

HILLSBOROUGH COUNTY SHERIFF'S OFFICE TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATIONS

PINEBROOKE 4 ROOF REPLACEMENT

HCSO RFP- 6-18

HILLSBOROUGH COUNTY SHERIFF'S OFFICE

1238 Tech Boulevard
Tampa, Florida 336019

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ITEM A-100 SCOPE OF WORK

DESCRIPTION

100-1.1 Project Description The Work included in the project consists of rehabilitation of the existing roof at the Hillsborough County Sheriff's Office (HCSO), Pinebrooke #4 building, located at 1238 N. Tech Boulevard, Tampa Florida 33619. Rehabilitation consists of, but is not limited to, installation of a TPO roofing system, installation of new wall coping, drip edge, and gutters and down spouts, new HVAC package units drain lines with supports (All drain lines to be routed to gutters).

All Work shall be accomplished in accordance with the construction documents (Refer to Exhibit A Existing Roof Plan BLDG. 4, dated: August 18, 2017 and Exhibit B Pinebrooke Building #4, Technical Specifications, dated: August 18, 2017), and the requirements furnished within all the RFP documents to include any Q & A Responses, Addenda and/or Amendments issued by the HCSO. The Contractor shall provide all incidentals required for the construction to meet all local, state, and federal codes and ordinances.

100-1.2 Work Sequence Work shall be performed at the location shown in Exhibit A Existing Roof Plan BLDG. 4. Prior to proceeding with any Work, the Contractor shall submit a detailed Phasing Plan which indicates locations and durations of Work.

WORK ITEMS

100-2.1 TPO Roofing System This Work Item consists of the removal, and legal offsite disposal, of the existing built-up roofing system and replacement with a new Plate-Bonded (RhinoBond®) TPO (White) 60 mil single ply roofing system. This includes all TPO related components as recommended by the roofing manufacturer including, but not limited to, new polyisocyanurate roofing insulation with a minimum R-11.4 (2" Minimum) rating, new TPO cap sheet, new metal flashing, new pitch pockets, and new roof walk pads. Also included shall be new roof drain grates and curb flashing around existing mechanical equipment if required.

100-2.2 Parapet Wall Replacement This Work Item consists of the removal, and legal disposal offsite, of all existing metal wall panel fasteners, metal base flashing and sealant at the existing parapet wall, and preparation and installation of new fasteners, with gaskets, and new pre-finished metal base flashing, per the manufacturer's recommendations.

100-2.3 DEMOBILIZATION The Contractor shall completely demobilize and remove from the project site all equipment, vehicles, materials, offices and waste within 10 days of final acceptance. Retainage will not be released for the project until the Contractor has completely demobilized from the project site.

GENERAL

100-3-1 Site Visits Site visits will be included in the mandatory Pre-Proposal Conference (refer to Part B, Paragraph 4). Measurements, notes, photographs, etc. may be taken at this time. Care should be taken to obtain any and all technical information necessary to complete and submit a concise but inclusive Proposal.

100-3-2 Responsibilities The Contractor shall be responsible for all material and equipment procurement, equipment and material handling and storage, and removal of debris. The HCSO will not make any direct purchases of materials.

All Work areas (active, below active, adjacent, and surrounding), are to be properly identified and secured on a daily basis. All debris, work materials, tools, and equipment should be removed and /or secured after completion of each Work day.

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The Contractor shall be responsible for all painting touch up required to areas impacted by the Work, or access to the Work area. Paint is to match existing and must be submitted for pre-approval by the HCSO Project Manager.

In the event the Contractor determines any contradiction or non-compliance with any laws, ordinances, rules, codes or regulations applicable to the Scope of Work and Technical Specifications (Part C), it is incumbent upon the Contractor to notify the HCSO promptly in writing no later than the close of the Q & A period as defined in the Table of Contents. Any necessary changes in the Scope of Work and Technical Specifications (Part C) will be adjusted by an amendment to the RFP. The cost of any Work or related remedy performed by the Contractor that it knew or should have known was in violation of any laws, ordinances, rules, codes or regulations without proper notice to the HCSO will be born solely by the Contractor.

END OF ITEM A-100

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ITEM A-101 SAFETY AND SECURITY

GENERAL

101-1.1 The provisions of this safety and security plan and associated procedures are applicable within the boundaries of the HCSO property. A complete understanding of all procedures and requirements contained herein is required to ensure safety during construction. *The HCSO requires a complete Construction Safety and Phasing Plan (CSPP), which will be provided by the Contractor once awarded. It is required that the Contractor comply with all OSHA requirements at all times during the project. The Contractor shall be required to submit for approval, a Safety Plan Compliance Document (SPCD) which details how the Contractor will comply with the CSPP.* This safety plan is a part of this Contract and deviations from the requirements established herein will be sufficient cause for Contract termination.

CONTRACTOR SAFETY AND SECURITY OFFICER

101-2.1 CONTRACTOR SAFETY AND SECURITY OFFICER (CSSO). The Contractor shall appoint an on-site Construction Superintendent or other qualified individual(s) as its duly authorized representative to serve as CSSO for the duration of the Contract. The CSSO shall thoroughly understand the safety and security requirements, the necessity for them and shall have sufficient authority to implement its provisions without deviation. The Contractor shall notify the HCSO Project Manager in writing, of the name of the individual(s) selected for the assignment.

101-2.2 Contractor Employees and Background Checks. The Contractor shall submit within seven (7) days of award; a list of all employees that will work on the project, for background checks and approval, performed by HCSO at no cost to the Contractor.

101-2.3 Security of Sheriff's Operational Offices. Ensure that no Contractor employees, employees of subcontractors or suppliers, or other persons enter any part of the occupied offices from the construction site unless authorized.

CONSTRUCTION SEQUENCING

1013.1 The Contractor shall prepare a construction schedule and submit to the HCSO Project Manager within 10 days from the date of award of the Contract.

ACCESS TO THE SITE OF CONSTRUCTION

101-5.2 The Contractor's access to the site shall be as shown on Exhibit C Pinebrooke Building #4 Roof-Staging Plan, dated 1/8/18. No other access points shall be allowed unless approved by the HCSO Project Manager. All Contractor traffic authorized to enter the site shall be experienced in the route. The Contractor shall not permit any unauthorized construction personnel or traffic on the site.

MATERIAL SUPPLIERS

101-5.3. All material suppliers, subcontractors, and visitors to the Work site are obligated to follow the same safety and security operating procedures as the Contractor. All material suppliers shall make their deliveries using the same access points and routes as the Contractor and shall be advised of the appropriate delivery procedures at the time the material order is placed. The Contractor shall use the site street address for any delivery but direct the deliverer to the site access point for entry. If it is not practical to conform, the Contractor shall be prepared to escort all suppliers, subcontractors and visitors while they are on site.

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PERSONNEL IDENTIFICATION

101-5.4 All employees, agents, vendors, invitees, etc. of the Contractor or subcontractors requiring access to the construction site shall, conform to the security requirements outlined at the pre-construction meeting.

CONSTRUCTION CONTROL

101-6.1 A primary and alternate responsible Contractor's representative shall be designated by the Contractor. The Contractor's representatives shall be available locally on a 24-hour basis. Names of the primary and alternate, including phone number, shall be made available to the Project Manager by the Contractor. The Contractor shall insure that the names and phone numbers are kept current and made available to the Project Manager.

CONSTRUCTION TECHNIQUES

101-7.1 Construction shall be planned and conducted throughout this project in such a manner as to allow the maintenance of completely safe HCSO operations. Every effort shall be made to reduce the impact of construction activity on overall HCSO operations. To this end the Contractor's activities shall be conducted in such a manner so as to preclude, except where absolutely required, any open excavations, trenches, ditches and above ground obstacles such as booms on cranes or obstacle markers such as wooden saw horses. The primary responsibility for assuring that the safest possible construction techniques are followed rests with the CSSO.

In addition to the inspection and cleanup required at the end of each shift, the Contractor is responsible for the immediate cleanup of any debris generated along the construction site access route(s) as a result of construction related traffic or operations whether or not created by Contractor personnel.

The Contractor is responsible for the reinstallation of any other equipment and/or accessories temporarily removed. Any damaged items shall be replaced to match existing. All new construction or repair materials are to be new and be installed or applied in accordance with all manufacturers' recommendations and backed by a full manufacturer's warranty.

END OF ITEM A-101

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ITEM A-102 TEMPORARY CONSTRUCTION ITEMS

DESCRIPTION

102-1.1 This item consists of furnishing all labor, materials, and equipment for temporary construction items necessary for the safe and proper execution of Work and not otherwise included in other contract bid items. The Contractor will be expected to supply and utilize the items listed below and other items contained in the plans and specifications. Temporary construction items to be provided include, but are not limited to the following: construction barricades and equipment lighting.

MATERIALS AND PLACEMENT

102-2.1 CONSTRUCTION BARRICADES. The Contractor shall furnish, place and maintain temporary barricades as required and/or as directed by the Project Manager. The Contractor must provide enough barricades as required to segregate Work areas from vehicular operations, with barricades spaced at 12 feet maximum, center to center. Barricades shall be low mass and easily collapsible.

102-2.2 OTHER MISCELLANEOUS ITEMS. Any other items not listed herein but which are associated directly or indirectly with temporary construction related work shall, by reference, be included in the requirements of this specification. No additional payment will be made for any temporary construction related item not specifically listed herein. The Contractor shall be responsible for providing any and all items necessary to ensure a safe, secure and functioning project construction site.

The HCSO shall provide access to electrical power and non-potable water. The Contractor is to provide all other utilities, dumpsters, sanitation facilities and all other incidentals required for the completion of the Work or provisions for personnel.

END OF ITEM A-102

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SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract (RFP 6-18), apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Wood blocking and nailers.

- B. Related Requirements:

- 1. Section 075423 "Thermoplastic Polyolefin (TPO) Roofing" for roofing accessories made of wood.

1.3 DEFINITIONS

- A. Exposed Framing: Framing not concealed by other construction.

- B. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) or greater but less than 5 inches nominal (114 mm actual) in least dimension.

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

- 1. NeLMA: Northeastern Lumber Manufacturers' Association.
- 2. NLGA: National Lumber Grades Authority.
- 3. SPIB: The Southern Pine Inspection Bureau.
- 4. WWPA: Western Wood Products Association.

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

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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.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: American Wood Protection Agency (AWPA) UC3b
 - 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 that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the American Lumber Standard Committee (ALSC) Board of Review.
- D. Application: Treat all rough carpentry unless otherwise indicated.
 - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - 2. Wood sills, sleepers, blocking, and similar concealed members in contact with masonry or concrete.
 - 3. Wood framing members that are less than 18 inches above the ground.
 - 4. Wood floor plates that are installed over concrete slabs-on-grade.

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2.3 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - 1. Blocking.
 - 2. Nailers.
 - 3. Rooftop equipment bases and support curbs.
- B. For 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.
- C. 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 rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with American Society for Testing and Materials (ASTM) A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Wood Screws: American Society of Mechanical Engineers (ASME) B18.6.1.
- D. Lag Bolts: ASME B18.2.1
- E. 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.
- F. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry assemblies and equal to four times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

2.5 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1- inch (25-mm) nominal thickness, compressible to 1/32 inch (0.8 mm); selected from manufacturer's standard widths to suit width of sill members indicated.
- B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spun bonded polyolefin to produce an overall thickness of not less than 0.025 inch (0.6 mm).

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PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough 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. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.
- D. Do not splice structural members between supports unless otherwise indicated.
- E. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches on center.
- F. 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.
- G. 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.
- H. Use hot-dip galvanized 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.

END OF SECTION 061000

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SECTION 075423 - THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract (RFP 6-18), apply to this Section.

1.2 SUMMARY

- A. Section Includes:

1. Plate-Bonded (RhinoBond®) Thermoplastic Polyolefin (TPO) roofing system.
2. Roof insulation.

- B. Related Requirements:

1. Section 061000 Rough Carpentry for wood nailers, curbs, and blocking; and for wood-based, structural-use roof deck panels.
2. Section 076200 "Sheet Metal Flashing and Trim" for metal roof flashings and counter flashings.

1.3 DEFINITIONS

- A. Roofing Terminology: Definitions in ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" apply to the Work of this Section.

1.4 PREINSTALLATION MEETINGS

- A. Preliminary Roofing Conference: Before starting construction, conduct conference at the Site.

1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review deck substrate requirements for conditions and finishes, including flatness and fastening.
5. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
6. Review governing regulations and requirements for insurance and certificates if applicable.
7. Review temporary protection requirements for roofing system during and after installation.
8. Review roof observation and repair procedures after roofing installation.

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1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other Work, including:
 - 1. Base flashings and membrane terminations.
 - 2. Roof plan showing orientation of roofing, fastening spacings, and patterns for plate-bonded fastened roofing.
 - 3. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
- C. Samples for Verification: For the following products:
 - 1. Sheet roofing, of color indicated in Section 2.3.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.
- B. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - 1. Submit evidence of compliance with performance requirements.
- C. Product Test Reports: For components of roofing system, tests performed by manufacturer and witnessed by a qualified testing agency. Florida Building Code or Miami Dade NOA.
- D. Research/Evaluation Reports: For components of roofing system, from ICC-ES.
- E. Field quality-control reports.
- F. Sample Warranties: For manufacturer's special warranties.

1.7 CLOSEOUT SUBMITTALS

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

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is FM Global approved for roofing system identical to that used for this Project.
- B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and

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labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
 - 1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.10 FIELD CONDITIONS

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

1.11 WARRANTY

- A. Special Warranty: Manufacturer No Dollar Limit (NDL) agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.
 - 1. Manufactures NDL warranty includes roofing, base flashings, roof insulation, fasteners, cover boards, and other components of roofing system.
 - 2. Warranty Period: 20 years from date of Substantial Completion.
- B. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering the Work of this Section, including all components of roofing system such as roofing, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, roof pavers, and walkway products, for the following warranty period:
 - 1. Warranty Period: 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide GAF Everguard® TPO 60 Mil RhinoBond® System. Spec # TRBTI60
 - 2. Approved Manufacturers: Carlisle SynTec; Flex Roofing Systems; GAF Commercial

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Roofing Products; Versico Roofing Systems or an approved equal manufacturer. Approved equal manufacturer shall be submitted and approved prior to the close of the question and answer (Q&A) period specified at the pre-bid meeting.

- B. Source Limitations: Obtain components including roof insulation, fasteners, and bonding adhesive for roofing system from same membrane roofing manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing and base flashings shall remain watertight.
 - 1. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.
 - 2. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272.
- B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.
- C. Roofing System Design: Tested by a qualified testing agency to resist the following uplift pressures:
 - 1. Corner Uplift Pressure: -116 lbf/sq. ft.
 - 2. Perimeter Uplift Pressure: -78 lbf/sq. ft.
 - 3. Field-of-Roof Uplift Pressure: -45 lbf/sq. ft.

2.3 TPO ROOFING

- A. Fabric-Reinforced TPO Sheet: ASTM D 6878, internally-fabric or scrim-reinforced, uniform, flexible fabric-backed TPO sheet.
 - 1. Thickness: 60 mils
 - 2. Exposed Face Color: White

2.4 AUXILIARY ROOFING MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing.
 - 1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
 - 2. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the following limits for VOC content:
 - a. Plastic Foam Adhesives: 50 g/L.
 - b. Gypsum Board and Panel Adhesives: 50 g/L.
 - c. Multipurpose Construction Adhesives: 70 g/L.
 - d. Fiberglass Adhesives: 80 g/L.

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- e. Single-Ply Roof Membrane Adhesives: 250 g/L.
 - f. Single-Ply Roof Membrane Sealants: 450 g/L.
 - g. Non-membrane Roof Sealants: 300 g/L.
 - h. Sealant Primers for Nonporous Substrates: 250 g/L.
 - i. Sealant Primers for Porous Substrates: 775 g/L.
 - j. Other Adhesives and Sealants: 250 g/L.
- B. Sheet Flashing: Manufacturer's standard unreinforced TPO sheet flashing, 55 mils (1.4 mm) thick, minimum, of same color as TPO sheet.
- C. Bonding Adhesive: Manufacturer's standard and approved for a fully adhered system
- D. Slip Sheet: Manufacturer's standard, of thickness required for application.
- E. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm) thick; with anchors.
- F. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roofing to substrate, and acceptable to roofing system manufacturer.
- G. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

2.5 ROOF INSULATION

- A. General: Preformed roof insulation boards manufactured by TPO roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated.
- B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces.
- 1. Basis-of-Design Product: Subject to compliance with requirements, provide GAF EnergyGuard™ PolyISO or comparable product by one of the following:
 - a. Firestone Roofing Systems.
 - b. Johns Manville
- C. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.6 INSULATION ACCESSORIES

- A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with roofing.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.
- C. Protection Mat / TPO Walkway: Woven or nonwoven polypropylene, polyolefin, or polyester fabric, water permeable and resistant to UV degradation, type and weight as recommended

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by roofing system manufacturer for application.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work:
 - 1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
 - 2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no Work is taking place or when rain is forecast.
- C. Install insulation strips according to acoustical roof deck manufacturer's written instructions.

3.3 ROOFING INSTALLATION, GENERAL

- A. Install roofing system according to roofing system manufacturer's written instructions.
- B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.
- C. Install roofing and auxiliary materials to tie in to existing roofing to maintain weather tightness of transition.

3.4 INSULATION INSTALLATION

- A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.
- C. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
- D. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch (6 mm) with insulation.

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

3.5 PLATE-BONDED ROOFING INSTALLATION

- A. Plate-bond TPO roofing membrane over area to receive roofing according to roofing system manufacturer's written instructions. Unroll roofing and allow to relax before retaining.
- B. Start installation of roofing in presence of roofing system manufacturer's technical personnel.
- C. Accurately align roofing, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- D. Mechanically attach insulation per manufactured required fastening pattern with #15 XHD Fasteners and RhinoBond® Plates.
- E. Use RhinoBond® Heat Induction Tool to weld membrane to RhinoBond® Plate.
- F. In addition to RhinoBond® fastening patterns, use #15 fasteners and RhinoBond® Plates to attach roofing securely at terminations, penetrations, and perimeter of roofing.
- G. Apply roofing with side laps shingled with slope of roof deck where possible.
- H. Seams: Clean seam areas, overlap roofing, and hot-air weld side and end laps of roofing and sheet flashings according to manufacturer's written instructions, to ensure a watertight seam installation.
 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet.
 2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
 3. Repair tears, voids, and lapped seams in roofing that do not comply with requirements.
- I. Spread sealant bed over deck-drain flange at roof drains, and securely seal roofing in place with clamping ring.
- J. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.
- K. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- L. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.
- M. Terminate and seal top of sheet flashings.

3.6 FIELD QUALITY CONTROL

- A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.
- B. Repair or remove and replace components of roofing system where inspections indicate that

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they do not comply with specified requirements.

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

3.7 PROTECTING AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
- B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

D. **ROOFING INSTALLER'S WARRANTY WHEREAS** _____ of _____, herein called the "Roofing Installer," has performed roofing and associated Work (Work) on the following project:

- 1. Owner:
- 2. Address:
- 3. Building Name/Type:
- 4. Address:
- 5. Area of Work:
- 6. Acceptance Date:_____.
- 7. Warranty Period:
- 8. Expiration Date:_____.

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

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

IN WITNESS THEREOF, this instrument has been duly executed this day of _____, _____.

- 1. Authorized Signature _____.
- 2. Name _____.
- 3. Title: _____.

END OF SECTION 075423

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SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract (RFP 6-18), apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Formed roof-drainage sheet metal fabrications.
 - 2. Formed low-slope roof sheet metal fabrications.
 - 3. Formed wall sheet metal fabrications.
- B. Related Requirements:
 - 1. Section 061000 "Rough Carpentry" for wood nailers, curbs, and blocking.
 - 2. Section 075423 "Thermoplastic Polyolefin (TPO) Roofing" for installation of sheet metal flashing and trim integral with roofing.

1.3 COORDINATION

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.
- B. Shop Drawings: For sheet metal flashing and trim.
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled Work.
 - 3. Include identification of material, thickness, weight, and finish for each item and location in Project.
 - 4. Include details for forming, including profiles, shapes, seams, and dimensions.
 - 5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
 - 6. Include details of termination points and assemblies.
 - 7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.

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8. Include details of roof-penetration flashing.
9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counter flashings as applicable.
10. Include details of special conditions.
11. Include details of connections to adjoining Work.

C. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.

D. Samples for Verification: For each type of exposed finish.

1. Sheet Metal Flashing: 12 inches (300 mm) long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches long and in required profile. Include fasteners and other exposed accessories.
3. Unit-Type Accessories and Miscellaneous Materials: Full-size Sample.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.
- B. Product Certificates: For each type of roof edge flashing that is FM Approvals approved.
- C. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- D. Sample Warranty: For special warranty.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricates sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
 1. For roof edge flashings that comply with FM Approvals wind uplift requirements, shop shall be listed as able to fabricate required details as tested and approved.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

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1.8 WARRANTY

- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with National Roofing Contractors Association (NRCA) "The NRCA Roofing Manual" and Sheet Metal and Air Conditioning Contractors National Association (SMACNA) "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. FM Approvals Listing: Manufacture and install copings and roof edge flashings that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-90. Identify materials with name of fabricator and design approved by FM Approvals.

2.2 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

Aluminum Sheet: Roof coping, roof edge and miscellaneous roof flashing.

- 1. ASTM B 209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with flat surface and minimum thickness of 0.050 inch, unless otherwise noted.
- 2. Finish:
 - a. Two-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
- 3. Color: To be determined during construction.

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4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil (0.013 mm).

B. Galvanized (Hot-Dipped) Sheet Metal Material:

1. Galvanized (hot-dipped) sheet metal flashings, cleats, copings, counter flashings, roof edges, scuppers, downspouts, and all miscellaneous sheet metal items indicated on Drawings shall be fabricated to shapes detailed on Drawings.
2. Galvanized steel sheet shall comply with ASTM A 526, G 90, commercial quality, or ASTM A 527, G 90, lock-forming quality, for hot-dip galvanized steel sheet with 0.20 percent copper, mill phosphatized where indicated for painting. Provide minimum 24 gage material thickness, unless otherwise indicated on Drawings. Zinc coating shall not be less than 1.25 ounce/sq. ft. (total weight both sides).

2.3 **MISCELLANEOUS MATERIALS**

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal, unless otherwise indicated.

- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
 - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
3. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.4 **LOW-SLOPE ROOF SHEET METAL FABRICATIONS**

- A. Roof Edge Flashing: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6- m-) long sections. Furnish with 6-inch- (150-mm-) wide, joint cover plates.

- B. Roof Edge-Flashing: Fabricate from the following materials: Shop fabricate interior and exterior corners.

1. Aluminum: 0.050 inch (1.27 mm) thick.

- C. Flashing Receivers: Fabricate from the following materials:

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1. Aluminum: 0.032 inch (0.81 mm) thick.

2.5 WALL SHEET METAL FABRICATIONS

- A. Base Flashing: Fabricate continuous flashings in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long sections. Fabricate from the following materials:

1. Galvanized Steel: 0.040 inch (1.02 mm) thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
 1. Verify compliance with requirements for installation tolerances of substrates.
 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. 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, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 2. 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.
 3. Space cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
 4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
 5. Torch cutting of sheet metal flashing and trim is not permitted.
 6. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
 1. Coat concealed side of uncoated-aluminum and sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.

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2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
 2. Use lapped expansion joints only where indicated on Drawings.

- D. Fasteners: Use fastener sizes that penetrate wood blocking 1-1/4 inches for nails and not less than 3/4 inch for wood screws. Substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance

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

- F. Seal joints as required for watertight construction.
 1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).

3.3 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install Work with laps, joints, and seams that are permanently watertight and weather resistant.

- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for FM Approvals' listing for required windstorm classification.

- C. Pipe or Post counter flashing: Install counter flashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches (100 mm) over base flashing. Install stainless-steel draw band and tighten.

- D. Counter flashing: Coordinate installation of counter flashing with installation of base flashing. Insert counter flashing in rivets or receivers and fit tightly to base flashing. Extend counter flashing 4 inches (100 mm) over base flashing. Lap counter flashing joints minimum of 4 inches (100 mm). Secure in waterproof manner by means of interlocking folded seam and sealant unless otherwise indicated.

- E. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with

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installation of roofing and other items penetrating roof. Seal with butyl sealant and clamp flashing to pipes that penetrate roof.

3.4 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

3.5 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean off excess sealants.
- C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.
- D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 076200