard tumbler type, six-pin standard core.
   1. Provide cams and/or tailpieces as required for locking devices required.

C. Keying: Grand master keyed.

D. Latches: Provide a latch for every door that is not required to lock, unless specifically indicated "push/pull" or "not required to latch".

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that doors and frames are ready to receive work; labeled, fire-rated doors and frames are present and properly installed, and dimensions are as indicated on shop drawings.

3.2 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions and applicable codes.

B. Use templates provided by hardware item manufacturer.

C. Install hardware on fire-rated doors and frames in accordance with code and NFPA 80.

D. Mounting heights for hardware from finished floor to center line of hardware item.

3.3 ADJUSTING

A. Adjust work under provisions of Section 01 7000.

B. Adjust hardware for smooth operation.

3.4 SCHEDULE - ATTACHED

END OF SECTION
SECTION 08 8000 - GLAZING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Glass.
B. Glazing compounds and accessories.

1.2 REFERENCE STANDARDS

F. GANA (GM) - GANA Glazing Manual; Glass Association of North America; 2009.
G. GANA (SM) - GANA Sealant Manual; Glass Association of North America; 2008.

1.3 SUBMITTALS

A. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.
B. Recycled Content: Provide submittals for materials with recycled content in accordance with Section 01 8113, Sustainable Building Requirements.
C. Samples: Submit two samples 12 x 12 inch (305 x 305 mm) in size of glass and plastic units, showing coloration and design.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with GANA Glazing Manual and GANA Sealant Manual for glazing installation methods.
B. Installer Qualifications: Company specializing in performing the work of this section with minimum three years experience.

1.5 WARRANTY

A. Sealed Insulating Glass Units: Provide a five (5) year warranty to include coverage for seal failure, interpane dusting or misting, including replacement of failed units.

B. Laminated Glass: Provide a five (5) year warranty to include coverage for delamination, including replacement of failed units.

PART 2 PRODUCTS

2.1 GLAZING TYPES

A. Window Insulating Glass Units:
   1. Basis of Design Manufacturer: Oldcastle
   2. Components
      a. Out Board Lite: 1/4” Guardian SunGuard SNX 62/27 on UltraWhite Low-E. Provide tempered out board light where safety glazing is required by code.
      b. Air Space: 1/2 inch Air Fill.
      c. Inboard Lite: 15/32” Laminate - 3/16” PPG Starphire® - 0.090” DuPont SentryGlas - 3/16” PPG Starphire.
   3. Properties
      a. Visible Light Transmittance: 62%.
      c. Light to Solar Gain: 2.38.
   4. Total Thickness: 1-7/32 inch (31 mm).

2.2 GLASS MATERIALS

A. Float Glass: All glazing is to be float glass unless otherwise indicated.
   1. Annealed Type: ASTM C1036, Type I, transparent flat, Class 1 clear, Quality Q3 (glazing select).
   3. Tinted Types: Color and performance characteristics as indicated.
   4. Thicknesses: As indicated; for exterior glazing comply with specified requirements for wind load design regardless of specified thickness.
B. Laminated Glass: Float glass laminated in accordance with ASTM C1172.
   1. Plastic Interlayer: 0.060 inch (1.52 mm) thick, minimum.
   2. Where fully tempered is specified or required, provide glass that has been tempered by the tong-less horizontal method.

2.3 PERFORMANCE REQUIREMENTS

A. Meet TDI Requirements for Project zone and structural requirements as listed in the drawings.
B. Missile Impact: Exterior glazed openings shall meet the requirements of the large missile test of ASTM E 1996.

2.4 GLAZING ACCESSORIES

A. As provided or recommended by window and door manufacturer for application.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that openings for glazing are correctly sized and within tolerance.
B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing.

3.2 PREPARATION

A. Clean contact surfaces with solvent and wipe dry.
B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
C. Install sealants in accordance with ASTM C1193 and GANA Sealant Manual.

3.3 INSTALLATION

A. INSTALLATION
   1. Install glazing in accordance with the instructions from the product manufacturer of the system to receive the glazing and GANA Glazing Manual;

3.4 CLEANING

A. Remove glazing materials from finish surfaces.
B. Remove labels after Work is complete.
C. Clean glass and adjacent surfaces.
3.5 PROTECTION

A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

END OF SECTION 08 8000
SECTION 08 9100 - LOUVERS

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Louvers, frames, and accessories.

1.2 REFERENCE STANDARDS

1.3 SUBMITTALS
A. Product Data: Provide data describing design characteristics, maximum recommended air velocity, design free area, materials and finishes.
B. Samples: Submit two samples 2 by 2 inches in size illustrating finish and color of exterior and interior surfaces.
C. Test Reports: Independent agency reports showing compliance with specified performance criteria.

1.4 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum three years of documented experience.
C. Field Measurements: Filed Verify All Louver and Louver Screen Grille Conditions including: size, location and placement of screen units prior to fabrication.
D. Shop Assembly: Coordinate field measurements and shop drawings with fabrication and shop assembly to minimize field adjustments.

1.5 WARRANTY
A. Provide twenty year manufacturer warranty against distortion, metal degradation, and failure of connections.
1. Finish: Include coverage against degradation of exterior finish.
B. The Surety shall not be held liable beyond two years from the project acceptance date.

PART 2 PRODUCTS

2.1 MANUFACTURERS
A. Wall Louvers:

2.2 LOUVERS

A. Louvers: Factory fabricated and assembled, complete with frame, mullions, and accessories; AMCA Certified in accordance with AMCA 511.
   1. Wind Load Resistance: Design to resist positive and negative wind loads listed in the drawings.
   2. High Velocity Hurricane: Tested and certified to meet TDI and Miami-Dade County protocols TAS - 201, TAS - 202 and TAS - 203.
   3. Drainable Blades: Continuous rain stop at front or rear of blade aligned with vertical gutter recessed into both jambs of frame.

B. Stationary Louvers: Storm Resistant Horizontal Louver.
   1. Basis of Design: Model DCH-5704; Construction Specialties, Inc.
   2. Properties:
      a. Blades: Manufacturer's storm rated design.
      b. Frame: 5 inches deep, channel profile; corner joints mitered and, with continuous recessed caulking channel each side.
      d. Aluminum Finish: 100% Fluoropolymer Resin Powder Coat System complying with AAMA-2605 and AAMA-2605-5 standards for gloss and color retention. Finish thickness to be 1.5 to 3.0 mils.
         • 1. Finish to allow zero VOCs to be emitted into facility of application or at job site.
         • 2. Finish to adhere to a 4H Hardness rating.
         • 3. Furnish manufacturer's twenty (20) year warranty for finish for gloss and color retention
         • Color to match University’s standard blue as provided in CMYK format by Architect at time of Submittal

C. Stationary Louver Screen Grilles: Myriad Continuous Grille
   1. Basis of Design: Myriad Continuous Grille; Construction Specialties, Inc., sizes and layouts as indicated in the drawings.
   2. Properties:
      a. Frame: as required to meet structural wind pressure requirements of the drawings.
      e. Aluminum Finish: 100% Fluoropolymer Resin Powder Coat System complying with AAMA-2605 and AAMA-2605-5 standards for gloss and color retention. Finish thickness to be 1.5 to 3.0 mils.
         • 1. Finish to allow zero VOCs to be emitted into facility of application or at job site.
Texas A&M University Corpus Christi
CI Re-Roof and Building Envelope Improvements

- 2. Finish to adhere to a 4H Hardness rating.
- 3. Furnish manufacturer's twenty (20) year warranty for finish for gloss and color retention
- Color to match University’s standard blue as provided in CMYK format by Architect at time of Submittal

2.3 MATERIALS


2.4 FINISHES

A. Superior Performing Organic Coatings: AAMA 2605 multiple coat, thermally cured polyvinylidene fluoride system.

2.5 ACCESSORIES

A. Sill Pan: Same material as frame and louver.
B. Screens: Frame of same material as louver, with reinforced corners; removable, screw attached; installed on inside face of louver frame.
C. Insect Screen.
D. Fasteners and Anchors: Stainless steel.
E. Head and Sill Flashings: Same material as frame or 316L Stainless Steel.
F. Sealant for Setting Sills and Sill Flashing: Non-curing butyl type.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that prepared openings and flashings are ready to receive work and opening dimensions are as indicated on shop drawings.
B. Verify that field measurements are as indicated.

3.2 INSTALLATION

A. Install louver assembly in accordance with manufacturer's instructions.
B. Install louvers level and plumb.
C. Align louver assembly to ensure moisture shed from flashings and diversion of moisture to exterior.
D. Secure louver frames in openings with concealed fasteners.

3.3 CLEANING

A. Strip protective finish coverings.
B. Clean surfaces and components.

END OF SECTION 08 9100
SECTION 26 4100 – LIGHTNING PROTECTION SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section specifies the lightning protection system for the Texas A&M University Corpus Christi Performing Arts Center Re-Roof. This system shall provide safety for the building and occupants by preventing damage to the structure caused by lightning. The design of this system is to be in strict accordance with this section of the specification and all contract drawings that apply.

B. The work covered under this section of the specifications consists of furnishing labor, materials and services required for the completion of a functional, unobtrusive, certified lightning protection system.

C. Work is exclusive to firms actively engaged in the installation of certified lightning protection systems.

1.3 SYSTEM DESCRIPTION/DESIGN

A. the entire lightning protection system shall be designed and installed in accordance with one or more of the following:
   1. National Fire Protection Assoc. (NFPA) Document # 780
   2. Underwriters’ Laboratories, Inc. (UL) Standard # 96 and 96A
   3. Lightning Protection Institute (LPI) Standard # 175

B. The lightning protection system shall be designed by an LPI Certified Master Designer and the shop drawings shall bear the designers seal. The seal shall be current at the time of submission and shall be signed by the Master Designer. This shall be accepted in lieu of a state certified engineers stamp on the lightning protection drawings.

1.4 SUBMITTALS

A. Complete shop drawings shall be submitted for approval prior to commencement of the installation. The shop drawing will show the extent of the system layout designed for the structure along with details of the products to be used in the installation.
B. Submit a copy of the LPI Master Installer Certificate for the certified person selected to perform on-site oversight of the job.

1.5 QUALITY ASSURANCE

A. The lightning protection system shall conform to the requirements and standards for lightning protection systems of LPI, UL and NFPA. Provide Lightning Protection Institute Inspection Program inspection and issuance of the system certification.

1.6 PRODUCTS

A. All materials shall comply in weight, size, and composition with the requirements of a nationally recognized testing laboratory. All equipment shall be listed and properly labeled. The system furnished under this specification shall be the standard product of a manufacturer regularly engaged in the production of lightning protection equipment and a member of LPI. Equipment shall be the manufacturer’s latest approved design of construction to suit the application where it is to be used in accordance with accepted industry standards and with NFPA, LPI, & UL requirements.

B. Components must meet the FM Requirements of the project.

C. Acceptable Manufacturers
   1. Advanced Lightning Technology, Ltd. (www.altfab.com)
   2. East Coast Lightning Equipment, Inc. (www.ecle.biz)
   3. ERICO, Inc. (www.erico.com)
   4. Harger, Inc. (www.harger.com)
   5. Heary Brothers Lightning Protection Co., Inc. (www.hearybros.com)
   7. Preferred Lightning Protection (www.preferredlp.com)
   8. Robbins Lightning, Inc. (www.robbinslightning.com)

PART 2 - PRODUCTS

2.1 PRODUCTS

A. All materials shall comply in weight, size, and composition with the requirements of a nationally recognized testing laboratory. All equipment shall be listed and properly labeled. The system furnished under this specification shall be the standard product of a manufacturer regularly engaged in the production of lightning protection equipment and a member of LPI. Equipment shall be the manufacturer’s latest approved design of construction to suit the
application where it is to be used in accordance with accepted industry standards and with NFPA, LPI, & UL requirements.

B. Components must meet the FM Requirements of the project.

C. Acceptable Manufacturers:

1. Advanced Lightning Technology, Ltd. (www.altfab.com)
2. East Coast Lightning Equipment, Inc. (www.ecle.biz)
3. ERICO, Inc. (www.erico.com)
4. Harger, Inc. (www.harger.com)
5. Heary Brothers Lightning Protection Co., Inc. (www.hearybros.com)
7. Preferred Lightning Protection (www.preferredlp.com)
8. Robbins Lightning, Inc. (www.robbinslightning.com)

2.2 MATERIALS

A. Where deemed appropriate by the LPI Master Installer, existing materials and components may be salvaged and reinstalled provided they meet project requirements including wind loads, FM Requirements, and waterproofing requirements.

B. Class I materials shall be used for systems on structures not exceeding 75 feet in height and Class II materials shall be used for systems on structures exceeding 75 feet above grade.

C. Copper shall be of the grade ordinarily required for commercial electrical work, generally designated as being 95 percent conductive when annealed. Aluminum conductors shall be of electrical grade aluminum.

D. Lightning protection materials shall be coordinated with building construction materials to assure compatibility. Aluminum lightning protection materials shall not be embedded in concrete or masonry, installed on or below copper surfaces, or used for the in-ground system. Copper lightning protection materials shall not be installed on aluminum surfaces. Copper system components within 2 feet of chimney exhausts shall be tin coated to protect against deterioration.

E. Strike termination devices shall be provided to place the entire structure under a zone of protection as defined by the Standards. Air terminals shall project a minimum of 10 inches above protected areas or objects. Air terminals shall be located within 2 feet of exposed corners and roof edges.

F. Metallic bodies having a thickness 3/16” or greater may serve as strike termination devices without the addition of air terminals. These bodies shall be made a part of the lightning protection system by connection(s) according to the Standards using main size conductors and bonding fittings with 3 square inches of surface contact area.

G. Cable conductors shall provide a two-way path from strike termination devices horizontally and downward to connections with the ground system. Cable conductors shall be free of excessive
splices and sharp bends. No bend of a conductor shall form a final included angle of less than 90 degrees nor have a radius of bend less than 8 inches. Structural elements and design features shall be used whenever possible to minimize the visual impact of exposed conductors.

H. Cable down conductors shall be routed in such a way as to minimize them from view from roof to grade level. Down conductors shall be spaced at intervals averaging not more than 100 feet around the protected perimeter of the structure. In no case shall any structure have fewer than two down conductors. Where down conductors exposed to environmental hazards at grade level, guards shall be used to protect the conductor to a point 6 feet above grade.

I. Exposed cable conductors shall be secured to the structure at intervals not exceeding 3 feet – 0 inches. Fasteners, nails, screws, or bolts shall be of suitable configuration for the intended application and of the same material as the conductor or of electrolytically compatible materials. Galvanized or plated steels are not acceptable.

J. Connectors and splices shall be of suitable configuration and type for the intended application and of the same material as the conductors or of electrolytically compatible materials.

K. Ground terminations suitable for the soil conditions shall be provided for each down lead conductor. For any structure in excess of 60 ft. in vertical elevation above grade, a ground loop interconnecting all ground terminals and other building grounded systems shall be provided.

L. Common interconnection of all grounded systems within the building shall be accomplished using main size conductors and fittings. Grounded metal bodies located within the calculated bonding distance as determined by the formulas of the Standards shall be bonded to the system using properly sized bonding conductors.

M. Verify surge suppression has been provided at every system entrance to the structure to prevent massive lightning over voltages from entering the structure.

PART 3 - EXECUTION

3.1 GENERAL

A. The installation shall comply with the requirements of NFPA 780, UL96A, and LPI 175.

3.2 ACCEPTABLE INSTALLERS

A. The lightning protection installation company shall employ an LPI Certified Master Installer to oversee/lead on-site installation of the subject lightning protection system. A copy of that certified person’s certification shall be part of the submittal package. The card shall be carried onsite at all times.

3.3 SYSTEM INSTALLATION

A. The installation of the lightning protection system components shall be done in a neat and workmanlike manner.
B. Roof penetrations will not be allowed. Down conductors shall be routed around-roof assemblies, taking care to keep them neat and as concealed as possible.

C. LPI certification requires a signature by a representative of the owner for two stages of the installation – the in-ground system and the exposed or roof level section. LPI certification also requires photo documentation of the in-ground system and the concealed portions of the installation. LPI certification requires inspection by their third-party field staff after completion of the installation. Upon completion of the lightning protection installation, the installing contractor shall provide to the owner an as-built drawing of the system, along with copies of the LPI Certificates of completion.

D. If the protected structure is an addition to or is attached to an existing structure that does not have a lightning protection system, the contractor shall certify that the system installed complies with the requirements of the Standards, and advise the owner of the lightning protection work required on the existing structure to obtain full certification for the structure. If the existing structure does have a lightning protection system, the contractor shall advise the owner of any additional work required on the existing system to bring it into compliance with current Standards and thus qualify for and LPI certification.

END OF SECTION 26 4100