

## **SECTION 07320 - CLAY ROOF TILES**

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Clay roof tiles.
  - 2. Tile accessories.
  - 3. Felt underlayment.
  - 4. Self-adhering sheet underlayment.

#### 1.3 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D 1079, glossaries in RTI/WSRCA's "Concrete and Clay Roof Tile Design Criteria Installation Manual for Moderate Climate Regions," and NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of clay tile and clay tile accessory indicated.
  - 1. Include similar Samples of trim involving color selection.
- C. Samples for Verification: For the following products, of sizes indicated, to verify color selected:
  - 1. Clay Tile: Full size.
  - 2. Clay Tile Accessories: Full size (Bird stops for barrel infill and tiles at edge conditions).
  - 3. Fastenings: Wire-tie system components, 12 inches (300 mm) long.
  - 4. Self-Adhering Underlayment: 12 inches (300 mm) square.
- D. Research/Evaluation Reports: For clay tile, fasteners, and fastener systems.
- E. Maintenance Data: For clay tile roofing to include in maintenance manuals.

- F. Warranties: Special warranties specified in this Section.

#### 1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain clay tiles and clay tile accessories through one source from a single manufacturer.
- B. Fire-Test-Response Characteristics: Provide clay tiles and related roofing materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
  - 1. Exterior Fire-Test Exposure: Class A; UL 790 or ASTM E 108 for application and roof slopes indicated.
- C. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.
  - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect in writing.
  - 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store underlayment rolls on end on pallets or other raised surfaces. Do not double-stack rolls.
  - 1. Handle, store, and place roofing materials in a manner to avoid significant or permanent damage to roof deck or structural supporting members.
- B. Protect unused underlayment from weather, sunlight, and moisture when left overnight or when roofing work is not in progress.

#### 1.7 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing to be performed according to manufacturer's written instructions and warranty requirements.
  - 1. Install self-adhering sheet underlayment within the range of ambient and substrate temperatures recommended by manufacturer.

## 1.8 WARRANTY

- A. Special Clay Roof Tile Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace tile that fails in materials within specified warranty period. Material failures include manufacturing defects that result in leaks.
  - 1. Material Warranty Period: 50 years from date of Substantial Completion.
- B. Special Roofing Installer's Warranty: Roofing Installer's warranty, on warranty form at end of this Section, signed by roofing Installer, covering Work of this Section, in which roofing Installer agrees to repair or replace components of clay tile roofing that fail in materials or workmanship within the following warranty period:
  - 1. Warranty Period: 10 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

### 2.2 CLAY TILES

- A. Products:
  - 1. **MATCH EXISTING STYLE – SIMILAR TO ORIENTAL STYLE BY MCA TILES.**
  - 2. **MATCH EXISTING STYLE – BY LUDOWICI.**
  - 3. Approved Equal.
- B. Clay Tile: ASTM C 1167, molded- or extruded-clay roof tile units of shape and configuration indicated, kiln fired to vitrification, and free of surface imperfections. Provide with fastening holes prepunched at factory before firing.
  - 1. Durability: Grade 1.
  - 2. Size: **MATCH EXISTING**
  - 3. Color: As selected by Architect from Manufacturer's full line.
  - 4. High-Profile-Shape Clay Tile Accessories: As follows, but not limited to: Ridge, ridge end, hip and hip starter, header course, L-shaped rake edge, roll rake edge, starter, eave closure and top fixture units, color to match roof tile.

### 2.3 ACCESSORIES

- A. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.

- B. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied.
- C. Elastomeric Sealant: ASTM C 920, silicone-based joint sealant; of Type M or S, Grade NS, Class 25, Use NT related to exposure, and, as applicable to joint substrates indicated, Use O.
- D. Roofing Asphalt: ASTM D 312, Type IV.
- E. Wood Nailers, Beveled Cant Strips and Battens: Comply with requirements in Division 6 Section "Rough Carpentry" for pressure-preservative-treated wood.

## 2.4 FASTENERS

- A. Screws: Stainless steel, # 8 Philips head screws with minimum 3/8-inch- (10-mm-) diameter head; and of sufficient length to penetrate 1 inch (19 mm) into metal deck. Contractor shall submit samples to the architect for review.
  - 1. Where screws are in contact with metal flashing, use nails made from **same** metal as flashing.
- B. Felt Underlayment Nails: Aluminum, stainless-steel, or hot-dip galvanized steel wire with low-profile capped heads or disc caps, 1-inch (25-mm) minimum diameter.
- C. Wood Batten Nails: ASTM F 1667, common or box, steel wire, flat head, and smooth shank.
- D. Wire Ties: Stainless steel, 0.083-inch (2.1-mm) minimum diameter.

## 2.5 UNDERLAYMENT MATERIALS

- A. Roof Felt Underlayment: ASTM D 226, Type II, asphalt-saturated organic felt, unperforated.
- B. Self-Adhering Sheet Underlayment, Granular Surfaced: ASTM D 1970, minimum of 55 mils (1.4 mm) thick; glass-fiber-mat-reinforced, SBS-modified asphalt; mineral-granule surfaced; with release-paper backing; cold applied.
  - 1. Products:
    - a. ALCO-NVC, Inc.; ALCO Shield.
    - b. Atlas Roofing Corporation; StormMaster DG.
    - c. Carlisle Coatings & Waterproofing, Div. of Carlisle Companies Inc.; Dri-Start "G."
    - d. Celotex Corporation; Celo-Guard.
    - e. CertainTeed Corporation; WinterGuard.
    - f. GAF Materials Corporation; Weather Watch.
    - g. Henry Company; Eaveguard.
    - h. IKO; ArmourGuard.
    - i. Johns Manville International, Inc.; Roof Defender.

## 2.6 SHEET METAL FLASHING AND TRIM

- A. **Sheet Metal Flashing and Trim:** Comply with requirements in Division 7 **Section 07620 "Sheet Metal Flashing and Trim."** **REFER TO THIS SPEC SECTION FOR ALL FLASHING SPECIFIED UNDER 07320 ON THE DRAWINGS.**
- B. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item.
1. Apron Flashings: Fabricate with lower flange extending a minimum of 6 inches (150 mm) over and 4 inches (100 mm) beyond each side of downslope tile roofing and 6 inches (150 mm) up the vertical surface.
  2. Step Flashings: Fabricate with a 3-inch (75-mm) headlap extending a minimum of 5 inches (125 mm) over the underlying tile roofing and 5 inches (125 mm) up the vertical surface.
  3. Drip Edges: Fabricate in lengths not exceeding 10 feet (3 m), with 2-inch (50-mm) roof-deck flange and 1-1/2-inch (38-mm) fascia flange with 3/8-inch (9.6-mm) drip at lower edge.
- C. Vent-Pipe Flashings: ASTM B 749, Type L51121, at least 1/16 inch (1.6 mm) thick. Provide lead sleeve sized to slip over and turn down into pipe, soldered to skirt at slope of roof, and extending at least 4 inches (100 mm) from pipe onto roof.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
1. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.
  2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored; and that provision has been made for flashings and penetrations through roof.
  3. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 UNDERLAYMENT INSTALLATION

- A. General: Install underlayments according to tile manufacturer's written recommendations and recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."
1. Cover ridge and hip wood nailers with underlayment strips.

- B. Self-Adhering Sheet Underlayment: Install wrinkle free, complying with low-temperature installation restrictions of underlayment manufacturer if applicable. Install at locations indicated below and on Drawings, lapped in direction to shed water. Lap sides not less than 3-1/2 inches (89 mm). Lap ends not less than 6 inches (150 mm), staggered 24 inches (600 mm) between succeeding courses. Roll laps with roller. Cover underlayment within seven days.
  - 1. Extend self-adhering sheet underlayment over entire roof deck.
  - 2. After the installation of the self-adhering underlayment is complete, install roof felt underlayment perpendicular to roof slope in parallel courses. Lap sides a minimum of 2 inches (50 mm) over underlying course. Lap ends a minimum of 4 inches (100 mm). Stagger end laps between succeeding courses at least 72 inches (1830 mm). Fasten with roofing nails.

### 3.3 METAL FLASHING INSTALLATION

- A. General: Install metal flashings and other sheet metal to comply with requirements in Division 7 Section "Sheet Metal Flashing and Trim."
  - 1. Install metal flashings according to tile manufacturer's written recommendations and recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."
- B. Apron Flashings: Extend lower flange over and beyond each side of downslope tile roofing and up the vertical surface.
- C. Step Flashings: Install with a 3-inch (75-mm) headlap extending over the underlying tile and up the vertical surface. Install with lower edge of flashing just upslope of, and concealed by, butt of overlying tile. Fasten to roof deck only.
- D. Cricket Flashings: Install against roof-penetrating elements, extending concealed flange beneath upslope tile roofing and beyond each side.
- E. Channel Flashings: Install over underlayment and fasten to roof deck.
- F. Rake Pan Flashings: Install over underlayment and fasten to roof deck.
- G. Rake Drip Edges: Install over underlayment and fasten to roof deck.
- H. Eave Drip Edges: Install beneath underlayment and fasten to roof deck.
- I. Pipe Flashings: Form flashing around pipe penetrations and tile roofing. Fasten and seal to tile roofing.

### 3.4 TILE INSTALLATION

- A. General: Install roof tiles according to manufacturer's written instructions and recommendations in RTI/WSRCA's "Concrete and Clay Roof Tile Design Criteria Installation Manual for Moderate Climate Regions," and to NRCA's "The NRCA Roofing and Waterproofing Manual."

1. Maintain uniform exposure and coursing of tiles throughout roof.
2. Extend tiles 2 inches (50 mm) over eave fasciae.
3. Screw Fastening: Drive screws to clear the tile so the tile hangs from the screw and is not drawn up.
  - a. Install wire through nail holes of cut tiles that cannot be screwed directly to roof deck, and fasten to screws driven into deck.
4. Wire Tie Fastening: Install wire-tie systems and fasten tile according to manufacturer's written instructions.
5. Install tile locks to support and lock overlying tile butts to underlying tiles.
6. Cut and fit tiles neatly around roof vents, pipes, ventilators, and other projections through roof. Fill voids with mortar.
7. Install tiles with color blend approved by Architect.

B. High-Profile Tile Installation:

1. Install tile eave closure.
2. Provide minimum 3-inch (75-mm) lap between succeeding courses of tiles.
3. Install roll rake tiles.
4. Install ridge tiles with laps facing away from prevailing wind. Seal laps with asphalt roofing cement.

3.5 ADJUSTING AND CLEANING

- A. Remove and replace damaged or broken tiles.
- B. Remove excess tile and debris from Project site.

3.6 ROOFING INSTALLER'S WARRANTY

- A. WHEREAS **<Insert name>** of **<Insert address>**, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:
  1. Owner: **<Insert name of Owner.>**
  2. Address: **<Insert address.>**
  3. Building Name/Type: **<Insert information.>**
  4. Address: **<Insert address.>**
  5. Area of Work: **<Insert information.>**
  6. Acceptance Date: **<Insert date.>**
  7. Warranty Period: **<Insert time.>**
  8. Expiration Date: **<Insert date.>**
- 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:

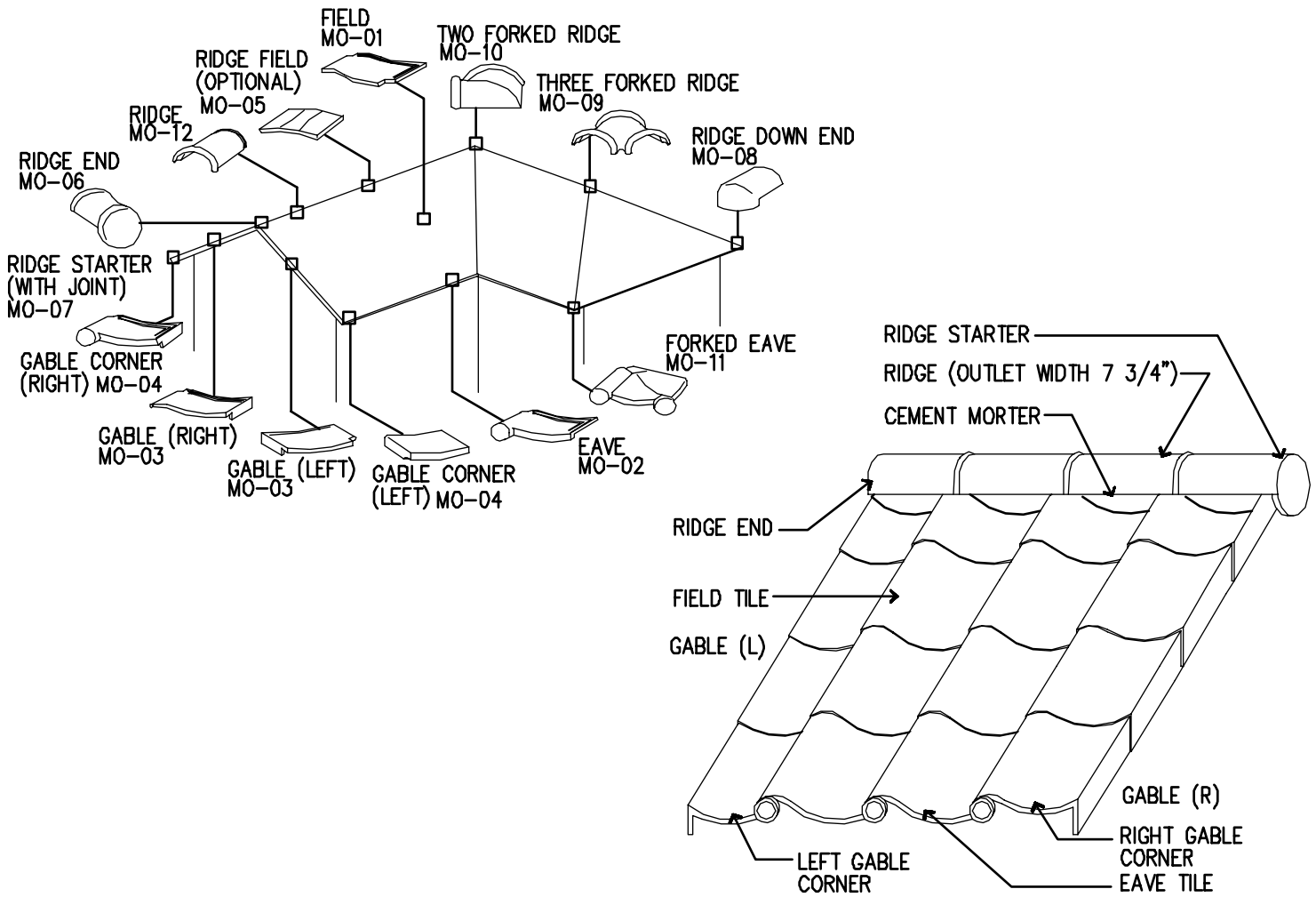
1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
  - a. lightning;
  - b. peak gust wind speed exceeding <Insert wind speed> mph (m/sec);
  - c. fire;
  - d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
  - e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
  - f. vapor condensation on bottom of roofing; and
  - g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed, 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.

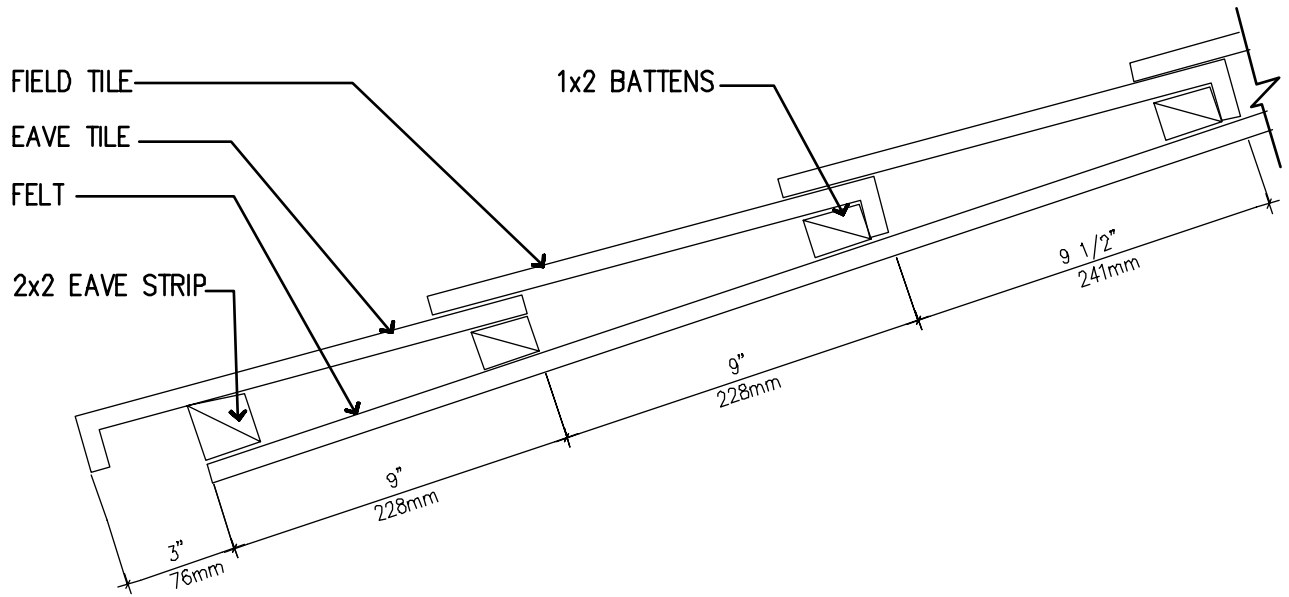


E. IN WITNESS THEREOF, this instrument has been duly executed this <Insert day> day of <Insert month>, <Insert year>.

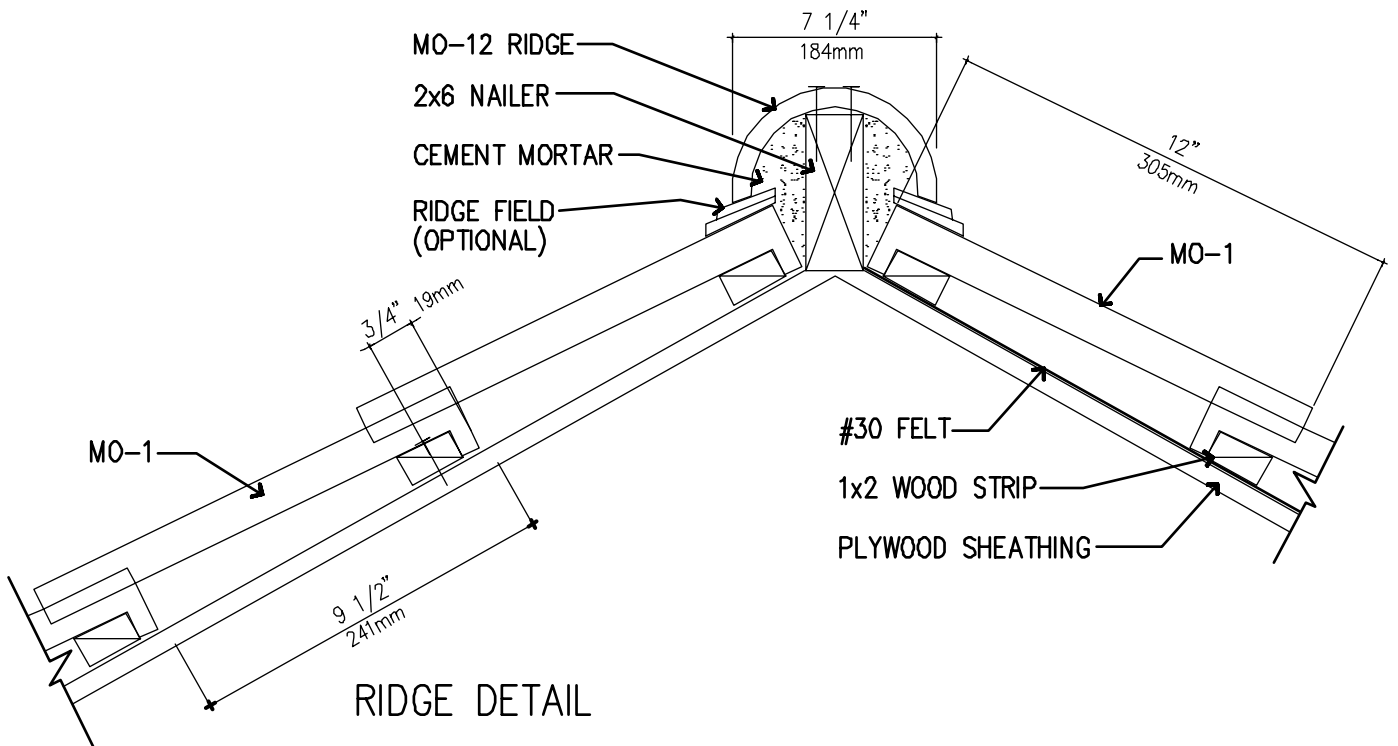
1. Authorized Signature: <Insert signature.>
2. Name: <Insert name.>
3. Title: <Insert title.>

**MISCELLANEOUS DETAILS (FOR INFORMATIONAL PURPOSES) - REFER TO SELECTED MANUFACTURER'S STANDARD DETAILS FOR SELECTED TILE:**

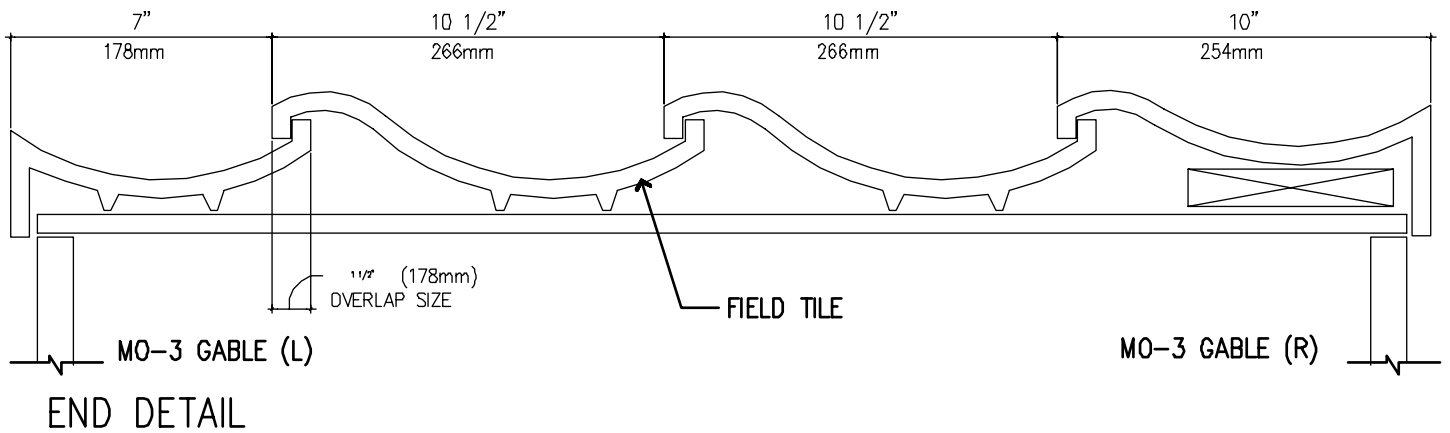
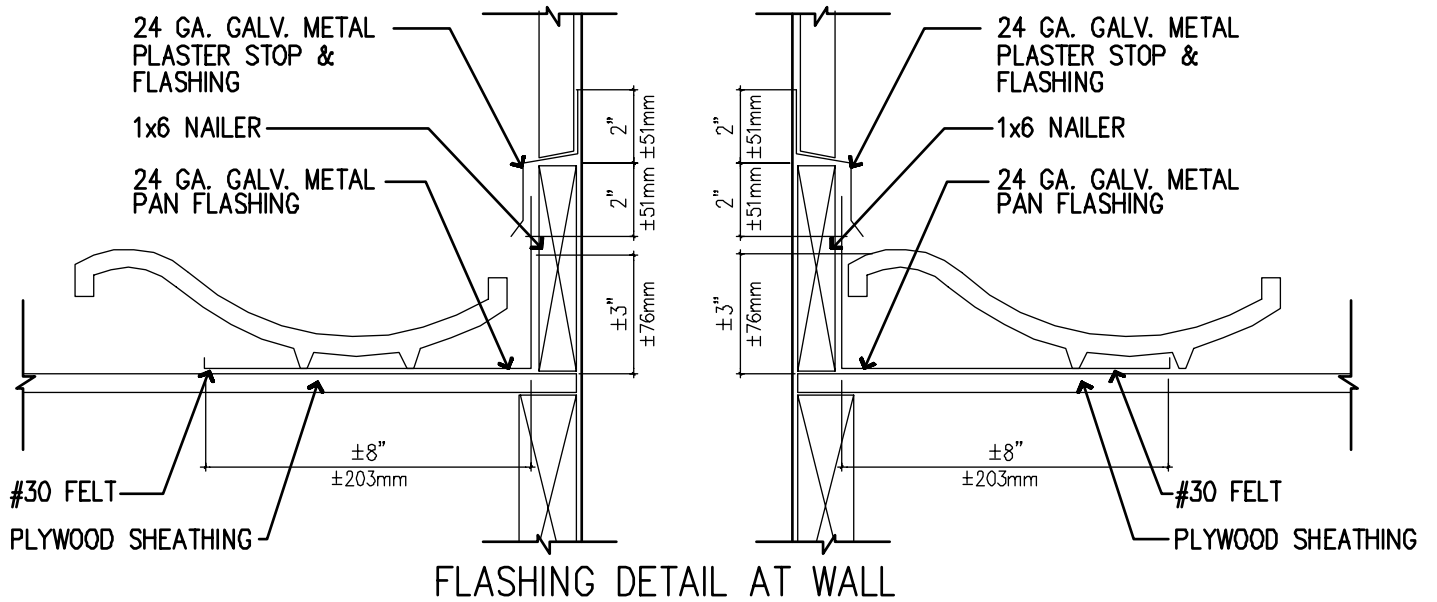




SIDE DETAIL



RIDGE DETAIL



END OF SECTION 07320

## **SECTION 07522 - SBS-MODIFIED BITUMINOUS MEMBRANE ROOFING (CONCRETE DECK)**

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. SBS-modified bituminous membrane roofing.
  - 2. Roof insulation.

#### 1.3 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.
- B. Hot Roofing Asphalt: Roofing asphalt heated to its equiviscous temperature, the temperature at which its viscosity is 125 centipoise for mop-applied roofing asphalt and 75 centipoise for mechanical spreader-applied roofing asphalt, within a range of plus or minus 25 deg F (14 deg C), measured at the mop cart or mechanical spreader immediately before application.

#### 1.4 PERFORMANCE REQUIREMENTS

- A. General: Provide installed roofing membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.
- 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. FMG Listing: Provide roofing membrane, base flashings, and component materials that comply with requirements in FMG 4450 and FMG 4470 as part of a roofing system and that are listed in FMG's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FMG markings.
  - 1. Fire/Windstorm Classification: Class 1A-90.
  - 2. Hail Resistance: MH.

## 1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other Work.
  - 1. Base flashings, cants, and membrane terminations.
  - 2. Tapered insulation, including slopes.
  - 3. Crickets, saddles, and tapered edge strips, including slopes.
- C. Samples for Verification: For the following products:
  - 1. 12-by-12-inch (300-by-300-mm) square of base ply.
  - 2. 12-by-12-inch (300-by-300-mm) square of mineral-granule-surfaced roofing membrane cap sheet [flashing sheet], of color specified.
  - 3. 12-by-12-inch (300-by-300-mm) square of roof insulation.
- D. Warranties: Special warranties specified in this Section.
- E. Inspection Report: Copy of roofing system manufacturer's inspection report of completed roofing installation.

## 1.6 QUALITY ASSURANCE

- A. 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 warranty.
- B. Manufacturer Qualifications: A qualified manufacturer that has UL listing for roofing system identical to that used for this Project.
- C. Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.
- D. Source Limitations: Obtain components for roofing system from roofing system manufacturer.
- E. Fire-Test-Response Characteristics: Provide roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.
  - 1. Exterior Fire-Test Exposure: Class A ; ASTM E 108, for application and roof slopes indicated.
- F. Preinstallation Conference: Conduct conference at Project site. Comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to roofing system including, but not limited to, the following:

1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing 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 will affect 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.

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

#### 1.8 PROJECT CONDITIONS

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

## 1.9 WARRANTY

- A. Special Warranty: Manufacturer's warranty, without monetary limitation, in which manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks. Special warranty includes roofing membrane, base flashings, roofing membrane accessories, roof insulation, fasteners, walkway products and other components of roofing system. The Roofing Manufacturer's Guarantee shall guarantee at the manufacturer's own cost and expense, to made or cause to be made such repairs to or replacement of, to correct any and all faulty installations or materials of the roofing system, to keep the roofing system in a watertight condition throughout the 10 year guarantee period. The guarantee shall not be prorated. The executed guarantee shall be delivered to the Architect in three original counterparts prior to acceptance of the Work. Any interior wall and ceiling finishes damaged by failure to correct any problems in a timely fashion shall be paid by the roofing contractor and/or roofing manufacturer.
1. The definition of the roofing system is the materials and methods used from the deck up. Excluded are the metal counter flashing, edging, caps, and copings, vent covers (pre-manufactured) and roof drain assemblies. The manufacturer is to include a list of all component parts of the roofing system that shall be guaranteed.
  2. The manufacturer's letter shall also state acceptance of the installer of the roofing system.
  3. Warranty Period: 10 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. SBS-Modified Bituminous Membrane Roofing:
    - a. Johns Manville International, Inc.
    - b. Siplast, Inc.
    - c. Soprema Roofing and Waterproofing Inc.
    - d. TAMKO Roofing Products, Inc.
- Note: All approved roofing manufacturers, listed above, shall provide a roofing system equal to Siplast's Paradiene 20/30 FR.**
- B. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:
1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

## 2.2 SBS-MODIFIED ASPHALT-SHEET MATERIALS

- A. Roofing Membrane Sheet: ASTM D 6163, Grade S, Type I or II, glass-fiber-reinforced, SBS-modified asphalt sheet; smooth surfaced (first ply) and ASTM D 6163, Grade G, Type I or II, glass-fiber-reinforced, SBS-modified asphalt sheet; granule surfaced (second ply) ; suitable for application method specified.

## 2.3 BASE FLASHING SHEET MATERIALS

- A. Flashing Sheet: ASTM D 6163, Grade G, Type I or II, glass-fiber-reinforced, SBS-modified asphalt sheet; granular surfaced; suitable for application method specified, and as follows:
  - 1. Granule Color: White.

## 2.4 AUXILIARY ROOFING MEMBRANE MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing membrane.
- B. Asphalt Primer: ASTM D 41.
- C. Roofing Asphalt: ASTM D 312, Type III or IV as recommended by roofing system manufacturer for application.
- D. Roofing Asphalt: ASTM D 6152, SEBS modified.
- E. Mastic Sealant: Polyisobutylene, plain or modified bitumen, nonhardening, nonmigrating, nonskinning, and nondrying.
- F. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roofing membrane components to substrate, tested by manufacturer for required pullout strength, and acceptable to roofing system manufacturer.
- G. **Metal Flashing Sheet:** Metal flashing sheet is specified in Division 7 **Section 07620 "Sheet Metal Flashing and Trim."** **REFER TO THIS SPEC SECTION FOR ALL FLASHING SPECIFIED UNDER 07552 ON THE DRAWINGS.**
- H. 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 membrane.
- I. Miscellaneous Accessories: Provide miscellaneous accessories recommended by roofing system manufacturer.



## 2.5 ROOF INSULATION

- A. General: Provide preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.
- B. Perlite Board Insulation: ASTM C 728; composed of expanded perlite, cellulosic fibers, binders, and waterproofing agents with top surface seal-coated.
  - 1. Manufacturers:
    - a. Celotex Corporation.
    - b. GAF Materials Corporation.
    - c. Honeywell Commercial Roofing Systems.
    - d. Johns Manville International, Inc.
    - e. Koppers Industries.
- C. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches (1:48), unless otherwise indicated.
- D. 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 compatible with membrane roofing.
- B. Insulation Cant Strips: ASTM C 728, perlite insulation board.
- C. Wood Nailer Strips: Comply with requirements in Division 6 Section "Miscellaneous Carpentry".
- D. Tapered Edge Strips: ASTM C 728, perlite insulation board.
- E. Substrate Joint Tape: 6- or 8-inch- (150- or 200-mm-) wide, coated, glass-fiber joint tape.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
  - 1. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.
  - 2. Verify that wood cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.

3. Verify that concrete curing compounds that will impair adhesion of roofing components to roof deck have been removed.
4. Verify that concrete substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
  - a. Test for moisture by pouring 1 pint (0.5 L) of hot roofing asphalt on deck at start of each day's work and at start of each roof area or plane. Do not proceed with roofing work if test sample foams or can be easily and cleanly stripped after cooling.
5. 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 INSULATION INSTALLATION

- A. Comply with roofing system manufacturer's written instructions for installing roof insulation.
- B. Insulation Cant Strips: Install and secure preformed 45-degree insulation cant strips at junctures of roofing membrane system with vertical surfaces or angle changes greater than 45 degrees.
- C. Install tapered insulation under area of roofing to conform to slopes indicated. Provide a minimum of 1/2 inch (13 mm) of insulation at low points on roof deck.
- D. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch (6 mm) with insulation.
  1. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.
- E. Install one or more layers of insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2 inches (50 mm) or greater, install 2 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.
- F. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.

- G. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.
- H. Adhered Insulation: Install each layer of insulation and adhere to substrate as follows:
  - 1. Set each layer of insulation in a solid mopping of hot roofing asphalt.

### 3.4 ROOFING MEMBRANE INSTALLATION, GENERAL

- A. Install roofing membrane system according to roofing system manufacturer's written instructions and applicable recommendations of ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing."
  - 1. Install roofing system MBS 2-I-M-G 0 with base sheet-M, according to specification-plate classifications in NRCA's "The NRCA Roofing and Waterproofing Manual" and requirements in this Section.
- B. Start installation of roofing membrane in presence of roofing system manufacturer's technical personnel.
- C. Where roof slope exceeds 1/2 inch per 12 inches (1:24), install roofing membrane sheets parallel with slope.
  - 1. Backnail roofing membrane sheets to substrate according to roofing system manufacturer's written instructions.
- D. Cooperate with testing and inspecting agencies engaged or required to perform services for installing roofing system.
- E. Coordinate installing roofing system so insulation and other components of the roofing membrane system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.
  - 1. Provide tie-offs at end of each day's work to cover exposed roofing membrane sheets and insulation with a course of coated felt set in roofing cement or hot roofing asphalt with joints and edges sealed.
  - 2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.
  - 3. Remove and discard temporary seals before beginning work on adjoining roofing.
- F. Asphalt Heating: Do not raise roofing asphalt temperature above equiviscous temperature range more than one hour before time of application. Do not exceed roofing asphalt manufacturer's recommended temperature limits during roofing asphalt heating. Do not heat roofing asphalt within 25 deg F (14 deg C) of flash point. Discard roofing asphalt maintained at a temperature exceeding finished blowing temperature for more than 4 hours.
- G. Substrate-Joint Penetrations: Prevent roofing asphalt from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.

### 3.5 BASE-SHEET INSTALLATION

- A. Install lapped base sheet course, extending sheet over and terminating beyond cants. Attach base sheet as follows:
  - 1. Adhere to substrate in a solid mopping of hot roofing asphalt.

### 3.6 SBS-MODIFIED BITUMINOUS MEMBRANE INSTALLATION

- A. Install modified bituminous roofing membrane sheet and cap sheet according to roofing manufacturer's written instructions, starting at low point of roofing system. Extend roofing membrane sheets over and terminate beyond cants, installing as follows:
  - 1. Adhere to substrate in a solid mopping of hot roofing asphalt applied at not less than 425 deg F (218 deg C).
  - 2. Unroll roofing membrane sheets and allow them to relax for minimum time period required by manufacturer.
- B. Laps: Accurately align roofing membrane 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 membrane sheets so side and end laps shed water.

### 3.7 FLASHING AND STRIPPING INSTALLATION

- A. Install base flashing over cant strips and other sloping 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: Adhere flashing sheet to substrate in a solid mopping of hot roofing asphalt applied at not less than 425 deg F (218 deg C). Apply hot roofing asphalt to back of flashing sheet if recommended by roofing system manufacturer.
- 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.
- D. Install roofing membrane cap-sheet stripping where metal flanges and edgings are set on membrane roofing according to roofing system manufacturer's written instructions.

### 3.8 FIELD QUALITY CONTROL

- A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Architect.
  - 1. Notify Architect or Owner 7 days in advance of date and time of inspection.
- B. Repair or remove and replace components of roofing system where test results or inspections indicate that they do not comply with specified requirements.
- C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

### 3.9 PROTECTING AND CLEANING

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

END OF SECTION 07522

## **SECTION 07620 - SHEET METAL FLASHING AND TRIM**

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:

- 1. Formed Products:

- a. Formed roof drainage sheet metal fabrications.
    - b. Formed low-slope roof sheet metal fabrications.
    - c. Formed steep-slope roof sheet metal fabrications.
    - d. Formed wall sheet metal fabrications.

#### 1.3 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies as indicated 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. Fabricate and install roof edge flashing and copings capable of resisting the following forces according to recommendations in FMG Loss Prevention Data Sheet 1-49:
  - 1. Wind Zone 2: For velocity pressures of 31 to 45 lbf/sq. ft. (1.48 to 2.15 kPa): 90-lbf/sq. ft. (4.31-kPa) perimeter uplift force, 120-lbf/sq. ft. (5.74-kPa) corner uplift force, and 45-lbf/sq. ft. (2.15-kPa) outward force.
- C. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperature changes.
  - 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

#### 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 for each manufactured product and accessory.

- B. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:
  - 1. Identification of 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 joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
  - 4. Details of termination points and assemblies, including fixed points.
  - 5. Details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction.
  - 6. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
  - 7. Details of special conditions.
  - 8. Details of connections to adjoining work.
- C. Samples for Initial Selection: For each type of sheet metal flashing, trim, and accessory indicated with factory-applied color finishes involving color selection.
- D. Qualification Data: For qualified fabricator.
- E. Maintenance Data: For sheet metal flashing, trim, and accessories to include in maintenance manuals.
- F. Warranty: Sample of special warranty.

#### 1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
- B. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

#### 1.6 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 the extent necessary for the period of sheet metal flashing and trim installation.

## 1.7 WARRANTY

- A. Special Warranty on Finishes: Manufacturer's standard form in which 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 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.
- B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.
  - 1. Exposed Coil-Coated Finishes:
    - a. Three-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
  - 2. Color: As selected by Architect from manufacturer's full range.

### 2.2 UNDERLAYMENT MATERIALS

- A. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.

### 2.3 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 and 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.
    - 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.
- C. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
- D. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- G. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.
- H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

#### 2.4 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.
1. 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.
  2. Obtain field measurements for accurate fit before shop fabrication.
  3. Form 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.
  4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.
- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines as indicated and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

- C. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.
- D. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.
- E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- F. Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" and by FMG Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.
- G. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.
- H. Do not use graphite pencils to mark metal surfaces.

## 2.5 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Roof-Edge Flashing (Gravel Stop): Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 10-foot- (3-m-) long, sections. Furnish with 6-inch- (150-mm-) wide, joint cover plates.
  - 1. Joint Style: Lap, 4 inches (100 mm) wide.
  - 2. Fabricate from the following materials:
    - a. Aluminum: 0.050 inch (1.27 mm) thick.
- B. Base Flashing: Fabricate from the following materials:
  - 1. Aluminum: 0.040 inch (1.02 mm) thick.
- C. Counterflashing: Fabricate from the following materials:
  - 1. Aluminum: 0.032 inch (0.81 mm) thick.
- D. Flashing Receivers: Fabricate from the following materials:
  - 1. Aluminum: 0.032 inch (0.81 mm) thick.
- E. Roof-Penetration Flashing: Fabricate from the following materials:
  - 1. Lead: 4.0 lb/sq. ft. (1.6 mm thick), hard tempered.
- F. Roof-Drain Flashing: Fabricate from the following materials:
  - 1. Lead: 4.0 lb/sq. ft. (1.6 mm thick), hard tempered.

## 2.6 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Apron, Step, Cricket, and Backer Flashing: Fabricate from the following materials:
  - 1. Aluminum: 0.032 inch (0.81 mm) thick.
- B. Valley Flashing: Fabricate from the following materials:
  - 1. Aluminum: 0.032 inch (0.81 mm) thick.
- C. Drip Edges: Fabricate from the following materials:
  - 1. Aluminum: 0.032 inch (0.81 mm) thick.
- D. Eave, Rake, Ridge, and Hip Flashing: Fabricate from the following materials:
  - 1. Aluminum: 0.032 inch (0.81 mm) thick.
- E. Counterflashing: Fabricate from the following materials:
  - 1. Aluminum: 0.032 inch (0.81 mm) thick.
- F. Flashing Receivers: Fabricate from the following materials:
  - 1. Aluminum: 0.032 inch (0.81 mm) thick.
- G. Roof-Penetration Flashing: Fabricate from the following materials:
  - 1. Lead: 4.0 lb/sq. ft (1.6mm) thick.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of the Work.
  - 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.
- B. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 UNDERLAYMENT INSTALLATION

- A. General: Install underlayment as indicated on Drawings.
- B. Felt Underlayment: Install felt underlayment with adhesive for temporary anchorage to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches (50 mm).

### 3.3 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. Install sheet metal flashing and trim true to line and levels indicated. 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 (300 mm) apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
  4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
  5. Install sealant tape where indicated.
  6. Torch cutting of sheet metal flashing and trim is not permitted.
  7. Do not use graphite pencils to mark metal surfaces.
- 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 SMACNA.
1. Coat back side of uncoated aluminum 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 sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (600 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.
- D. Fastener Sizes: Use Stainless Steel fasteners of sizes that will penetrate wood sheathing not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.
- E. Seal joints as shown and as required for watertight construction.
1. Where sealant-filled joints are used, 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 moderate, 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).
  2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."

- F. 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 (38 mm), except reduce pre-tinning where pre-tinned surface would show in completed Work.
  - 1. Where surfaces to be soldered are lead coated, do not tin edges, but wire brush lead coating before soldering.

### 3.4 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." 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 and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at 12-inch (300-mm) 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 (100 mm) over base flashing. Install stainless-steel draw band and tighten.
- D. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches (100 mm) over base flashing. Lap counterflashing joints a minimum of 4 inches (100 mm) and bed with sealant. Secure in a waterproof manner by means of snap-in installation and sealant or lead wedges and sealant or interlocking folded seam or blind rivets and sealant or anchor and washer at 36-inch (900-mm) centers.
- E. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

### 3.5 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines as indicated and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.
- B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

### 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.
- C. Clean off excess sealants.
- D. 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 installation, remove unused materials and clean finished surfaces. Maintain in a clean condition during construction.
- E. 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 07620