

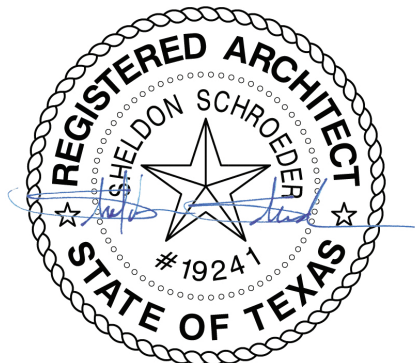
**NATURAL RESOURCES CENTER (NRC)
RE-ROOF OVERLAY (Fluid Applied Coating
System)**

TEXAS A&M CORPUS CHRISTI



ISSUED FOR CONSTRUCTION

November 8th, 2024



PREPARED BY:



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SECTION 01 21 00 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements governing allowances.
 - 1. Certain items of work are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer determination of the exact quantities required to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.
- B. Types of allowances include the following:
 - 1. Contingency allowances.
 - 2. Quantity allowances.
- C. Related Sections include the following:
 - 1. Division 1 Section "Unit Prices" for procedures for using unit prices.
 - 2. Divisions 2 through 48 Sections for items of Work covered by allowances.

1.3 SUBMITTALS

- A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- B. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.4 COORDINATION

- A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.5 CONTINGENCY ALLOWANCE

- A. Use the contingency allowance only as directed by Architect or Owner's Representative for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.
- B. Contractor's overhead, profit, and related costs for products and equipment ordered by Owner under the contingency allowance are included in the allowance and are not part of the Contract Sum. These costs include delivery, installation, insurance, equipment rental, and similar costs.

- C. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit margins.
- D. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

1.6 QUANTITY ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner under allowance and shall include taxes, freight, and delivery to Project site.
- B. Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner under allowance shall be included as part of the Contract Sum and not part of the allowance.
- C. Additional quantities over and above the specified allowances will, upon proper documentation and verification of actual quantities required, be added to the Contract by Change Order in accordance with Division 1 Section "Unit Prices".
- D. The unused portion of the allowance quantities will (upon proper documentation and verification of actual quantities required) be deducted from the Contract by Change Order in accordance with Division 1 Section "Unit Prices".

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 DOCUMENTATION

- A. Verify allowance quantities used on a daily basis with the project superintendent, the roofing inspector or another third party representative of the school district or the architects office and provide written and photographic documentation for inclusion in the daily reports.

3.4 SCHEDULE OF ALLOWANCES

- A. Contingency Allowance: Contingency Allowance: Include a contingency allowance of **\$20,000.00** for use according to Owner's written instructions.
 - 1. This allowance includes material cost receiving, handling, and installation and Contractor overhead and profit.
 - 2. This allowance is intended to be used for roof flashings and related rooftop work as required by the rehabilitation or replacement of existing mechanical and electrical equipment and/or systems, conduit, piping, curbs or other roof flashing requirements made necessary by other new construction, replacement or renovations that require roof penetrations, connections or tie-in.

- B. Allowance No. 1:
 - 1. Replacement and/or repair of wet insulation as shown by thermal scan.
 - a. Allow for replacement and/or repair of the existing **wet insulation** in the base proposal as follows:
 - 1) 100 square feet.

END OF SECTION 01 21 00

SECTION 01 23 00 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

- A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Comply with all specification requirements for service, inspection, maintenance, documentation and follow-up as specified elsewhere in these documents.
- E. Schedule: A Schedule of Alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. Alternates to be added to base proposal one, as per sections “070150.73 Rehabilitation of Modified Bitumen Roofing” as selected by owner.
 - 1. Alternate Number 1: Fully reinforced fluid applied system for 20yr manufacturers QA NDL warranty.

END OF SECTION 01 23 00

SECTION 01 27 00 – UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for unit prices.

1.3 DEFINITIONS

- A. Unit price is an amount proposed by bidders, stated on the Bid Form, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
- D. List of Unit Prices: A list of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 LIST OF UNIT PRICES

- A. Unit Price No. 1: Wet or damaged insulation repair or replacement as marked by thermal scan.

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1. Description: Provide replacement of wet or damaged roofing insulation and/or crickets as discovered by manufacturers thermal scan.
2. Unit of Measurement: 1 square foot.

END OF SECTION 01 27 00

SECTION 02 4100 - DEMOLITION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Selective demolition of building elements for alteration purposes.

1.2 REFERENCE STANDARDS

- A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.
- B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2013.

PART 2 - PRODUCTS -- NOT USED

PART 3 - EXECUTION

3.1 SCOPE

- A. Remove existing roof flashings, copings and other accessory and supporting structure as indicated. NOTE: Existing modified roof membrane and insulation system shall remain in place.
- B. Remove other items indicated for salvage.
- C. Required masonry demo must be performed by skilled mason performing same masonry repair at areas indicated.

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 Owner when demolition equipment will traverse, infringe upon or limit access to their facility or other parts of the Campus property.
9. Comply with applicable requirements and obtain applicable 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 04 01 20.63 - BRICK MASONRY REPAIR

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes repairing brick masonry.

1.2 UNIT PRICES

- A. Work of this Section is affected by unit prices specified in Section 012200 "Unit Prices."

1.3 DEFINITIONS

- A. Rebuilding (Setting) Mortar: Mortar used to set and anchor masonry in a structure, distinct from pointing mortar installed after masonry is set in place.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at [Project site] <Insert location>.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, and locations of replacement bricks on the structure.
 - 2. Show provisions for expansion joints or other sealant joints.
- C. Samples: For each exposed product and for each color and texture specified.

1.6 INFORMATIONAL SUBMITTALS

- A. Quality-control program.

1.7 QUALITY ASSURANCE

- A. Brick Masonry Repair Specialist Qualifications: Engage an experienced brick masonry repair firm to perform work of this Section. Firm shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance. Experience in only installing masonry is insufficient experience for masonry repair work.

- B. Quality-Control Program: Prepare a written quality-control program for this Project to systematically demonstrate the ability of personnel to properly follow methods and use materials and tools without damaging masonry. Include provisions for supervising performance and preventing damage.
- C. Mockups: Prepare mockups of brick masonry repair to demonstrate aesthetic effects and to set quality standards for materials and execution and for fabrication and installation.
 - 1. Masonry Repair: Prepare sample areas for each type of masonry repair work performed. If not otherwise indicated, size each mockup not smaller than two adjacent whole units or approximately 48 inches square. Construct sample areas in locations in existing walls where directed by Architect unless otherwise indicated. Demonstrate quality of materials, workmanship, and blending with existing work.

PART 2 - PRODUCTS

2.1 MASONRY MATERIALS

- A. Face Brick: As required to complete brick masonry repair work.
 - 1. Brick Matching Existing: Units with colors, color variation within units, surface texture, size, and shape that match existing brickwork.
 - a. Physical Properties: According to ASTM C67:
 - b. For existing brickwork that exhibits a range of colors or color variation within units, provide brick that proportionally matches that range and variation rather than brick that matches an individual color within that range.
 - 2. Special Shapes:
 - a. Provide molded, 100 percent solid shapes for applications where core holes or "frogs" could be exposed to view or weather when in final position and where shapes produced by sawing would result in sawed surfaces being exposed to view.
 - b. Provide specially ground units, shaped to match patterns, for arches and where indicated.
 - c. Mechanical chopping or breaking brick, or bonding pieces of brick together by adhesive, are unacceptable procedures for fabricating special shapes.
- B. Building Brick: ASTM C62, Grade SW where in contact with earth or Grade SW, MW, or NW for concealed backup; and of same vertical dimension as face brick, for masonry work concealed from view.

2.2 MORTAR MATERIALS

- A. Portland Cement: ASTM C150/C150M, Type I or Type II; gray mortar, where required for color matching of mortar.

1. Provide cement containing not more than 0.60 percent total alkali when tested according to ASTM C114.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Masonry Cement: ASTM C91/C91M.
- D. Mortar Cement: ASTM C1329/C1329M.
- E. Mortar Sand: ASTM C144.
 1. Exposed Mortar: Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary to achieve suitable match.
 2. Colored Mortar: Natural sand or ground marble, granite, or other sound stone of color necessary to produce required mortar color.
- F. Water: Potable.

2.3 MANUFACTURED REPAIR MATERIALS

- A. Brick Patching Compound: Factory-mixed cementitious product that is custom manufactured for patching brick masonry.
 1. Use formulation that is vapor and water permeable (equal to or more than the brick), exhibits low shrinkage, has lower modulus of elasticity than bricks being repaired, and develops high bond strength to all types of masonry.
 2. Formulate patching compound in colors and textures to match each brick being patched.

2.4 ACCESSORY MATERIALS

- A. Setting Buttons and Shims: Resilient plastic, nonstaining to masonry, sized to suit joint thicknesses and bed depths of bricks, less the required depth of pointing materials unless removed before pointing.
- B. Other Products: Select materials and methods of use based on the following, subject to approval of a mockup:
 1. Previous effectiveness in performing the work involved.
 2. Minimal possibility of damaging exposed surfaces.
 3. Consistency of each application.
 4. Uniformity of the resulting overall appearance.
 5. Do not use products or tools that could leave residue on surfaces.

2.5 MORTAR MIXES

- A. Measurement and Mixing: Measure cementitious materials and sand in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.

- B. Colored Mortar: Produce mortar of color required by using specified ingredients. Do not alter specified proportions without Architect's approval.
 - 1. Mortar Pigments: Where mortar pigments are indicated, do not add pigment exceeding 10 percent by weight of the cementitious or binder materials, except for carbon black which is limited to 2 percent.
- C. Do not use admixtures in mortar unless otherwise indicated.
- D. Mixes: Mix mortar materials in the following proportions:
 - 1. Rebuilding (Setting) Mortar by Type: ASTM C270, Proportion Specification, Type N unless otherwise indicated; with cementitious material limited to portland cement and lime.

PART 3 - EXECUTION

3.1 PROTECTION

- A. Remove scupper assemblies and / or any other building attached elements adjacent to masonry and store during masonry repair. Reinstall when repairs are complete.
 - 1. Provide temporary rain drainage during work to direct water away from building.

3.2 BRICK REMOVAL AND REPLACEMENT

- A. At locations indicated, remove brick necessary to create new scupper as detailed or repair wall area behind veneer. Carefully remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.
- B. Support and protect remaining masonry that surrounds removal area.
- C. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition.
- D. Notify Architect of unforeseen detrimental conditions including voids, cracks, bulges, and loose units in existing masonry backup, rotted wood, rusted metal, and other deteriorated items.
- E. Remove in an undamaged condition as many whole bricks as possible.
 - 1. Remove mortar, loose particles, and soil from brick by cleaning with hand chisels, brushes, and water.
 - 2. Remove sealants by cutting close to brick with utility knife and cleaning with solvents.
- F. Clean masonry surrounding removal areas by removing mortar, dust, and loose particles in preparation for brick replacement.
- G. Replace removed damaged brick with other removed brick in good condition, where possible, matching existing brick. Do not use broken units unless they can be cut to usable size.

- H. Install replacement brick into bonding and coursing pattern of existing brick. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.
 - 1. Maintain joint width for replacement units to match existing joints.
 - 2. Use setting buttons or shims to set units accurately spaced with uniform joints.
- I. Lay replacement brick with rebuilding (setting) mortar and with completely filled bed, head, and collar joints. Butter ends with enough mortar to fill head joints and shove into place. Wet both replacement and surrounding bricks that have ASTM C67 initial rates of absorption (suction) of more than 30 g/30 sq. in. per min. Use wetting methods that ensure that units are nearly saturated but surface is dry when laid.
 - 1. Tool exposed mortar joints in repaired areas to match joints of surrounding existing brickwork.
 - 2. Rake out mortar used for laying brick before mortar sets according to Section 040120.64 "Brick Masonry Repointing." Point at same time as repointing of surrounding area.
 - 3. When mortar is hard enough to support units, remove shims and other devices interfering with pointing of joints.
- J. Curing: Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours, including weekends and holidays.
 - 1. Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.

3.3 BRICK MASONRY PATCHING

A. Patching Bricks:

- 1. Remove loose material from masonry surface. Carefully remove additional material so patch does not have feathered edges but has square or slightly undercut edges on area to be patched and is at least 1/4 inch thick, but not less than recommended in writing by patching compound manufacturer.
- 2. Mask adjacent mortar joint or rake out for repointing if patch extends to edge of brick.
- 3. Mix patching compound in individual batches to match each unit being patched. Combine one or more colors of patching compound, as needed, to produce exact match.
- 4. Rinse surface to be patched and leave damp, but without standing water.
- 5. Brush-coat surfaces with slurry coat of patching compound according to manufacturer's written instructions.
- 6. Place patching compound in layers as recommended in writing by patching compound manufacturer, but not less than 1/4 inch or more than 2 inches thick. Roughen surface of each layer to provide a key for next layer.
- 7. Trowel, scrape, or carve surface of patch to match texture and surrounding surface plane or contour of brick. Shape and finish surface before or after curing, as determined by testing, to best match existing brick.
- 8. Keep each layer damp for 72 hours or until patching compound has set.

3.4 FINAL CLEANING

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

END OF SECTION 040120.63

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 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 - 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
 - 3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM 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: AWWPA 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.
 - 4. Cants.
- 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.
- C. Power-Driven Fasteners: NES NER-272.
- 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.
 - 1. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Grade A1 or A4).

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 AWWA 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:
 - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
- 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 01 50.73 REHABILITATION OF MODIFIED BITUMEN ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Roof re-coating preparation.
2. Manufacturer's THERMAL SCAN Required.
3. Application of partially reinforced fluid-applied roof membrane and flashings over existing granule-surfaced modified bituminous membrane roofing.

B. Related Information:

1. Division 07 Section "Sheet Metal Flashing and Trim" for formed metal flashings and counter flashings.

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.

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

1.2 ROOFING CONFERENCES

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

1. Meet with Owner; Architect; roofing re-coating materials manufacturer's representative; roofing re-coating Installer including project manager and foreman; and installers whose work interfaces with or affects re-coating including installers of roof accessories and roof-mounted equipment requiring removal and replacement as part of the Work.
2. Review methods and procedures related to re-coating preparation, including membrane roofing system manufacturer's written instructions.
3. Procedures for salvaging and recycling of demolition and construction waste
4. Review temporary protection requirements for existing roofing system that is to remain, during and after installation.
5. Review roof drainage during each stage of re-coating and review roof drain plugging and plug removal procedures.

6. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
7. Review base flashings, special roofing details, drainage, penetrations, equipment curbs, and condition of other construction that will affect re-coating.
8. Review HVAC shutdown and sealing of air intakes.
9. Review shutdown of fire-suppression, -protection, and -alarm and -detection systems.
10. Review procedures for asbestos removal or unexpected discovery of asbestos-containing materials.
11. Review governing regulations and requirements for insurance and certificates if applicable.
12. Review existing conditions that may require notification of Owner before proceeding.

1.3 MATERIALS OWNERSHIP

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

1.4 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D1079 "Standard Terminology Relating to Roofing and Waterproofing" and glossary in NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" for definition of terms related to roofing work in this Section.
- B. Roofing Coating Preparation: Existing roofing that is to remain and be prepared to accept restorative coating application.
- C. Patching: Removal of a portion of existing membrane roofing system from deck or removal of selected components and accessories from existing membrane roofing system and replacement with compatible similar materials.
- D. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and reinstalled.
- E. Existing to Remain: Existing items of construction that are not indicated to be removed.
- F. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- G. Demolition Waste: Building and site improvement materials resulting from re-roofing preparation, demolition, or selective demolition operations.
- H. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product specified.
- B. Sustainable Design Submittals:
 - 1. Product Test Reports: For roof coating, indicating that coated roof will comply with solar reflectance index requirement.

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. 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.
 - 1. Provide manufacturer's UL listing certificate for roofing system.
- C. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, and for dust control. Indicate proposed locations and construction of barriers.
- D. Warranties: Unexecuted sample copies of special warranties.
- E. Existing Conditions Photographs: Show existing conditions of adjoining construction and site improvements, including exterior and interior finish surfaces, which might be misconstrued as having been damaged by re-coating operations. Submit before Work begins.
- F. Inspection Reports: Reports of Roofing Inspector. Include weather conditions, description of work performed, tests performed, defective work observed, and corrective actions required and carried out.
 - 1. Submit report within 48 hours after inspection.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: To include in maintenance manuals.
- B. Warranties: Executed copies of approved warranty forms.

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 three years' experience installing products comparable to those specified, able to communicate verbally with Contractor, and employees, and the following:

1. Installer must provide (2) manufacturer inspections each week. Noncompliance may result in an \$850 per day fee for missing inspections.
2. Roofing Contractors included in the following list are to the owner's knowledge, the only pre-approved installers that can install and provide the system and warranty for this specified system. A list of additional certified contractors for the specified system can be obtained by contacting the system manufacturer.
 - a. American Contracting USA, Inc., Mr. Eddie Fuentes; (956) 748-4030.
 - b. Argio Roofing Inc., Mr. Rojerio Escobedo, (956) 748-9507.
 - c. Sechrist Hall Roofing, Mr. Bill McBride; (956) 423-3359

- d. Rio Roofing Inc., Mr. Tom Gonzalez; (956) 423-3359
 - e. Haeber Roofing Company, Mr. Don Rucker; (361) 851-8142.
 - f. Port Enterprises, Inc., Mr Cody Comstock; (361) 289-2944.
 - g. Rain King, Inc; Mr. Jared Cain; (361) 576-0606
 - h. McNeil Roofing & Sheet Metal, Mr. Mike McNeil; (210) 651-4636
 - i. Rain Seal Master Roofing & Sheet Metal, Mr. Ramon Gonzalez; (361) 576-0926
 - j. American Roofing & Metal, Mr. Toby Cargile; (210) 224-5463
 - k. Tadco Roofing, Mr. Javier Ramos; (956) 227-4339
3. Qualified by the manufacturer to install manufacturer's product and furnish warranty of type specified.
- B. Manufacturer Qualifications: Primary product manufacturer that is UL listed for roofing system identical to that specified for this Project with minimum five years' experience in manufacture of comparable products in successful use in similar applications, and able to furnish warranty with provisions matching specified requirements.
- A. 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.
- 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.

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

1.11 FIELD CONDITIONS

- A. Weather Limitations: Proceed with rehabilitation work only when existing and forecasted weather conditions permit Work to proceed without water entering into existing roofing system or building.
 1. Store all materials prior to application at temperatures recommended by manufacturer.
 2. Apply coatings within range of ambient and substrate temperatures recommended by manufacturer.
 3. Do not apply roofing in snow, rain, fog, or mist. Night work for installation of coating systems is prohibited.
- B. Protect building to be rehabilitated, adjacent buildings, walkways, site improvements, exterior plantings, and landscaping from damage or soiling from rehabilitation operations.
- C. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.
- D. Daily Protection: Coordinate installation of roofing so insulation and other components of roofing system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.
- E. Owner will occupy portions of building immediately below re-coating area. Conduct re-coating so Owner's operations will not be disrupted. Provide Owner with not less than 72 hours' notice of activities that may affect Owner's operations.

1.12 WARRANTY

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: The roof system specified in this Section is based upon products of Tremco CPG Inc, Beachwood, OH, (800) 562-2728, www.tremcoroofing.com that are named in other Part 2 articles. Provide specified products.
- B. Source Limitations: Obtain components for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer.
- C. Consideration of Alternate System Manufacturers: Bidders may propose alternate single-source system manufacturer provided alternate system is approved for consideration prior to bid date by Architect and Owner. It is the responsibility of prospective bidders to submit system review package adequate for review against Basis of Design System. Review package shall be submitted in a timely manner sufficient for review by Architect and Owner, but not less than fifteen (15) calendar days prior to bid date. Approval for consideration of any roofing system does not relieve the bidder from compliance with requirements of this specification and the overall Contract Documents package.

2.2 PERFORMANCE REQUIREMENTS

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

2.3 MATERIALS

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

2.4 FLUID-APPLIED ROOFING MEMBRANE

- A. Polyurethane Elastomeric Fluid-Applied System: Two-coat fluid-applied roofing membrane formulated for application over prepared existing roofing substrate.
 - 1. Polyurethane Roof Coating System Base Coat: Bio-based, low-odor low-VOC two-part, for use with a compatible top coat.
 - a. Basis of design product: Tremco, AlphaGuard BIO Base Coat.
 - b. Combustion Characteristics, UL 790: Maintains combustion characteristics of existing roof system.
 - c. Volatile Organic Compounds (VOC), maximum, ASTM D3960: 1 g/L.
 - d. Accelerated Weathering, 5000 hours, ASTM G154: Pass.
 - e. Hardness, Shore A, minimum, ASTM D2240: 80.
 - f. Solids, by volume, ASTM D2697: 100 percent.
 - g. Bio-Based Content, Minimum: 70 percent.

- h. Minimum Thickness, Base Coat non-reinforced over Granular Surfaced MB: 48 mils (1.22 mm) wet.
 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: Maintains combustion characteristics of existing roof 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.
 - f. Hardness, Shore A, minimum, ASTM D2240: 81.
 - g. Solids, by volume, ASTM D2697: 100 percent.
 - h. Bio-Based Content, Minimum: 60 percent.
 - i. (Alt 1) Minimum Thickness, reinforced system: 32 mils (0.81 mm) wet.
 - j. Minimum Thickness, non-reinforced system: 16 mils (0.40 mm) wet.
 - k. Minimum Thickness, Slip-Resistant Coat: 24 mils (0.60 mm) wet.
 - l. Color: White.
- B. Primers:
1. Primer for Asphaltic and Single-Ply Membranes: Water-based, polymer-modified quick-dry low odor primer.
 - a. Basis of design product: Tremco, AlphaGuard WB Primer.
 - b. Volatile Organic Compounds (VOC), maximum, ASTM D3960: 1 g/L.
 - c. Solids, by weight: 70 percent.
 2. Primer for Masonry Surfaces: Two-part high-solids epoxy-penetrating low-odor primer for masonry and concrete surfaces.
 - a. Basis of design product: Tremco, AlphaGuard C-Prime.
 - b. Volatile Organic Compounds (VOC), maximum, ASTM D3960: 0 g/L.
 - c. Solids, by weight: 100 percent.

3. Primer for Non-Porous Surfaces: Single-part, water based primer to promote adhesion of urethanes to metals, PVC and other non-porous surfaces.
 - a. Basis of design product: Tremco, AlphaGuard M-Prime.
 - b. Volatile Organic Compounds (VOC), maximum, ASTM D3960: 22 g/L.
 - c. Nonvolatile Content, minimum, ASTM D2369: 5 percent.
 - d. Density at 77 deg F (25 deg C): 8.3 lb/gal (1kg/L).
4. Single-component reactivating primer used to prepare aged urethane products.
 - a. Basis of design product: Tremco, GeoGuard Primer.
 - b. Coverage Rate: 1/4 gal / 100 sq. ft. (0.1 L/m²) (4 wet mils) minimum.

2.5 AUXILIARY 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. Seam Sealer: Waterproof seam and patching material compatible with applied coating.
 1. Seam Sealer: Aliphatic polyurethane sealer, single-component, moisture curing, high solids, low-VOC, formulated for compatibility and use with specified roofing substrates.
 - a. Basis of design product: Tremco, SOLARGARD Seam Sealer.
 - b. Volatile Organic Compounds (VOC), maximum, ASTM D3960: 75 g/L.
 - c. Tensile Strength, ASTM D412: 270 psi (1860 kPa).
 - d. Tear Strength, ASTM D412: 35 pli (6 kN/m).
 - e. Elongation, ASTM D412: 700 percent.
 - f. Color: White.
- C. Seam and Detail Reinforcing Fabric for reinforcing at laps only:
 1. Polyester Reinforcing Fabric: 100 percent stitch-bonded mildew-resistant polyester fabric intended for reinforcement of compatible fluid-applied membranes and flashings.
 - a. Basis of design product: Tremco, Permafab.
 - b. Tensile Strength, Minimum, ASTM D5034 (2-inch): MD - 110 lbs (49.8 kg); XMD - 60 lbs (27.2 kg) avg.
 - c. Elongation, Minimum, ASTM D5034 (1-inch): MD - 25 percent; XMD - 100 percent.

- d. Tear Strength, Minimum, ASTM D5587: MD - 20 lbs (9.0 kg) avg; XMD - 20 lbs (9.0 kg) avg.
 - e. Weight: 3 oz./sq. yd (102 g/sq. m).
- D. Joint Sealant: Elastomeric joint sealant compatible with applied coating, with movement capability appropriate for application.
- 1. Joint Sealant, Polyurethane: ASTM C920, Type S, Grade NS, Class 50 single-component moisture curing sealant, formulated for compatibility and use in dynamic and static joints; paintable.
 - a. Basis of design product: Tremco, TremSEAL Pro.
 - b. Volatile Organic Compounds (VOC), maximum, ASTM D3960: 40 g/L.
 - c. Hardness, Shore A, ASTM C661: 40.
 - d. Adhesion to Concrete, ASTM C794: 35 pli.
 - e. Tensile Strength, ASTM D412: 350 psi (2410 kPa).
 - f. Color: Closest match to substrate.
- E. Blister or Wet insulation Repair Sheet:
- 1. SBS-modified asphalt coated composite polyester / fiberglass/fiberglass mat reinforced high tensile strength base sheet, ASTM D4601 Type II.
 - a. Basis of design product: Tremco, BURmastic Composite Ply HT.
 - b. Tensile Strength at 77 deg. F (25 deg. C), minimum, ASTM D5147: Machine direction, 165 lbf/in (725 N); Cross machine direction, 150 lbf/in (660 N).
 - c. Tear Strength at 77 deg. F (25 deg. C), minimum, ASTM D5147: Machine direction, 260 lbf (1150 N); Cross machine direction, 230 lbf (1120 N).
 - d. Thickness, minimum, ASTM D5147: 0.060 inch (1.5 mm).
- F. Membrane Adhesive for Repairs:
- 1. Cold-applied bio-based low odor urethane roofing adhesive, two-part, USDA Bio Preferred, formulated for compatibility and use with specified roofing membranes and flashings.
 - a. Basis of design product: Tremco, POWERply Endure BIO Adhesive TF.
 - b. Volatile Organic Compounds (VOC), maximum, ASTM D3690: 0 g/L.
 - c. Low Temperature Flexibility, ASTM D2240: Pass at -30 deg F (-34 deg C).

- d. Solids, by Volume, ASTM D2697: 100 percent.
 - e. Biobase Content, Minimum, ASTM D6866: 70 percent.
- G. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FM 4470; designed for fastening roofing membrane components to substrate; tested by manufacturer for required pullout strength; and acceptable to roofing system manufacturer.
- H. Miscellaneous Accessories: Provide miscellaneous accessories recommended by roofing system manufacturer.

2.6 WALKWAYS

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

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

3.3 ROOFING COATING PREPARATION

- A. Membrane Surface Preparation:
 - 1. Remove loose granular aggregate from granular aggregate-surfaced built-up bituminous roofing with a power broom.
 - 2. Remove blisters, ridges, buckles, roofing membrane fastener buttons projecting above the membrane, and other substrate irregularities from existing roofing membrane that would inhibit application of uniform, waterproof coating.
 - 3. Install repairs to blisters, ridges, buckles or other with new smooth modified bitumen adhered in two-part urethane adhesive. Oil based adhesive or mastics are prohibited.

4. Remove wet insulation as shown by Thermal Scan. Replace with like insulations. Mechanically fasten to steel deck as required. Areas larger than 100 square feet will require windstorm certification. Dry in replaced insulations with 2 plies smooth modified bitumen in two-part urethane based adhesive.
 5. Broom clean existing substrate.
 6. Substrate Cleaning: Clean substrate of contaminants such as dirt, debris, oil, and grease that can affect adhesion of coating by power washing at minimum 2,000 psi. (13,800 kPa).
 - a. Dispose of waste water in accordance with requirements of authorities having jurisdiction.
 7. Verify that existing substrate is dry before proceeding with application of coating. Spot check substrates with an electrical capacitance moisture-detection meter.
 8. Verify adhesion of new products.
- B. Existing Flashing and Detail Preparation: Repair flashings, gravel stops, copings, and other roof-related sheet metal and trim elements. Reseal joints, replace loose or missing fasteners, and replace components where required to leave in a watertight condition.
1. Do not damage metal counter flashings that are to remain. Replace metal counter flashings damaged during removal with counter flashings specified in Division 07 Section "Sheet Metal Flashing and Trim."
 2. Roof Drains: Remove drain strainer and clamping ring. Grind metal surfaces down to clean, bare, metal.
- C. 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.
- D. Membrane Repair: Repair membrane at locations with irregularities using seam sealer mastic and reinforcing fabric.
- E. Membrane Seam Reinforcement: Reinforce membrane seams using seam sealer mastic and reinforcing fabric overlapping onto field of existing membrane not less than width required by roof coating manufacturer.
- ### 3.4 FLUID-APPLIED FLASHING APPLICATION
- A. Fluid-Applied Flashing and Detail Base Coat Application: Complete base coat and fabric reinforcement at parapets, curbs, penetrations, and drains prior to application of field of fluid-applied membrane. Apply base coat in accordance with manufacturer's written instructions.

1. Apply base coat on prepared and primed surfaces and spread coating evenly. Extend coating minimum of 8 inches (200 mm) up vertical surfaces and 4 inches (100 mm) onto horizontal surfaces.
2. Back roll to achieve not less than minimum coating thickness indicated in Part 2 product listing, unless greater thickness is recommended by manufacturer. Verify thickness as work progresses.
3. Fabric Reinforcement: Embed fabric reinforcement into wet base coat. Lap adjacent flashing pieces of fabric minimum 3 inches (75 mm) along edges and 6 inches (150 mm) at end laps.
 - a. Roll surface of fabric reinforcing to completely embed and saturate fabric. Leave finished base coat with fabric free of pin holes, voids, or openings.
4. Roof Drains: Install base coat onto surrounding membrane surface and metal drain bowl flange. Install target piece of fabric reinforcement immediately into wet base coat and roll to fully embed and saturate fabric. Reinstall clamping ring and strainer following application of top coat. Replace broken drain ring clamping bolts.
5. Allow base coat to cure prior to application of top coat.

3.5 FLUID-APPLIED MEMBRANE APPLICATION

- A. Fluid-Applied Membrane Base Coat: Apply base coat to field of membrane in accordance with manufacturer's written instructions.
1. Apply base coat on prepared and primed surfaces and spread coating evenly.
 2. Back roll to achieve not less than minimum coating thickness indicated in Part 2 product listing, unless greater thickness is recommended by manufacturer. Verify thickness as work progresses.
 3. Fabric Reinforcement: Embed fabric reinforcement into wet base coat at all laps of existing membrane (base bid). Lap adjacent flashing pieces of fabric minimum 3 inches (75 mm) along edges and 6 inches (150 mm) at end laps.
 - a. Roll surface of fabric reinforcing to completely embed and saturate fabric. Leave finished base coat with fabric free of pin holes, voids, or openings.
 - b. Following curing of base coat and prior to application of top coat, sand raised or exposed edges of fabric reinforcement.
 4. Fabric Reinforcement.
 - a. Embed 6 inch fabric reinforcement into wet base coat at all laps of existing membrane, 4'x4' drain targets, irregularities, or other critical areas as noted by manufacturer (Base Bid).

- b. Embed complete fabric reinforcement into wet base coat at all areas of existing membrane (Alternate 1).
- B. Top Coat Application: Apply top coat to field of membrane and flashings uniformly in a complete, continuous installation.
- 1. Allow base coat to cure prior to application of top coat.
 - 2. Following curing of base coat and prior to application of top coat, sand raised or exposed edges of fabric reinforcement.
 - 3. Prime base coat prior to application of top coat if top coat is not applied within 72 hours of the base coat application, using manufacturer's recommended primer.
 - 4. Apply top coat extending coating up vertical surfaces and out onto horizontal surfaces. Install top coat over field base coat and spread coating evenly.
 - 5. Back roll to achieve not less than minimum coating thickness indicated in Part 2 product listing, unless greater thickness is recommended by manufacturer. Verify thickness as work progresses.
 - 6. Avoid foot traffic on new fluid-applied membrane for a minimum of 24 hours.

3.6 WALKWAY INSTALLATION

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

3.7 FIELD QUALITY CONTROL

- A. Roofing Inspector: Contractor shall engage a qualified roofing inspector to perform roof tests and inspections and to prepare test reports.
- B. Roof Inspection: Engage roofing system manufacturer's technical personnel to inspect roofing installation, and submit report. Notify Architect 48 hours in advance of dates and times of inspections. Inspect work as follows:

1. Upon completion of preparation of roof coating substrate, prior to application of coating materials.
 2. Following application of coating to flashings and application of base coat to field of roof.
 3. Upon completion of coating but prior to re-installation of other roofing components.
- C. Repair fluid-applied membrane where test inspections indicate that they do not comply with specified requirements.
- D. Arrange for additional inspections, at Contractor's expense, to verify compliance of replaced or additional work with specified requirements.

3.8 DISPOSAL

- A. Collect demolished materials and place 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 is not permitted.
- B. Transport and legally dispose of demolished materials off Owner's property.

3.9 PROTECTING AND CLEANING

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

END OF SECTION 070150.73

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, Supplementary, and Special Conditions and Division 01 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 Requirements:
 - 1. Division 06 1000 "Rough Carpentry" for wood nailers, curbs, and blocking.
 - 2. Division 07 5216 "SBS Modified Bituminous 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.
 - 1. Temperature Change (Range): 120 deg. F, ambient; 180 deg. F, material surfaces.
- 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.
 - 2. SMACNA Architectural Sheet Metal Manual (Fifth Edition) for construction details.
 - 3. ANSI/SPRI ES-1, "Wind Design Standard for Edge Metal Systems Used with Low Slope Roof Systems".
- 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 PERFORMANCE REQUIREMENTS

- A. Texas Department of Insurance (TDI) Windstorm Certification Standards. All TDI standards and requirements in place at the date of issue for this specification shall apply.

2.2 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.

2.3 SHEET METALS

- A. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 316L.
 - 1. Finish: No. 3
- 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.

2.4 UNDERLAYMENT 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
 - 2. Basis of Design: POWERply SA Base Sheet by Tremco.

- B. Slip Sheet: Rosin-sized paper, minimum 3 lb/100 sq. ft.

2.5 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.
 - 1. Exposed Fasteners: Stainless Steel.
 - 2. Fasteners for Flashing and Trim: Stainless Steel Blind fasteners or self-drilling screws, gasketed, with hex washer head.
 - 3. Blind Fasteners: High-strength stainless-steel rivets.
- 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.
- H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.6 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with the drawings and 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.
 - 2. SMACNA Architectural Sheet Metal Manual (Fifth Edition) for construction details.
 - 3. ANSI/SPRI ES-1, "Wind Design Standard for Edge Metal Systems Used with Low Slope Roof Systems".
- 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.
 - b. SMACNA Architectural Sheet Metal Manual (Fifth Edition) for construction details.
 - c. ANSI/SPRI ES-1, "Wind Design Standard for Edge Metal Systems Used with Low Slope Roof Systems".

2.7 ROOF DRAINAGE SHEET METAL FABRICATIONS

- A. Downspouts: Fabricate circular downspouts as required. Furnish with metal hangers, from same material as downspouts, and anchors.
 1. Fabricate downspouts from the following material:
 - a. Stainless Steel: 24 gauge.
- B. 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.
- C. 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.

2.8 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 from 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.

2.9 MISCELLANEOUS SHEET METAL FABRICATIONS

- A. Equipment Support Flashing: Fabricate from the following material:
 1. Stainless Steel: 24 gauge.

2.10 FINISHES

- A. All exposed flashing components to be No. 3 Finish
- B. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- C. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- D. 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.
 - 3. Bed flanges in thick coat of asphalt roofing cement where required for waterproof performance.
- 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.
 - 2. ANSI/SPRI ES-1, "Wind Design Standard for Edge Metal Systems Used with Low Slope Roof Systems".
 - 3. SMACNA Architectural Sheet Metal Manual (Fifth Edition) for construction details.

- 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.
 - 2. ANSI/SPRI ES-1, "Wind Design Standard for Edge Metal Systems Used with Low Slope Roof Systems".
 - 3. SMACNA Architectural Sheet Metal Manual (Fifth Edition) for construction details.
- B. Copings: Anchor to resist uplift and outward forces according to project stated design wind loads.
 - 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 62 00

SECTION 07 7200 - ROOF ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Roofhatches.

1.2 REFERENCE STANDARDS

- A. 29 CFR 1910.23 - Guarding floor and wall openings and holes; current edition.
- B. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- C. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.

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::
 - 1. Acudor Products Inc: www.acudor.com.
 - 2. Babcock-Davis: www.babcockdavis.com.
 - 3. Dur-Red Products: www.dur-red.com.
 - 4. Milcor, Inc: www.milcorinc.com.
- 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.
 4. Gasket: Neoprene, continuous around cover perimeter.
- F. Safety Railing System: Manufacturer's standard accessory safety rail system mounted directly to curb.
1. Comply with OSHA 29 CFR 1910.23, with a safety factor of two.
 2. Posts and Rails: Fiberglass reinforced polymer.
 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.
 4. Latch: Upon closing, engage latch automatically and reset manual release.
 5. Manual Release: Pull handle on interior.
 6. Locking: Padlock hasp on interior.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify 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. Non-sag gunnable joint sealants.
- B. Joint backings and accessories.

1.2 REFERENCE STANDARDS

- A. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- B. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.
- C. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2008 (Reapproved 2012).
- D. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints; 2013.

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

- A. Tremco Global Sealants: www.tremcosealants.com.
- B. Adhesives Technology Corporation: www.atcepoxy.com.
- C. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
- D. Dow Corning Corporation: www.dowcorning.com/construction.
- E. Momentive Performance Materials, Inc (formerly GE Silicones): www.momentive.com.
- F. Pecora Corporation: www.pecora.com.
- G. Sika Corporation: www.usa-sika.com.
- H. W.R. Meadows, Inc: www.wrmeadows.com.

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 non-sag 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.
 - 4. Color: Match adjacent finished surfaces.
 - 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 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 Natural Resources Center (NRC) 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.eclc.biz)
 3. ERICO, Inc. (www.erico.com)
 4. Harger, Inc. (www.harger.com)
 5. Heary Brothers Lightning Protection Co., Inc. (www.hearybros.com)
 6. Independent Protection Company, Inc. (www.ipclp.com)
 7. Preferred Lightning Protection (www.preferredlp.com)
 8. Robbins Lightning, Inc. (www.robbinslightning.com)
 9. Thompson Lightning Protection, Inc. (www.tlpinc.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.eclc.biz)
 - 3. ERICO, Inc. (www.erico.com)
 - 4. Harger, Inc. (www.harger.com)
 - 5. Heary Brothers Lightning Protection Co., Inc. (www.hearybros.com)
 - 6. Independent Protection Company, Inc. (www.ipclp.com)
 - 7. Preferred Lightning Protection (www.preferredlp.com)
 - 8. Robbins Lightning, Inc. (www.robbslightning.com)
 - 9. Thompson Lightning Protection, Inc. (www.tlpinc.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 lightening 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