

PART 1 GENERAL**1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section Includes:
1. Styrene-butadiene-styrene (SBS)-modified bituminous membrane roofing.
 2. Vapor retarder.
 3. Roof insulation.
 4. Roof pavers.
- B. Related Requirements:
1. Division 7 Section "Thermal Insulation" for insulation beneath the roof deck.
 2. Division 7 Section "Sheet Metal Flashing and Trim" for metal roof flashings and counterflashings.
 3. Division 7 Section "Joint Sealants" for joint sealants, joint fillers, and joint preparation.

1.3 QUALITY ASSURANCE

- A. The work of this section shall be performed by a company which specializes in the type of styrene-butadiene-styrene (SBS) modified bituminous membrane roofing work required for this Project, with a minimum of 10 years of documented successful experience and shall be performed by skilled workmen thoroughly experienced in the necessary crafts.
1. Work shall be performed in compliance with Owner's insurance underwriters' requirements and UL approvals and testing for materials, assemblies and procedures.
 2. Installer shall maintain a full-time supervisor/foreman at Project site during times that modified bituminous sheet roofing work is in progress and who is experienced in installation of roofing systems similar to type and scope required for this Project.
- B. Manufacturer shall specialize in manufacturing the type of styrene-butadiene-styrene (SBS) modified bituminous membrane roofing specified in this section, with a minimum of 10 years of documented successful experience, and have the facilities capable of meeting all requirements of Contract Documents as a single-source responsibility and warranty.
- C. Manufacturer Qualifications: A qualified manufacturer that is UL listed for membrane roofing system identical to that used for this Project.
- D. 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.
- E. Manufacturer's identification tags or marks are not acceptable on surfaces which will remain exposed to view after installation.
1. Evidence of "patching" after removal of tags or marks is not acceptable.

1.4 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 G152, ASTM G154, or ASTM G155.
 2. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D3746 or ASTM D4272.
 3. Specification is intended to provide intent of the type of membrane and overall system. The noted performance and warranty requirements shall be met by the installed system, whether specifically noted or not. The Contractor shall include all manufacturer requirements and recommendations.

- 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 uplift pressures calculated according to ASCE/SEI7, as required by local authority having jurisdiction and as indicated in Wind Tunnel Cladding Pressures Report, whichever is more stringent.
- D. Solar Reflectance Index: Not less than 78 when calculated according to ASTM E1980, based on testing identical products by a qualified testing agency.
- E. Exterior Fire-Test Exposure: ASTM E108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- F. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

1.5 ACTION SUBMITTALS

- A. Submit the following according to Conditions of the Construction Contract and Division 1 Specification Sections as a complete submittal package.
- B. Product Data: For each type of product.
- C. LEED Submittals:
 - 1. Product Test Reports for Credit SS 7.2: For roof materials, documentation indicating that roof materials comply with Solar Reflectance Index requirement.
 - 2. Product Data for Credit IEQ 4.1: For adhesives and sealants used inside the weatherproofing system, documentation including printed statement of VOC content.
- D. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work, including:
 - 1. Base flashings and membrane terminations.
 - 2. Tapered insulation, including slopes.
 - 3. Crickets, saddles, and tapered edge strips, including slopes.
 - 4. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
 - 5. Deck type and outline of roof and roof size (square footage).
 - 6. Roof slope and designated direction of slope.
 - 7. Key plan (on multiple roof areas).
 - 8. Location and each type of roof penetration.
 - 9. Each type of flashing detail including perimeter and penetration details.
 - 10. Membrane layout and sizes.
 - 11. Insulation board types, thickness and manufacturer.
 - 12. Layout of insulation showing slopes to drains.
 - 13. Method of installing each type of insulation boards.
 - 14. Fastener manufacturer, brand, length, location and spacing.
 - 15. Type and location of protective mat.
 - 16. Plan of means to capture and contain all spills and fugitive asphalt products.
 - 17. Indicate all associated sheet metal flashing in drawings and details.
 - 18. Method of installing roofing membrane.
- E. Samples for Verification: For the following products:
 - 1. Cap sheet, of color required.
 - 2. Flashing sheet, of color required.
 - 3. Walkway rolls, of color required.
 - 4. Roof pavers.
- F. Hazardous Materials Notification: In the event no product or material is available that does not contain asbestos, PCB or other hazardous materials as determined by the Owner, a "Material Safety Data Sheet" (MSDS) equivalent to OSHA Form 20 shall be submitted for that proposed product or material prior to installation.

- G. Asbestos and PCB Certification: After completion of installation, but prior to Substantial Completion, Contractor shall certify in writing that products and materials installed, and processes used, do not contain asbestos or polychlorinated biphenyls (PCB), using format in Article 3 of General Conditions.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.
- B. Notice of Award: Submit copy of manufacturer "Notice of Award" or equivalent documentation that confirms that the manufacturer is aware of the Project and has reviewed the system to be installed and that it is acceptable to the manufacturer. The letter should acknowledge the roof design pressures and confirm the installed system will meet or exceed those pressures.
- C. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - 1. Submit evidence of complying with performance requirements.
- D. Product Test Reports: For components of membrane roofing system, for tests performed by manufacturer and witnessed by a qualified testing agency.
- E. Research/Evaluation Reports: For components of membrane roofing system, from ICC-ES.
- F. Field quality-control reports.
- G. Sample Warranties: For manufacturer's special warranties.

1.7 CLOSEOUT SUBMITTALS

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

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Comply with General Conditions and Division 1 Section "Product Requirements".
- B. 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.
- C. 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.
- D. 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.
- E. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.9 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.

1.10 WARRANTY

- A. Comply with General Conditions and Division 1 Section "Product Requirements".
- B. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period. The warranty shall be a "No Dollar Limit" warranty.
 - 1. Special warranty includes membrane roofing, base flashings, roof insulation, fasteners, cover boards, substrate board, roofing accessories, vapor retarder, walkway products, copings, edge metal systems and other components of roofing system.

2. Warranty Period: 20 years from date of Substantial Completion.
 3. Wind Speed: The windspeed portion of the warranty shall match or exceed the local windspeed per ASCE 7.
- C. 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 membrane roofing, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, and walkway products, for the following warranty period:
1. Warranty Period: Two years from date of Substantial Completion.

1.11 PREINSTALLATION MEETINGS

- A. Preinstallation Roofing Conference: Conduct conference at Project site.
1. Meet with Owner, Architect, Roofing Consultant, 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. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
 5. Review structural loading limitations of roof deck during and after roofing.
 6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
 7. Review governing regulations and requirements for insurance and certificates if applicable.
 8. Review temporary protection requirements for roofing system during and after installation.
 9. Review roof observation and repair procedures after roofing installation.
- B. Insurance Certification: Assist Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance on roofing and associated work.
- C. Regulatory Requirements: Comply with applicable rules for the pollution-control regulatory agency having jurisdiction in the Project locale regarding volatile organic compounds (VOC) and use of hydrocarbon solvents.

PART 2 PRODUCTS

2.1 UNAUTHORIZED MATERIALS

- A. Materials and products required for work of this section shall not contain asbestos, polychlorinated biphenyls (PCB) or other hazardous materials identified by the Owner.

2.2 ACCEPTABLE MANUFACTURERS

- A. Products of the manufacturers specified in this section establish the minimum functional, aesthetic and quality standards required for work of this section.
- B. Basis-of-Design Product: Subject to compliance with requirements, provide Siplast Paradiene 20 TG/30 CR FR TG or comparable product by one of the following:
1. Sarnafil.
 2. Soprema, Inc.
- C. Source Limitations: Obtain components including roof insulation and adhesives for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer.
1. Obtain primary products, including each type of roofing sheet, bitumen, membrane flashings, and vapor retarder (if any), from a single manufacturer.
 2. Provide secondary products as recommended by manufacturer of primary products for use with roofing system specified.
- D. Substitutions: Comply with General Conditions using form in Division 1 Section "Substitution Request Form".

2.3 ROOFING SHEET MATERIALS

- A. Roofing Membrane Sheet: ASTM D6163, Grade S, Type I or II, SBS-modified asphalt sheet (reinforced with glass fibers); smooth surfaced; suitable for application method specified.
- B. Granule-Surfaced Roofing Cap Sheet: ASTM D6163, Grade G, Type I or II, SBS-modified asphalt sheet (reinforced with glass fibers); granule surfaced; suitable for application method specified, and as follows:
 - 1. Granule Color: White.
 - 2. Minimum SRI: 78.

2.4 BASE FLASHING SHEET MATERIALS

- A. Granule-Surfaced Flashing Sheet: ASTM D6162, Grade G, Type I or II, SBS-modified asphalt sheet (reinforced with a combination of polyester fabric and glass fibers) granule surfaced; suitable for application method specified as follows:
 - 1. Granule Color: White

2.5 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.
 - e. Contact Adhesives: 80 g/L.
 - f. Other Adhesives: 250 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.
- B. Asphalt Roofing Cement: ASTM D4586, asbestos free, of consistency required by roofing system manufacturer for application.
- C. Catalyzed Acrylic Resin Flashing System: A specialty flashing system consisting of a liquid-applied, fully reinforced, multi-component acrylic membrane installed over a prepared or primed substrate. The flashing system consists of a catalyzed polymethyl methacrylate primer, basecoat and topcoat, combined with a non-woven polyester fleece. The use of the specialty flashing system shall be specifically approved in advance by the membrane manufacturer for each application.
 - 1. Parapro 123 Flashing System by Siplast.
- D. Mastic Sealant: Polyisobutylene, plain or modified bitumen; nonhardening, nonmigrating, nonskinning, and nondrying.
- E. Fasteners: Factory-coated steel fasteners and metal plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roofing components to substrate; tested by manufacturer for required pullout strength, and acceptable to roofing system manufacturer.
- F. Roofing Granules: Ceramic-coated roofing granules, No. 11 screen size with 100 percent passing No. 8 (2.36 mm) sieve and 98 percent of mass retained on No. 40 (0.425-mm) sieve, color to match roofing.
- G. Miscellaneous Accessories: Provide those recommended by roofing system manufacturer.

2.6 VAPOR RETARDER

- A. Vapor Retarder: Roofing Membrane Sheet, ASTM 6163, Grades, Type I or II, SBS-Modified Asphalt Sheet (reinforced with glass fibers), smooth surfaced, suitable for application method specified.

2.7 ROOF INSULATION

- A. General: Preformed roof insulation boards manufactured or approved by roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated.
- B. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 1, Grade 3, felt or glass-fiber mat facer on both major surfaces. Insulation Type 6.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. To be supplied by the Roofing Manufacturer.
- C. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches (1:48) unless otherwise indicated.
 - 1. Minimum insulation thickness at drains shall be 3 inches.
- D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.8 INSULATION ACCESSORIES

- A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with roofing.
- B. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:
 - 1. Bead-applied, low-rise, one-component or multicomponent urethane adhesive.
- C. Insulation Cant Strips: ASTM C728, perlite insulation board.
- D. Wood Nailer Strips: Comply with requirements in Division 6, Section "Rough Carpentry".
- E. Tapered Edge Strips: ASTM C728, perlite insulation board.
- F. Cover Board: ASTM C1177/C 1177M, glass-mat, water-resistant gypsum substrate, minimum 1/2 inch (13 mm) thick.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Georgia Pacific Corporation; Dens Deck Prime.
 - b. USG Corporation; Securock Glass Mat Roof Board.
- G. Substrate Joint Tape: 6- or 8-inch- (150- or 200-mm-) wide, coated, glass fiber.

2.9 WALKWAYS

- A. Walkway Cap-Sheet Strips: ASTM D6163, Grade G, Type I or II, SBS-modified asphalt sheet (reinforced with glass fibers); granule surfaced; suitable for application method specified, and as follows:
 - 1. Granule Color: Gray.
- B. Roof Pavers: Heavyweight, hydraulically pressed concrete units, square edged beveled 3/16 inch (5 mm), factory cast for use as roof pavers; absorption not greater than 5 percent, ASTM C140; no breakage and maximum 1 percent mass loss when tested for freeze-thaw resistance, ASTM C67; and as follows:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hanover Specialties, Inc.
 - b. Roofblok Limited.
 - c. Wausau Tile Inc.
 - d. Westile Roofing Products.
 - 2. Size: 24 by 24 inches (600 by 600 mm). Manufacture pavers to dimensional tolerances of plus or minus 1/16 inch (1.6 mm) in length, height, and thickness.
 - 3. Weight: 22 lb/sq. ft. (110 kg/sq. m).
 - 4. Compressive Strength: 7500 psi (52 MPa), minimum.
 - 5. Colors and Textures: Glacier White.

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.
 3. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
 4. Verify that concrete substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D4263.
 5. Substrate Testing: The Installer shall test and document the existing substrate for amount of water retention in accordance with NRCA recommendations. The Installer shall have the option as to which test to use. An explanation of the tests follows:
 - a. Dryness Check Via Condensation on Glass:
 - 1) One test that indicates dryness is performed by placing a single pane of window glass over the concrete deck.
 - a) Before the test is set-up, the concrete deck is visually inspected and a location is selected that represents the typical surface texture and general surface condition of the deck.
 - b) At this location, a small area approximately 24" x 24" (610 mm x 610 mm) in size, is swept to remove construction debris, dirt, and loose particles from the deck's surface.
 - c) Then, a pane of glass (approximately 18" x 18" (457 mm x 457 m) is placed on the deck's surface and the perimeter outline of the glass is scribed onto the concrete surface with the point of a nail or pencil.
 - d) The pane of glass is lifted from the deck and a relatively thick bead of gun-grade sealant is applied onto the scribed outline.
 - 2) The glass is carefully set into the sealant so that the glass lays approximately parallel to the deck's surface and is approximately 1/2" (13 mm) above the concrete's surface.
 - a) It is important that the entire perimeter of the glass is bed in sealant and is well sealed onto the deck's surface.
 - 3) After exposure to mid-day sun for approximately two hours, if moisture droplets form on the underside of the glass, the concrete may be judged not dry enough to apply a vapor retarder, rigid insulation, or a roof membrane directly to the deck.
 - a) If moisture droplets are readily visible, additional drying of the concrete may be needed.
 - 4) Another test that is similar to the test above, but uses a sheet of 4mill polyethylene instead of a pane of glass, is ASTM D4263.
 6. Verify that concrete-curing compounds that impair adhesion of roofing components to roof deck have been removed.

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. Prime surface of concrete deck with asphalt primer at a rate of 3/4 gal./100 sq. ft. (0.3 L/sq. m), and allow primer to dry.

3.3 INSTALLATION, GENERAL

- A. Comply with roofing system manufacturer's written instructions.
- B. Substrate-Joint Penetrations: Prevent roofing adhesives from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.

3.4 VAPOR-RETARDER INSTALLATION

- A. Vapor Retarder: Prime substrate if required by manufacturer. Install vapor retarder over area to receive vapor retarder, side and end lapping each sheet a minimum of 3-1/2 inches (90 mm) and 6 inches (150 mm), respectively. Seal laps using roofing manufacturer's recommended torch method.
- B. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into roofing system using roofing manufacture's catalyzed acrylic resin flashing system.
- C. Ensure continuity of vapor barrier at transitions to air barrier of exterior wall systems.

3.5 INSULATION INSTALLATION

- A. Insulation Cant Strips: Install and secure preformed 45-degree insulation cant strips at junctures of roofing system with vertical surfaces or angle changes greater than 45 degrees.
- B. Install tapered insulation under area of roofing to conform to slopes indicated.
- C. Install insulation with long joints of insulation in a continuous straight line, with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch (6 mm) with insulation.
 - 1. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.
- D. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches (68 mm) or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (150 mm) in each direction.
 - 1. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.
- E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
- F. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.
- G. Adhered Insulation: Install each layer of insulation and adhere to substrate as follows:
 - 1. Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
- H. Adhered Cover Boards: Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches (150 mm) in each direction. Loosely butt cover boards together. Tape joints if required by roofing system manufacturer.
 - 1. Set each layer of cover board in ribbons of bead applied adhesive, firmly pressing and maintaining cover boards in place.

3.6 ROOFING INSTALLATION, GENERAL

- A. Install roofing system according to roofing system manufacturer's written instructions and applicable recommendations in ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing" and as follows:
 - 1. Deck Type: C (concrete or nonnailable).
 - 2. Adhering Method: T (torched).
 - 3. Number of SBS-Modified Asphalt Sheets: Two.
 - 4. Surfacing Type: M (mineral-granule-surfaced cap sheet).
- B. Start installation of roofing in presence of manufacturer's technical personnel.
- C. Coordinate installation of roofing system so insulation and other components of the roofing system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.
 - 1. Provide tie-offs at end of each day's work to cover exposed roofing sheets and insulation with a course of coated felt set in roofing cement or hot roofing asphalt, with joints and edges sealed.

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

3.7 SBS-MODIFIED BITUMINOUS MEMBRANE INSTALLATION

- A. Install modified bituminous roofing sheet and cap sheet according to roofing manufacturer's written instructions, starting at low point of roofing system. Extend roofing membrane sheets over and terminate beyond cants, installing as follows:
 1. Torch apply to substrate.
 2. Unroll roofing sheets and allow them to relax for minimum time period required by manufacturer.
- B. Laps: Accurately align roofing sheets, without stretching, and maintain uniform side and end laps. Stagger end laps. Completely bond and seal laps, leaving no voids.
 1. Repair tears and voids in laps and lapped seams not completely sealed.
 2. Apply roofing granules to cover exuded bead at laps while bead is hot.
- C. Install roofing sheets so side and end laps shed water.

3.8 FLASHING AND STRIPPING INSTALLATION

- A. Install base flashing over cant strips and other sloped and vertical surfaces, at roof edges, and at penetrations through roof, and secure to substrates according to roofing system manufacturer's written instructions and as follows:
 1. Prime substrates with asphalt primer if required by roofing system manufacturer.
 2. Flashing-Sheet Application: Torch apply flashing sheet to substrate.
- B. Extend base flashing up walls or parapets a minimum of 8 inches (200 mm) above roofing membrane and 4 inches (100 mm) onto field of roofing membrane.
- C. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing.
 1. Seal top termination of base flashing with a strip of glass-fiber fabric set in asphalt roofing cement.
- D. Install roofing cap-sheet stripping where metal flanges and edgings are set on roofing according to roofing system manufacturer's written instructions.
- E. Roof Drains: Strip 30-by-30-inch- (760-by-760-mm) metal flashing onto the base sheet, with the field cap sheet lapping over. Clamp roofing membrane, metal flashing, and stripping into roof-drain clamping ring.
 1. Install stripping according to roofing system manufacturer's written instructions.

3.9 WALKWAY AND PAVER INSTALLATION

- A. Walkway Cap-Sheet Strips: Install walkway cap-sheet strips over roofing membrane, using same application method as used for roofing cap sheet.
- B. Roof-Pavers: Install roof pavers according to manufacturer's written instructions in locations indicated.

3.10 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components, and to furnish reports to Architect.
- B. Test Cuts: Remove test specimens to evaluate problems observed during quality-assurance inspections of roofing membrane as follows:
 1. Determine approximate quantities of components within roofing membrane according to ASTM D3617.
 2. Examine test specimens for interply voids according to ASTM D3617 and to comply with criteria established in Appendix 3 of ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing".
 3. Repair areas where test cuts were made according to roofing system manufacturer's written instructions.

- C. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.
 - 1. Notify Architect and Owner 48 hours in advance of date and time of inspection.
- D. Roofing system will be considered defective if it does not pass tests and inspections.
 - 1. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.11 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.

3.12 ROOFING INSTALLER'S WARRANTY

- A. WHEREAS _____ of _____, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:
 - 1. Owner: TBD
 - 2. Address: TBD
 - 3. Building Name/Type: TBD
 - 4. Address: TBD
 - 5. Area of Work: Tower Roof Assembly Installation
 - 6. Acceptance Date: _____.
 - 7. Warranty Period: Two years.
 - 8. Expiration Date: _____.
- B. 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,
- C. 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.
- D. This Warranty is made subject to the following terms and conditions:
 - 1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
 - a. lightning;
 - b. peak gust wind speed exceeding 90 mph;
 - c. fire;
 - d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
 - e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work; and
 - f. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
 - 2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
 - 3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.

4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
 5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
 6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
 7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.
 8. This Warranty is a "No Dollar Limit" Warranty.
- E. IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____, _____.
1. Authorized Signature: _____.
 2. Name: _____.
 3. Title: _____.

END OF SECTION