



WMU Design Guidelines Instructions: These guidelines are to be used by the Design Professional to inform the design process and outline WMU-specific desires for University projects. Text appearing in blue indicates a WMU design guideline which must be met for all campus projects unless approved in writing by the University. Blue text that is struck out indicates products or practices that are **not** acceptable, and shall not be included unless similarly approved. Any text remaining in black is to be edited by the Design Professional as part of the normal specifications-writing process. Guidelines language shall be included in the project specifications and their intent incorporated into the drawings.

SECTION 07 5323 - ETHYLENE-PROPYLENE-DIENE-MONOMER (EPDM) ROOFING

PART 1 - GENERAL

Designer Note: WMU prefers a fully adhered EPDM roofing system for new construction on campus. If the Design Professional wants to stray from this, it will need to be discussed during the design stages of the project.

1.1 SUMMARY

A. Section Includes:

1. Adhered ethylene-propylene-diene-terpolymer (EPDM) roofing system.
2. Self-adhering, ethylene-propylene-diene-terpolymer (EPDM) roofing system.
3. ~~Mechanically fastened, ethylene-propylene-diene-terpolymer (EPDM) roofing system.~~
4. ~~Loosely laid and ballasted, ethylene-propylene-diene-terpolymer (EPDM) roofing system.~~
5. Substrate board.
6. Vapor retarder.
7. Roof insulation.
8. Cover board.
9. Walkways.

- B. Section includes installation of sound-absorbing insulation strips in ribs of roof deck. Sound-absorbing insulation strips are furnished under Section 05 3100 "Steel Decking."

1.2 DEFINITIONS

- A. Roofing Terminology: Definitions in ASTM D1079 and glossary of NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to work of this Section.

1.3 PREINSTALLATION MEETINGS

- A. Preliminary Roofing Conference: Before starting roof deck construction, conduct conference at **[Project site] <Insert location>**.

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



WMU Design Guidelines

2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review deck substrate requirements for conditions and finishes, including flatness and fastening.
5. Review 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.
10. Do not schedule the preinstallation meeting prior to receiving an approved preinstallation notice (PIN) from the roofing system manufacturer, stating the project is approved to proceed with a warrantable installation.

B. Preinstallation Roofing Conference: Conduct conference at **[Project site]** <Insert location>.

1. Meet with Owner, Architect, **[Construction Manager,**] Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, air barrier 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, 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.

1.4 ACTION SUBMITTALS

A. **Product Data:** For each type of product.

1. For insulation and roof system component fasteners, include copy of FM Approvals' RoofNav listing.

Designer Note: For projects seeking LEED certification, include sustainable design submittals as required.

B. Sustainable Design Submittals:

1. <Double click to insert sustainable design text for roofing.>
2. <Double click to insert sustainable design text for adhesives and sealants.>



3. <Double click to insert sustainable design text for recycled content.>
 4. <Double click to insert sustainable design text for environmental product declarations.>
- C. Shop Drawings: Include roof plans, sections, details, and attachments to other work, including the following:
1. Layout and thickness if insulation.
 2. Base flashings and membrane terminations.
 3. Flashing details at penetrations.
 4. Tapered insulation, thickness, and slopes.
 5. Roof plan showing orientation of steel roof deck and orientation of roof membrane and fastening spacings and patterns for mechanically fastened roofing system.
 6. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
 7. Tie-in with air barrier.
- D. Samples for Verification: For the following products:
1. Roof membrane and flashings of color required.
 2. ~~Aggregate surfacing material in gradation [and color] required.~~
 3. Roof paver, **[full sized,]** in each color and texture required.
 4. Walkway pads or rolls, of color required.
- E. Wind Uplift Resistance Submittal: For roofing system, indicating compliance with wind uplift performance requirements, and roof system manufacturer's approved design for warranted wind speed.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.
- B. Manufacturer Certificates:
1. Performance Requirement Certificate: Signed by roof membrane manufacturer, certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - a. Submit evidence of complying with performance requirements.
 2. Special Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.
- C. Product Test Reports: For components of roof membrane and insulation, for tests performed by a qualified testing agency, indicating compliance with specified requirements.
- D. Evaluation Reports: For components of roofing system, from ICC-ES.
1. Field Test Reports:
 2. Concrete internal relative humidity test reports.
 3. Fastener-pullout test results and manufacturer's revised requirements for fastener patterns.
- E. Field quality-control reports.



WMU Design Guidelines

- F. Sample Warranties: For manufacturer's special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roofing system to include in maintenance manuals.
- B. Certified statement from existing roof membrane manufacturer stating that existing roof warranty has not been affected by Work performed under this Section.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is **[UL listed] [listed in FM Approvals' RoofNav]** for roofing system identical to that used for this Project.
- B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.
 - 1. Prior to issuing the roofing contract, ask to receive proof of license with a letter in good standing from the roofing system manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
 - 1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.9 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. Only install what can be completed each day, and make watertight at end of day.



1.10 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.

1. Special warranty includes roof membrane, base flashings, [roof insulation,] [fasteners,] [cover boards,] [substrate board,] [roof pavers,] and other components of roofing system.

Designer Note: WMU requires a minimum 20-year special warranty.

2. Warranty Period: [10] [15] [20] [30] <Insert number> years from Date of Substantial Completion.

B. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering the Work of this Section, including all components of roofing system such as roof membrane, base flashing, [roof insulation,] [fasteners,] [cover boards,] [substrate boards,] [vapor retarders,] [roof pavers,] and [walkway products], for the following warranty period:

1. Warranty Period: [Two] <Insert number> years from Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Installed roofing system 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 flashings shall remain watertight.

1. Accelerated Weathering: Roof membrane shall withstand 2000 hours of exposure when tested according to ASTM G152, ASTM G154, or ASTM G155.
2. Impact Resistance: Roof membrane shall resist impact damage when tested according to ASTM D3746, ASTM D4272, or the Resistance to Foot Traffic Test in FM Approvals 4470.

B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roof membrane manufacturer based on testing and field experience.

C. Wind Uplift Resistance: Design roofing system to resist the following wind uplift pressures when tested according to FM Approvals 4474, UL 580, or UL 1897:

1. Zone 1 (Roof Area Field): <Insert lbf/sq. ft. >.
2. Zone 2 (Roof Area Perimeter): <Insert lbf/sq. ft. >.
 - a. Location: From roof edge to <Insert dimension> inside roof edge.
3. Zone 3 (Roof Area Corners): <Insert lbf/sq. ft. >.
 - a. Location: <Insert dimension> in each direction from building corner.



WMU Design Guidelines

- D. FM Approvals' RoofNav Listing: Roof membrane, base flashings, and component materials shall comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system, and shall be listed in FM Approvals' RoofNav for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals Certification markings.
1. Fire/Windstorm Classification: **[Class 1A-60] [Class 1A-75] [Class 1A-90] [Class 1A-105] [Class 1A-120] <Insert class>**.
 2. Hail-Resistance Rating: **[MH] [SH]**.

Designer Note: For projects seeking LEED certification, include sustainable design requirements as necessary.

- E. <Double click to insert sustainable design text for solar reflectance index.>
- F. ENERGY STAR Listing: Roofing system shall be listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for **[low] [steep]**-slope roof products.
- G. Energy Performance: Roofing system shall have an initial solar reflectance of not less than **[0.70] <Insert value>** and an emissivity of not less than **[0.75] <Insert value>** when tested according to CRRC-1.
- H. Exterior Fire-Test Exposure: ASTM E108 or UL 790, **[Class A] [Class B] [Class C]**; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- I. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.2 ETHYLENE-PROPYLENE-DIENE-TERPOLYMER (EPDM) ROOFING

Designer Notes:

A.1 and B.1: WMU prefers Firestone or Carlisle as the EPDM manufacturer.

A.2 and B.2: WMU requires 60 mil minimum thickness.

A.3 and B.3: WMU prefers black as the exposed face color of the roofing material, though this can be augmented if necessary to meet sustainable design criteria.

A.4 and B.4: For projects seeking LEED certification, include sustainable design requirements as necessary.

- A. EPDM Sheet: ASTM D4637/D4637M, **Type I, non-reinforced, [~~Type II, scrim or fabric internally reinforced,~~] [self-adhering]** EPDM sheet **[with factory-applied seam tape]**.
1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
 2. Thickness: ~~[45 mils]~~ 60 mils **[75 mils] [90 mils] <Insert value>**, nominal.
 3. Exposed Face Color: **Black** ~~[White on black] <Insert color>~~.
 4. <Double click to insert sustainable design text for recycled content.>
 5. Source Limitations: Obtain components for roofing system from **[roof membrane manufacturer] [or] [manufacturers approved by roof membrane manufacturer]**.
- B. Fabric-Backed EPDM Sheet: ASTM D4637/D4637M, Type III, non-reinforced, EPDM sheet, laminated to a nonwoven polyester fabric backing except at selvages **[with factory-applied seam tape]**.
1. <Double click here to find, evaluate, and insert list of manufacturers and products.>



2. Composite Thickness: [90 mils] [100 mils] [105 mils] [115 mils] <Insert value>, nominal.
3. Exposed Face Color: Black [White on black] <Insert color>.
4. <Double click to insert sustainable design text for recycled content.>
5. Source Limitations: Obtain components for roofing system from [roof membrane manufacturer] [or] [manufacturers approved by roof membrane manufacturer].

2.3 AUXILIARY ROOFING MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with other roofing components.
1. Adhesive and Sealants: Comply with VOC limits of authorities having jurisdiction.

Designer Note: For projects seeking LEED certification, include sustainable design text as required.

2. <Double click to insert sustainable design text for VOC content of adhesives and sealants.>
3. <Double click to insert sustainable design text for low-emitting adhesives and sealants.>

- B. Sheet Flashing: 60-mil-thick EPDM, partially cured or cured, according to application.
- C. Protection Sheet: Epichlorohydrin or neoprene nonreinforced flexible sheet, 55 to 60 mils thick, recommended by EPDM manufacturer for resistance to hydrocarbons, non-aromatic solvents, grease, and oil.
- D. Slip Sheet: ASTM D2178/D2178M, Type IV; glass fiber; asphalt-impregnated felt.
- E. Slip Sheet: Manufacturer's standard, of thickness required for application.
- F. Vented Base Sheet: ASTM D4897/D4897M, Type II; nonperforated, asphalt-impregnated fiberglass reinforced, with mineral granular patterned surfacing on bottom surface.
- G. Prefabricated Pipe Flashings: As recommended by roof membrane manufacturer.
- H. Roof Vents: As recommended by roof membrane manufacturer.
1. Size: Not less than 4-inch diameter.

Designer Note: Standard solvent based adhesive or self-adhered sheets are preferred over water based adhesives.

- I. Bonding Adhesive: Manufacturer's standard, [water based].
- J. Modified Asphaltic Fabric-Backed Membrane Adhesive: Roofing system manufacturer's standard modified asphalt, asbestos-free, cold-applied adhesive formulated for compatibility and use with fabric-backed membrane roofing.
- ~~K. Water-Based, Fabric-Backed Membrane Adhesive: Roofing system manufacturer's standard water-based, cold-applied adhesive formulated for compatibility and use with fabric-backed membrane roofing.~~



WMU Design Guidelines

- L. Low-Rise, Urethane, Fabric-Backed Membrane Adhesive: Roof system manufacturer's standard spray-applied, low-rise, two-component urethane adhesive formulated for compatibility and use with fabric-backed membrane roofing.
 - M. Seaming Material: **[Single-component, butyl splicing adhesive and splice cleaner] [Manufacturer's standard, synthetic-rubber polymer primer and 3-inch-wide minimum, butyl splice tape with release film] [Factory-applied seam tape, width as recommended by manufacturer].**
 - N. Lap Sealant: Manufacturer's standard, single-component sealant, **[colored to match membrane roofing].**
 - O. Water Cutoff Mastic: Manufacturer's standard butyl mastic sealant.
 - P. Metal Termination Bars: Manufacturer's standard, predrilled stainless steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.
 - Q. Metal Battens: Manufacturer's standard, aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch wide by 0.05 inch thick, prepunched.
 - ~~R. Ballast Retaining Bar: Perimeter securement system consisting of a slotted extruded aluminum retention bar with an integrated compression fastening strip.~~
 - ~~1. Fasteners: 1 1/2 inch stainless steel fasteners with neoprene washers.~~
 - S. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening components to substrate, and acceptable to roofing system manufacturer.
 - T. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, molded pipe boot flashings, preformed inside and outside corner sheet flashings, reinforced EPDM securement strips, T-joint covers, in-seam sealants, termination reglets, cover strips, and other accessories.
 - 1. Provide white flashing accessories for white EPDM membrane roofing.
 - U. Liquid Coating: Product specifically formulated for coating EPDM membrane roofing, as follows:
 - 1. Type: Acrylic emulsion complying with ASTM D6083.
 - 2. Type: Chlorosulfonated polyethylene complying with ASTM D3468/D3468M.
 - 3. Color: **[White] [Gray] [Tan] [As selected by Architect from manufacturer's full range] <Insert color>.**
- 2.4 SUBSTRATE BOARDS
- A. ~~Substrate Board: ASTM C1396/C1396M, Type X gypsum board.~~
 - ~~1. Thickness: 5/8 inch.~~
 - B. Substrate Board: ASTM C1177/C1177M, glass-mat, water-resistant gypsum board or ASTM C1278/C1278M, fiber-reinforced gypsum board.



1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

Designer Note: Use minimum 1/2-inch thickness or use 5/8-inch thickness depending on application.

2. Thickness: [~~1/4 inch~~] [**1/2 inch**] [**Type X, 5/8 inch**].
3. Surface Finish: [**Factory primed**] [~~Unprimed~~].

~~C. Substrate Board: ASTM C728, perlite board; seal coated.~~

- ~~1. Thickness: [~~3/4 inch~~] [~~1 inch~~].~~

D. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening substrate panel to roof deck.

2.5 VAPOR RETARDER

Designer Note: WMU prefers 6 mil minimum thickness for polyethylene film.

- A. Polyethylene Film: ASTM D4397, [**6 mils**] [**10 mil**] thick, minimum, with maximum permeance rating of [**0.13 perm**] [**0.076 perm**].
 1. Tape: Pressure-sensitive tape of type recommended by vapor retarder manufacturer for sealing joints and penetrations in vapor retarder.
 2. Adhesive: Manufacturer's standard lap adhesive, listed by FM Approvals for vapor retarder application.
- B. Laminated Sheet: Polyethylene laminate, two layers, reinforced with cord grid, with maximum permeance rating of 0.062 perm.
 1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
 2. Tape: Pressure-sensitive tape of type recommended by vapor retarder manufacturer for sealing joints and penetrations in vapor retarder.
- C. Self-Adhering-Sheet Vapor Retarder: ASTM D1970/D1970M, polyethylene film laminated to layer of rubberized asphalt adhesive, minimum 40-mil-total thickness; maximum permeance rating of 0.1 perm; cold applied, with slip-resisting surface and release paper backing. Provide primer when recommended by vapor retarder manufacturer.
- D. Self-Adhering-Sheet Vapor Retarder: Polyethylene film laminated to layer of butyl rubber adhesive, minimum 30-mil-total thickness; maximum permeance rating of 0.1 perm; cold applied, with slip-resisting surface and release paper backing. Provide primer when recommended by vapor retarder manufacturer.
- E. Glass-Fiber Felts: ASTM D2178/D2178M, Type IV, asphalt impregnated.

2.6 ROOF INSULATION

- A. General: Preformed roof insulation boards manufactured [**or approved**] by EPDM roof membrane manufacturer, [**approved for use in FM Approvals' RoofNav-listed roof assemblies**].



WMU Design Guidelines

- B. ~~Extruded Polystyrene Board Insulation: ASTM C578, [Type IV, 1.45-lb/cu. ft. minimum density, 25 psi minimum compressive strength] [Type V, 3.00-lb/cu. ft. minimum density, 100 psi minimum compressive strength] square edged.~~
1. ~~<Double click here to find, evaluate, and insert list of manufacturers and products.>~~
 2. ~~Thermal Resistance: R-value of 5.0 per inch.~~
 3. ~~Size: [48 by 48 inches] [48 by 96 inches].~~
 4. ~~Thickness:~~
 - a. ~~Base Layer: [1-1/2 inches] <Insert thickness>.~~
 - b. ~~Upper Layer: <Insert thickness>.~~
- C. ~~Molded (Expanded) Polystyrene Board Insulation: ASTM C578, Type VIII, 1.15-lb/cu. ft. minimum density, 13 psi minimum compressive strength, square edge.~~
1. ~~<Double click here to find, evaluate, and insert list of manufacturers and products.>~~
 2. ~~Thermal Resistance: R-value of 3.8 per inch.~~
 3. ~~Size: [48 by 48 inches] [48 by 96 inches].~~
 4. ~~Thickness:~~
 - a. ~~Base Layer: [1-1/2 inches] <Insert thickness>.~~
 - b. ~~Upper Layer: <Insert thickness>.~~
- D. ~~Composite Molded (Expanded) Polystyrene Board Insulation: ASTM C578, [Type II, 1.35-lb/cu. ft.] [Type VIII, 1.15-lb/cu. ft.] [Type IX, 1.8-lb/cu. ft.] minimum density, with factory-applied facings, as follows:~~
1. ~~<Double click here to find, evaluate, and insert list of manufacturers and products.>~~
 2. ~~Facer: ASTM C208, Type II, Grade 2, cellulosic fiber insulation board, asphalt coated, 1/2 inch thick.~~
 3. ~~Facer: DOC PS 2, Exposure 1, oriented strand board, 7/16 inch thick.~~
 4. ~~Size: [48 by 48 inches] [48 by 96 inches].~~
 5. ~~Thickness: <Insert thickness>.~~
- E. Polyisocyanurate Board Insulation: ASTM C1289, [**Type II, Class 1, Grade 2**] [**Type II, Class 2, Grade 2**], felt or glass-fiber mat facer on both major surfaces.
1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
 2. Compressive Strength: [**20 psi**] [**25 psi**].
 3. Size: [**48 by 48 inches**] [**48 by 96 inches**].
 4. Thickness:
 - a. Base Layer: [**1-1/2 inches**] <Insert thickness>.
 - b. Upper Layer: <Insert thickness>.
- F. Composite Polyisocyanurate Board Insulation: ASTM C1289, with factory-applied facing board on one major surface, as indicated below by type, and felt or glass-fiber mat facer on the other.
1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
 2. Facer: Type IV, cellulosic-fiber-insulation-board facer, Grade 2, 1/2 inch thick.
 3. Facer: Type V, oriented strand board facer, 7/16 inch thick.
 4. Facer: Type VII, glass-mat-faced gypsum board facer, 1/4 inch thick.
 5. Size: [**48 by 48 inches**] [**48 by 96 inches**].



6. Thickness: <Insert thickness>.

~~G. Perlite Board Insulation: ASTM C728, Type 1, rigid, mineral aggregate thermal insulation board composed of expanded perlite, cellulosic fibers, binders, and waterproofing agents with top surface seal coated.~~

~~1. <Double click here to find, evaluate, and insert list of manufacturers and products.>~~

~~2. Thermal Resistance: R-value of 2.78 per inch.~~

~~3. Size: [48 by 48 inches] [48 by 96 inches].~~

~~4. Thickness:~~

~~a. Base Layer: [1 1/2 inches] <Insert thickness>.~~

~~b. Upper Layer: <Insert thickness>.~~

~~H. Cellulosic Fiber Board Insulation: ASTM C208, Type II, Grade 2, fibrous felted, rigid insulation boards of wood fiber or other cellulosic fiber and water resistant binders, asphalt impregnated, chemically treated for deterioration.~~

~~1. <Double click here to find, evaluate, and insert list of manufacturers and products.>~~

~~2. Thermal Resistance: R-value of 2.78 per inch.~~

~~3. Size: [48 by 48 inches] [48 by 96 inches].~~

~~4. Thickness:~~

~~a. Base Layer: [1 1/2 inches] <Insert thickness>.~~

~~b. Upper Layer: <Insert thickness>.~~

~~I. Cellular Glass Board Insulation: ASTM C552, Type IV, rigid, cellular glass thermal board insulation faced with manufacturer's standard kraft paper sheets.~~

~~1. <Double click here to find, evaluate, and insert list of manufacturers and products.>~~

~~2. Thermal Resistance: R-value of 3.44 per inch.~~

~~3. Size: 24 by 48 inches.~~

~~4. Thickness: <Insert thickness>.~~

~~J. Mineral Wool Insulation — Multi-Density: ASTM C726, Type I, Class 1, comprising monolithic fibrous material having an upper layer of 11.2-lb/cu. ft. density, and a lower layer of 7.5-lb/cu. ft.~~

~~1. Thermal Resistance: R-value of 3.8 per inch.~~

~~2. Size: 48 by 48 inches.~~

~~3. Thickness:~~

~~a. Base Layer: [2 inches] <Insert thickness>.~~

~~b. Upper Layer: <Insert thickness>.~~

~~4. Face Treatment: Bitumen coating.~~

~~K. Mineral Wool Insulation — Single Density: ASTM C726, Type II, Class 1, comprising monolithic fibrous material having 12.5-lb/cu. ft.~~

~~1. Thermal Resistance: R-value of 4.0 per inch.~~

~~2. Size: 48 by 48 inches~~

~~3. Thickness: 1 inch.~~

~~4. Face Treatment: Bitumen coating.~~



WMU Design Guidelines

- L. Tapered Insulation: Provide factory-tapered insulation boards.

Designer Note: WMU prefers polyisocyanurate for tapered insulation if budget allows.

1. Material: **[Match roof insulation]** <Insert material>.
2. Minimum Thickness: 1/4 inch.
3. Slope:
 - a. Roof Field: **[1/4 inch per foot]** <Insert slope> unless otherwise indicated on Drawings.
 - b. Saddles and Crickets: **[1/2 inch per foot]** <Insert slope> unless otherwise indicated on Drawings.

2.7 INSULATION ACCESSORIES

- A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with other roofing system components.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation **[and cover boards]** to substrate, and acceptable to roofing system manufacturer.
- C. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:
1. ~~Modified asphaltic, asbestos free, cold-applied adhesive.~~
 2. Bead-applied, low-rise, one-component or multicomponent urethane adhesive.
 3. Full-spread, spray-applied, low-rise, two-component urethane adhesive.

Designer Note: For projects seeking LEED certification, include sustainable design text where required.

4. <Double click to insert sustainable design text for VOC content of adhesives and sealants.>
5. <Double click to insert sustainable design text for low-emitting adhesives and sealants.>

~~D. Cover Board: ASTM C208, Type II, Grade 2, cellulosic fiber insulation board, 1/2 inch thick.~~

~~E. Cover Board: DOC PS 2, Exposure 1, oriented strand board, 7/16 inch thick.~~

- F. Cover Board: ASTM C1177/C1177M, glass-mat, water-resistant gypsum substrate, or ASTM C1278/C1278M, fiber-reinforced gypsum board.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Thickness: **[1/4 inch]** **[1/2 inch]** **[5/8 inch]**.
3. Surface Finish: **[Factory primed]** **[Unprimed]**.

- G. Cover Board: ASTM C1325, fiber-mat-reinforced cementitious board, 7/16-inch thick.

- H. Cover Board: ASTM C1289 Type II, Class 4, Grade 1, 1/2-inch-thick polyisocyanurate, with a minimum compressive strength of 80 psi.

- I. ~~Protection Mat: Woven or nonwoven polypropylene, polyolefin, or polyester fabric; water permeable and resistant to UV degradation; type and weight as recommended by roofing system manufacturer for application.~~



2.8 ASPHALT MATERIALS

- A. Roofing Asphalt: **[ASTM D312/D312M, Type III or Type IV] [ASTM D6152/D6152M, SEBS modified]**.
- B. Asphalt Primer: ASTM D41/D41M.

2.9 BALLAST

- A. Aggregate Ballast: ~~[Smooth, washed, riverbed gravel or other acceptable smooth-faced stone] [Crushed gravel or crushed stone] that withstands weather exposure without significant deterioration and does not contribute to membrane degradation, of the following size:~~
 - 1. Size: ASTM D448, Size 4, ranging in size from 3/4 to 1-1/2 inches.
 - 2. Size: ASTM D448, Size 2, ranging in size from 1-1/2 to 2-1/2 inches.
 - 3. Size: ASTM D448, Size 3, ranging in size from 1 to 2 inches.
- B. Lightweight Roof Pavers: ~~Interlocking, lightweight concrete units; grooved back, with four-way drainage capability; beveled, doweled, or otherwise profiled; and as follows:~~
 - 1. ~~<Double click here to find, evaluate, and insert list of manufacturers and products.>~~
 - 2. Size: ~~<Insert actual size(s) of pavers>.~~
 - 3. Weight: ~~<Insert weight or weight range>.~~
 - 4. Compressive Strength: ~~[2500 psi] [5000 psi] <Insert value>, minimum.~~
 - 5. Colors and Textures: ~~[As indicated by manufacturer's designations] [Match Architect's samples] [As selected by Architect from manufacturer's full range].~~
- C. Rubber Roof Pavers: ~~Interlocking, lightweight rubber units, 24 by 24 by 2-1/4 inches, 6 lb/sq. ft.; with grooved back for four-way drainage, beveled and doweled; and as follows:~~
 - 1. ~~<Double click here to find, evaluate, and insert list of manufacturers and products.>~~
 - 2. Perimeter Securement Strip: ~~Manufacturer's standard [coated steel sheet channel] [aluminum sheet channel] [mill finish aluminum sheet hold-down] [coated aluminum sheet hold-down, color as selected by Architect,] and fasteners.~~
 - 3. Color: ~~[Black] [Gray] [Terra cotta] <Insert color>.~~
- D. Heavyweight Roof Pavers: ~~Heavyweight, hydraulically pressed concrete units, [square edged] [with top edges beveled 3/16 inch], factory cast for use as roof pavers; absorption not greater than 5 percent, ASTM C140/C140M; no breakage and maximum 1 percent mass loss when tested for freeze-thaw resistance, ASTM C67; and as follows:~~
 - 1. ~~<Double click here to find, evaluate, and insert list of manufacturers and products.>~~
 - 2. Size: ~~[24 by 24 inches] <Insert dimensions>. Manufacture pavers to dimensional tolerances of plus or minus 1/16 inch in length, height, and thickness.~~
 - 3. Weight: ~~[18 lb/sq. ft.] [22 lb/sq. ft.] <Insert value>.~~
 - 4. Compressive Strength: ~~[7500 psi] [6500 psi] <Insert value>, minimum.~~
 - 5. Colors and Textures: ~~[As indicated by manufacturer's designations] [Match Architect's samples] [As selected by Architect from manufacturer's full range].~~



WMU Design Guidelines

2.10 WALKWAYS

- A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway **[pads]** **[or]** **[rolls]**, approximately 3/16 inch thick and acceptable to roofing system manufacturer.
1. Size: Approximately 36 by 60 inches
 2. Color: Contrasting with roof membrane.
- B. Walkway Roof Pavers: Heavyweight, hydraulically pressed concrete units, **[square edged]** **[with top edges beveled 3/16 inch]**, factory cast for use as roof pavers; absorption not greater than 5 percent, ASTM C140/C140M; no breakage and maximum 1 percent mass loss when tested for freeze-thaw resistance, ASTM C67; and as follows:
1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
 2. Size: **[24 by 24 inches]** **<Insert dimensions>**. Manufacture pavers to dimensional tolerances of plus or minus 1/16 inch in length, height, and thickness.
 3. Weight: **[18 lb/sq. ft.] [22 lb/sq. ft.] <Insert value>**.
 4. Compressive Strength: **[7500 psi] [6500 psi] <Insert value>**, minimum.
 5. Colors and Textures: **[As indicated by manufacturer's designations]** **[Match Architect's samples]** **[As selected by Architect from manufacturer's full range]**.

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 surface plane flatness and fastening of steel roof deck complies with requirements in Section 05 3100 "Steel Decking."
 4. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
 5. Verify that concrete substrate is visibly dry and free of moisture, and that minimum concrete internal relative humidity is not more than **[75]** **<Insert number>** percent, or as recommended by roofing system manufacturer when tested according to ASTM F2170.
 - a. Test Frequency: One test probe per each **[1000 sq. ft.] <Insert area>**, or portion thereof, of roof deck, with not less than three test probes.
 - b. Submit test reports within 24 hours of performing tests.
 6. Verify that concrete-curing compounds that will impair adhesion of roofing components to roof deck have been removed.
 7. Verify that joints in precast concrete roof decks have been grouted flush with top of concrete.
 8. Verify that minimum curing period recommended by roof system manufacturer for lightweight insulating concrete roof decks has passed.



9. Verify any damaged sections of cementitious wood-fiber decks have been repaired or replaced.
 10. Verify adjacent cementitious wood-fiber panels are vertically aligned to within 1/8 inch
- 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 system 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. Perform fastener-pullout tests according to roof system manufacturer's written instructions.
1. Submit test result within 24 hours of performing tests.
 - a. Include manufacturer's requirements for any revision to previously submitted fastener patterns required to achieve specified wind uplift requirements.
- D. Install sound-absorbing insulation strips according to acoustical roof deck manufacturer's written instructions.

3.3 ROOFING INSTALLATION, GENERAL

- A. Install roofing system according to roofing system manufacturer's written instructions, FM Approvals' RoofNav assembly requirements, and FM Global Property Loss Prevention Data Sheet 1-29.
- B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.
- C. Install roof membrane and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition [**and to not void warranty for existing roofing system**].
- D. Coordinate installation and transition of roofing system component serving as an air barrier with air barrier specified under [**Section 07 2713 "Modified Bituminous Sheet Air Barriers."**] [**Section 07 2715 "Nonbituminous Self-Adhering Sheet Air Barriers."**] [**Section 07 2726 "Fluid-Applied Membrane Air Barriers."**]

3.4 SUBSTRATE BOARD INSTALLATION

- A. Install substrate board with long joints in continuous straight lines, with end joints staggered not less than 24 inches in adjacent rows.
1. At steel roof decks, install substrate board at right angle to flutes of deck.



WMU Design Guidelines

- a. Locate end joints over crests of steel roof deck.
2. Tightly butt substrate boards together.
3. Cut substrate board to fit tight around penetrations and projections, and to fit tight to intersecting sloping roof decks.
4. Fasten substrate board to top flanges of steel deck according to recommendations in FM Approvals' RoofNav assembly requirements and FM Global Property Loss Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification.
5. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to roofing system manufacturers' written instructions.
6. Loosely lay substrate board over roof deck.

3.5 VAPOR RETARDER INSTALLATION

- A. Polyethylene Film: Loosely lay polyethylene-film vapor retarder in a single layer over area to receive vapor retarder, side and end lapping each sheet a minimum of 2 and 6 inches, respectively.
 1. Extend vertically up parapet walls and projections to a minimum height equal to height of insulation and cover board.
 2. Continuously seal side and end laps with **[tape]** **[adhesive]**.
- B. Laminate Sheet: Loosely lay laminate-sheet vapor retarder in a single layer over area to receive vapor retarder, side and end lapping each sheet a minimum of 2 and 6 inches, respectively.
 1. Extend vertically up parapet walls and projections to a minimum height equal to height of insulation and cover board.
 2. Continuously seal side and end laps with tape.
- C. Self-Adhering-Sheet Vapor Retarder: Prime substrate if required by manufacturer. Install self-adhering-sheet vapor retarder over area to receive vapor retarder, side and end lapping each sheet a minimum of 3-1/2 and 6 inches, respectively.
 1. Extend vertically up parapet walls and projections to a minimum height equal to height of insulation and cover board.
 2. Seal laps by rolling.
- D. Built-Up Vapor Retarder: Install two glass-fiber felt plies lapping each felt 19 inches over preceding felt.
 1. Extend vertically up parapet walls and projections to a minimum height equal to height of insulation and cover board.
 2. Embed each felt in a solid mopping of hot roofing asphalt.
 3. Glaze coat completed surface with hot roofing asphalt.
 4. Apply hot roofing asphalt within plus or minus 25 deg F of equiviscous temperature.
- E. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into roofing system.



3.6 INSULATION INSTALLATION

- A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at end of workday.
- B. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.
- C. Installation Over Metal Decking:
 - 1. Install base layer of insulation with **[joints staggered not less than 24 inches in adjacent rows] [end joints staggered not less than 12 inches in adjacent rows] [and with long joints continuous at right angle to flutes of decking]**.
 - a. Locate end joints over crests of decking.
 - b. 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.
 - c. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 - d. Make joints between adjacent insulation boards not more than 1/4 inch in width.
 - e. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.
 - 1) Trim insulation so that water flow is unrestricted.
 - f. Fill gaps exceeding 1/4 inch with insulation.
 - g. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
 - h. Loosely lay base layer of insulation units over substrate.
 - i. Mechanically attach base layer of insulation **[and substrate board]** using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to metal decks.
 - 1) Fasten insulation according to requirements in FM Approvals' RoofNav for specified Windstorm Resistance Classification.
 - 2) Fasten insulation to resist specified uplift pressure at corners, perimeter, and field of roof.
 - 2. Install upper layers of insulation **[and tapered insulation]** with joints of each layer offset not less than 12 inches from previous layer of insulation.
 - a. Staggered end joints within each layer not less than 24 inches in adjacent rows.
 - b. Install with long joints continuous and with end joints staggered not less than 12 inches in adjacent rows.
 - c. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 - d. Make joints between adjacent insulation boards not more than 1/4 inch in width.
 - e. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.
 - f. Trim insulation so that water flow is unrestricted.
 - g. Fill gaps exceeding 1/4 inch with insulation.
 - h. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
 - i. Loosely lay each layer of insulation units over substrate.



WMU Design Guidelines

- j. Adhere each layer of insulation to substrate using adhesive according to FM Approvals' RoofNav assembly requirements and FM Global Property Loss Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification, as follows:
 - 1) Set each layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.
 - 2) Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
 - 3) Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

D. Installation Over **[Wood] [Wood Panel]** Decking:

- 1. Mechanically fasten slip sheet to roof deck using mechanical fasteners specifically designed and sized for fastening slip sheet to **[wood] [wood panel]** decks.
 - a. Fasten slip sheet according to requirements in FM Approvals' RoofNav for specified Windstorm Resistance Classification.
 - b. Fasten slip sheet to resist specified uplift pressure at corners, perimeter, and field of roof.
- 2. Install base layer of insulation with **[joints staggered not less than 24 inches in adjacent rows] [end joints staggered not less than 12 inches in adjacent rows]**.
 - a. 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.
 - b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 - c. Make joints between adjacent insulation boards not more than 1/4 inch in width.
 - d. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.
 - 1) Trim insulation so that water flow is unrestricted.
 - e. Fill gaps exceeding 1/4 inch with insulation.
 - f. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
 - g. Loosely lay base layer of insulation units over substrate.
 - h. Mechanically attach base layer of insulation **[and substrate board]** using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to **[wood] [wood panel]** decks.
 - 1) Fasten insulation according to requirements in FM Approvals' RoofNav for specified Windstorm Resistance Classification.
 - 2) Fasten insulation to resist specified uplift pressure at corners, perimeter, and field of roof.
- 3. Install upper layers of insulation **[and tapered insulation]** with joints of each layer offset not less than 12 inches from previous layer of insulation.
 - a. Staggered end joints within each layer not less than 24 inches in adjacent rows.



- b. Install with long joints continuous and with end joints staggered not less than 12 inches in adjacent rows.
- c. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
- d. Make joints between adjacent insulation boards not more than 1/4 inch in width.
- e. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.
 - 1) Trim insulation so that water flow is unrestricted.
- f. Fill gaps exceeding 1/4 inch with insulation.
- g. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
- h. Loosely lay each layer of insulation units over substrate.
- i. Adhere each layer of insulation to substrate using adhesive according to FM Approvals' RoofNav assembly requirements and FM Global Property Loss Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification, as follows:
 - 1) Set each layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.
 - 2) Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
 - 3) Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

E. Installation Over Concrete Decks:

- 1. Install base layer of insulation with **[joints staggered not less than 24 inches in adjacent rows] [end joints staggered not less than 12 inches in adjacent rows]**.
 - a. 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.
 - b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 - c. Make joints between adjacent insulation boards not more than 1/4 inch in width.
 - d. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.
 - 1) Trim insulation so that water flow is unrestricted.
 - e. Fill gaps exceeding 1/4 inch with insulation.
 - f. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
 - g. Loosely lay base layer of insulation units over substrate.
 - h. Adhere base layer of insulation to **[concrete roof deck] [vapor retarder]** according to FM Approvals' RoofNav assembly requirements and FM Global Property Loss Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification, as follows:
 - 1) Prime surface of concrete deck with asphalt primer at rate of 3/4 gal./100 sq. ft., and allow primer to dry.
 - 2) Set insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.



WMU Design Guidelines

- 3) Set insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
 - 4) Set insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.
2. Install upper layers of insulation [**and tapered insulation**] with joints of each layer offset not less than 12 inches from previous layer of insulation.
- a. Staggered end joints within each layer not less than 24 inches in adjacent rows.
 - b. Install with long joints continuous and with end joints staggered not less than 12 inches in adjacent rows.
 - c. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 - d. Make joints between adjacent insulation boards not more than 1/4 inch in width.
 - e. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.
 - 1) Trim insulation so that water is unrestricted.
 - f. Fill gaps exceeding 1/4 inch with insulation.
 - g. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
 - h. Loosely lay each layer of insulation units over substrate.
 - i. Adhere each layer of insulation to substrate using adhesive according to FM Approvals' RoofNav assembly requirements and FM Global Property Loss Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification, as follows:
 - 1) Set each layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.
 - 2) Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
 - 3) Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.
- F. Installation Over Cementitious Wood-Fiber Decks:
1. Mechanically fasten slip sheet to roof deck using mechanical fasteners specifically designed and sized for fastening slip sheet to cementitious wood-fiber decks.
 - a. Fasten slip sheet according to requirements in FM Approvals' RoofNav for specified Windstorm Resistance Classification.
 - b. Fasten slip sheet to resist uplift pressure at corners, perimeter, and field of roof.
 2. Install base layer of insulation with [**joints staggered not less than 24 inches in adjacent rows**] [**end joints staggered not less than 12 inches in adjacent rows**].
 - a. 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.
 - b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 - c. Make joints between adjacent insulation boards not more than 1/4 inch in width.



- d. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.
 - 1) Trim insulation so that water flow is unrestricted.
 - e. Fill gaps exceeding 1/4 inch with insulation.
 - f. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
 - g. Loosely lay base layer of insulation units over substrate.
 - h. Adhere base layer of insulation to slip sheet according to FM Approvals' RoofNav assembly requirements and FM Global Property Loss Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification, as follows:
 - 1) Set insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.
 - 2) Set insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
 - 3) Set insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.
3. Install upper layers of insulation [**and tapered insulation**] with joints of each layer offset not less than 12 inches from previous layer of insulation.
- a. Staggered end joints within each layer not less than 24 inches in adjacent rows.
 - b. Install with long joints continuous and with end joints staggered not less than 12 inches in adjacent rows.
 - c. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 - d. Make joints between adjacent insulation boards not more than 1/4 inch in width.
 - e. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.
 - 1) Trim insulation so that water flow is unrestricted.
 - f. Fill gaps exceeding 1/4 inch with insulation.
 - g. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
 - h. Loosely lay each layer of insulation units over substrate.
 - i. Adhere each layer of insulation to substrate using adhesive according to FM Approvals' RoofNav assembly requirements and FM Global Property Loss Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification, as follows:
 - 1) Set each layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.
 - 2) Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
 - 3) Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.
- G. Installation Over Lightweight Insulating Concrete Roof Decks:
- 1. Mechanically fasten vented base sheet to lightweight insulating concrete, with vented side down, using mechanical fasteners specifically designed and sized for fastening to lightweight insulating concrete roof decks.



WMU Design Guidelines

- a. Fasten vented base sheet according to requirements in FM Approvals' RoofNav for specified Windstorm Resistance Classification.
 - b. Fasten vented base sheet to resist uplift pressure at corners, perimeter, and field of roof.
2. Install base layer of insulation with **[joints staggered not less than 24 inches in adjacent rows] [end joints staggered not less than 12 inches in adjacent rows]**.
- a. 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.
 - b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 - c. Make joints between adjacent insulation boards not more than 1/4 inch in width.
 - d. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.
 - 1) Trim insulation so that water flow is unrestricted.
 - e. Fill gaps exceeding 1/4 inch with insulation.
 - f. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
 - g. Loosely lay base layer of insulation units over substrate.
 - h. Adhere base layer of insulation to vented base sheet according to FM Approvals' RoofNav assembly requirements and FM Global Property Loss Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification, as follows:
 - 1) Set insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.
 - 2) Set insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
 - 3) Set insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.
3. Install upper layers of insulation **[and tapered insulation]** with joints of each layer offset not less than 12 inches from previous layer of insulation.
- a. Staggered end joints within each layer not less than 24 inches in adjacent rows.
 - b. Install with long joints continuous and with end joints staggered not less than 12 inches in adjacent rows.
 - c. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 - d. Make joints between adjacent insulation boards not more than 1/4 inch in width.
 - e. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.
 - 1) Trim insulation so that water flow is unrestricted.
 - f. Fill gaps exceeding 1/4 inch with insulation.
 - g. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
 - h. Loosely lay each layer of insulation units over substrate.
 - i. Adhere each layer of insulation to substrate using adhesive according to FM Approvals' RoofNav assembly requirements and FM Global Property Loss



Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification, as follows:

- 1) Set each layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.
- 2) Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
- 3) Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

3.7 INSTALLATION OF COVER BOARDS

- A. 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 in each direction.
1. Trim cover board neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 2. At internal roof drains, conform to slope of drain sump.
 - a. Trim cover board so that water flow is unrestricted.
 3. Cut and fit cover board tight to nailers, projections, and penetrations.
 4. Loosely lay cover board over substrate.
 5. Adhere cover board to substrate using adhesive according to FM Approvals' RoofNav assembly requirements and FM Global Property Loss Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification, as follows:
 - a. Set cover board in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.
 - b. Set cover board in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
 - c. Set cover board in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.
- B. Install slip sheet over cover board and immediately beneath roofing.

3.8 ADHERED ROOFING INSTALLATION

- A. Adhere roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.
- B. Unroll membrane roof membrane and allow to relax before installing.
- C. Start installation of roofing in presence of roofing system manufacturer's technical personnel **[and Owner's testing and inspection agency]**.
- D. Accurately align roof membrane, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.



WMU Design Guidelines

- E. Bonding Adhesive: Apply to substrate and underside of roof membrane at rate required by manufacturer, and allow to partially dry before installing roof membrane. Do not apply to splice area of roof membrane.
- F. Hot Roofing Asphalt: Apply a solid mopping of hot roofing asphalt to substrate at temperature and rate required by manufacturer, and install fabric-backed roofing. Do not apply to splice area of roof membrane.
- G. Fabric-Backed Roof Membrane Adhesive: Apply to substrate at rate required by manufacturer, and install fabric-backed roof membrane.
- H. In addition to adhering, mechanically fasten roof membrane securely at terminations, penetrations, and perimeters.
- I. Apply roof membrane with side laps shingled with slope of roof deck where possible.
- J. Adhesive Seam Installation: Clean both faces of splice areas, apply splicing cement.
 - 1. Firmly roll side and end laps of overlapping roof membrane to ensure a watertight seam installation.
 - 2. Apply lap sealant and seal exposed edges of roofing terminations.
 - 3. Apply a continuous bead of in-seam sealant before closing splice if required by roofing system manufacturer.
- K. Tape Seam Installation: Clean and prime both faces of splice areas, apply splice tape.
 - 1. Firmly roll side and end laps of overlapping roof membrane to ensure a watertight seam installation.
 - 2. Apply lap sealant and seal exposed edges of roofing terminations.
- L. Factory-Applied Seam Tape Installation: Clean and prime surface to receive tape.
 - 1. Firmly roll side and end laps of overlapping roof membrane to ensure a watertight seam installation.
 - 2. Apply lap sealant and seal exposed edges of roofing terminations.
- M. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.
- N. Spread sealant or mastic bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.
- O. Adhere protection sheet over roof membrane at locations indicated.

3.9 SELF-ADHERING ROOFING INSTALLATION

- A. Adhere roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.
- B. Unroll roof membrane and allow to relax before installing.
- C. Start installation of roofing in presence of roofing system manufacturer's technical personnel **[and Owner's testing and inspection agency]**.



- D. Accurately align roof membrane, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- E. Fold roof membrane to expose half of sheet width's bottom surface.
 - 1. Remove release liner on exposed half of sheet.
 - 2. Roll roof membrane over substrate while avoiding wrinkles.
- F. Fold remaining half of roof membrane to expose bottom surface.
 - 1. Remove release liner on exposed half of sheet.
 - 2. Roll roof membrane over substrate while avoiding wrinkles.
- G. In addition to adhering, mechanically fasten roof membrane securely at terminations, penetrations, and perimeter of roofing.
- H. Apply roof membrane with side laps shingled with slope of roof deck where possible.
- I. Adhesive Seam Installation: Clean both faces of splice areas, apply splicing cement.
 - 1. Firmly roll side and end laps of overlapping roof membrane to ensure a watertight seam installation.
 - 2. Apply lap sealant and seal exposed edges of roofing terminations.
 - 3. Apply a continuous bead of in-seam sealant before closing splice if required by roofing system manufacturer.
- J. Tape Seam Installation: Clean and prime both faces of splice areas, apply splice tape.
 - 1. Firmly roll side and end laps of overlapping roof membrane to ensure a watertight seam installation.
 - 2. Apply lap sealant and seal exposed edges of roofing terminations.
- K. Factory-Applied Seam Tape Installation: Clean and prime surface to receive tape.
 - 1. Firmly roll side and end laps of overlapping roof membrane to ensure a watertight seam installation.
 - 2. Apply lap sealant and seal exposed edges of roofing terminations.
- L. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.
- M. Spread sealant or mastic bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.
- N. Adhere protection sheet over roof membrane at locations indicated.

~~3.10 — MECHANICALLY FASTENED MEMBRANE ROOFING INSTALLATION~~

- ~~A. — Mechanically fasten roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.~~
- ~~B. — Unroll roofing membrane and allow to relax before installing.~~



WMU Design Guidelines

- ~~C. For in-splice attachment, install roof membrane with long dimension perpendicular to steel roof deck flutes.~~
- ~~D. Start installation of roofing in presence of roofing system manufacturer's technical personnel [and Owner's testing and inspection agency].~~
- ~~E. Accurately align roof membrane, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.~~
- ~~F. Mechanically fasten or adhere roof membrane securely at terminations, penetrations, and perimeter of roofing.~~
- ~~G. Apply roof membrane with side laps shingled with slope of roof deck where possible.~~
- ~~H. Adhesive Seam Installation: Clean both faces of splice areas, apply splicing cement.
 - ~~1. Firmly roll side and end laps of overlapping roof membrane to ensure a watertight seam installation.~~
 - ~~2. Apply lap sealant and seal exposed edges of roofing terminations.~~
 - ~~3. Apply a continuous bead of in-seam sealant before closing splice if required by roofing system manufacturer.~~~~
- ~~I. Tape Seam Installation: Clean and prime both faces of splice areas, apply splice tape.
 - ~~1. Firmly roll side and end laps of overlapping roof membrane to ensure a watertight seam installation.~~
 - ~~2. Apply lap sealant and seal exposed edges of roofing terminations.~~~~
- ~~J. Factory Applied Seam Tape Installation: Clean and prime surface to receive tape.
 - ~~1. Firmly roll side and end laps of overlapping roof membrane to ensure a watertight seam installation.~~
 - ~~2. Apply lap sealant and seal exposed edges of roofing terminations.~~~~
- ~~K. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.~~
- ~~L. Spread sealant or mastic bed over deck drain flange at roof drains, and securely seal roof membrane in place with clamping ring.~~
- ~~M. In Splice Attachment: Secure one edge of roof membrane using fastening plates or metal battens centered within splice, and mechanically fasten roof membrane to roof deck. Field splice seam.~~
- ~~N. Through Membrane Attachment: Secure roofing using fastening plates or metal battens, and mechanically fasten roof membrane to roof deck. Cover battens and fasteners with a continuous cover strip.~~
- ~~O. Adhere protection sheet over roof membrane at locations indicated.~~



3.11 LOOSELY LAID AND BALLASTED MEMBRANE ROOFING INSTALLATION

- A. Loosely lay roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.
- B. Unroll roof membrane and allow to relax before installing.
- C. Comply with requirements in SPRI RP-4 for [System 1] [System 2] [System 3].
- D. Start installation of roofing in presence of roofing system manufacturer's technical personnel [and Owner's testing and inspection agency].
- E. Accurately align roof membrane, without stretching, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- F. Mechanically fasten or adhere perimeter of roof membrane according to requirements in SPRI RP-4.
- G. [Mechanically fasten] [or] [adhere] roof membrane at corners, perimeters, and transitions according to requirements in SPRI RP-4.
 - 1. At corners and perimeters, omit aggregate ballast leaving roof membrane exposed.
 - 2. At corners and perimeters, adhere a second layer of roof membrane
- H. Apply roof membrane with side laps shingled with slope of deck where possible.
- I. Adhesive Seam Installation: Clean both faces of splice areas, apply splicing cement.
 - 1. Firmly roll side and end laps of overlapping roof membrane to ensure a watertight seam installation.
 - 2. Apply lap sealant and seal exposed edges of roofing terminations.
 - 3. Apply a continuous bead of in-seam sealant before closing splice if required by roofing system manufacturer.
- J. Tape Seam Installation: Clean and prime both faces of splice areas, apply splice tape.
 - 1. Firmly roll side and end laps of overlapping roof membrane to ensure a watertight seam installation.
 - 2. Apply lap sealant and seal exposed edges of roofing terminations.
- K. Factory-Applied Seam Tape Installation: Clean and prime surface to receive tape.
 - 1. Firmly roll side and end laps of overlapping roof membrane to ensure a watertight seam installation.
 - 2. Apply lap sealant and seal exposed edges of roofing terminations.
- L. Leave seams uncovered until inspected by [roofing system manufacturer] [testing agency].
- M. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.
- N. Spread sealant or mastic bed over deck drain flange at roof drains, and securely seal roof membrane in place with clamping ring.



WMU Design Guidelines

- ~~Q. Adhere protection sheet over roof membrane at locations indicated.~~
- ~~P. Install protection mat over roof membrane, overlapping a minimum of 6 inches. Install an additional protection mat layer at projections, pipes, vents, and drains, overlapping a minimum of 12 inches.~~
- ~~Q. Aggregate Ballast: Apply uniformly over roof membrane at the rate required by roofing system manufacturer, but not less than the following, spreading with care to minimize possibility of damage to roofing system. Lay ballast as roof membrane is installed, leaving roof membrane ballasted at end of workday.
 - ~~1. Ballast Weight: Size 4 aggregate, 10 lb/sq. ft..~~
 - ~~2. Ballast Weight: Size 2 aggregate, 13 lb/sq. ft., at corners and perimeter; Size 4 aggregate, 10 lb/sq. ft., elsewhere.~~
 - ~~3. Ballast Weight: Size 2 aggregate, 13 lb/sq. ft..~~
 - ~~4. Ballast Weight: Size 3 aggregate, <Insert weight>, at corners, <Insert weight> at perimeter, and <Insert weight>, elsewhere.~~~~
- ~~R. Roof Paver Ballast: Install [lightweight] [heavyweight] roof paver ballast according to manufacturer's written instructions.~~
- ~~S. Roof Paver Ballast: Install rubber roof paver ballast according to manufacturer's written instructions, in locations indicated.
 - ~~1. Install perimeter paver edge securement.~~~~
- ~~T. Roof Paver and Aggregate Ballast: Install heavyweight roof pavers according to manufacturer's written instructions on roof corners and perimeter.
 - ~~1. Install Size 4 aggregate ballast elsewhere on roof membrane at a minimum rate of 10 lb/sq. ft..~~
 - ~~2. Install Size 2 aggregate ballast elsewhere on roof membrane at a minimum rate of 13 lb/sq. ft..~~~~

3.12 BASE FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.
- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- D. Clean splice areas, apply splicing cement, and firmly roll side and end laps of overlapping sheets to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of sheet flashing terminations.
- E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.



3.13 COATING INSTALLATION

- A. Apply coatings to **[roof membrane]** **[and]** **[base flashings]** according to manufacturer's written recommendations, by spray, roller, or other suitable application method.

3.14 WALKWAY INSTALLATION

- A. Flexible Walkways: Install walkway products according to manufacturer's written instructions.
 - 1. Install flexible walkways at the following locations:
 - a. Perimeter of each rooftop unit.
 - b. Between each rooftop unit location, creating a continuous path connecting rooftop unit locations.
 - c. Between each roof hatch and each rooftop unit location or path connecting rooftop unit locations.
 - d. Top and bottom of each roof access ladder.
 - e. Between each roof access ladder and each rooftop unit location or path connecting rooftop unit locations.
 - f. Locations indicated on Drawings.
 - g. As required by roof membrane manufacturer's warranty requirements.
 - 2. Provide 6-inch clearance between adjoining pads.
 - 3. Adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.
- B. Roof-Paver Walkways: Install walkway roof pavers according to manufacturer's written instructions.
 - 1. Install roof paver walkways at the following locations:
 - a. Perimeter of each rooftop unit.
 - b. Between each rooftop unit location, creating a continuous path connecting rooftop unit locations.
 - c. Between each roof hatch and each rooftop unit location or path connecting rooftop unit locations.
 - d. Top and bottom of each roof access ladder.
 - e. Between each roof access ladder and each rooftop unit location or path connecting rooftop unit locations.
 - f. Locations indicated on Drawings.
 - g. As required by roof membrane manufacturer's warranty requirements.
 - 2. Provide 3 inches of space between adjacent roof pavers.

3.15 FIELD QUALITY CONTROL

- A. Testing Agency: **[Owner will engage]** **[Engage]** a qualified testing agency to inspect substrate conditions, surface preparation, roof membrane application, sheet flashings, protection, and drainage components, and to furnish reports to Architect.
- B. **[Owner will engage a qualified testing agency to perform]** **[Perform]** the following tests:



WMU Design Guidelines

1. Flood Testing: Flood test each roofing area for leaks, according to recommendations in ASTM D5957, after completing roofing and flashing. Install temporary containment assemblies, plug or dam drains, and flood with potable water.
 - a. Perform tests before overlying construction is placed.
 - b. Flood to an average depth of [2-1/2 inches] <Insert depth> with a minimum depth of [1 inch] <Insert depth> and not exceeding a depth of [4 inches] <Insert depth>. Maintain 2 inches of clearance from top of base flashing.
 - c. Flood each area for [24] [48] [72] hours.
 - d. After flood testing, repair leaks, repeat flood tests, and make further repairs until roofing and flashing installations are watertight.
 - 1) Cost of retesting is Contractor's responsibility.
 - e. Testing agency shall prepare survey report indicating locations initial leaks, if any, and final survey report.
2. Infrared Thermography: Testing agency shall survey entire roof area using infrared color thermography according to ASTM C1153.
 - a. Perform tests before overlying construction is placed.
 - b. After infrared scan, locate specific areas of leaks by electrical capacitance/impedance testing or nuclear hydrogen detection tests.
 - c. After testing, repair leaks, repeat tests, and make further repairs until roofing and flashing installations are watertight.
 - 1) Cost of retesting is Contractor's responsibility.
 - d. Testing agency shall prepare survey report of initial scan indicating locations of entrapped moisture, if any.
3. Electrical Capacitance/Impedance Testing: Testing agency shall survey entire roof area for entrapped water within roof assembly according to ASTM D7954/D7954M.
 - a. Perform tests before overlying construction is placed.
 - b. After testing, repair leaks, repeat tests, and make further repairs until roofing and flashing installations are watertight.
 - 1) Cost of retesting is Contractor's responsibility.
 - c. Testing agency shall prepare survey report indicating locations of entrapped moisture, if any.
4. Nuclear Hydrogen Detection Testing: Testing agency shall survey entire roof area for entrapped water within roof assembly according to SPRI/RCI NT-1.
 - a. Perform tests before overlying construction is placed.
 - b. After testing, repair leaks, repeat tests, and make further repairs until roofing and flashing installations are watertight.
 - 1) Cost of retesting is Contractor's responsibility.



- c. Testing agency shall prepare survey report indicating locations of entrapped moisture, if any.
 5. Low-Voltage Electrical Conductance Testing: Testing agency shall survey entire roof area and flashings to locate discontinuity in the roof membrane using **[an exposed metal electrical loop to create an electrical field tested with handheld probes] [or] [a scanning platform with integral perimeter electrical loops creating a complete electrical field]**.
 - a. Perform tests before overlying construction is placed.
 - b. After testing, repair areas of discontinuities, repeat tests, and make further repairs until roofing and flashing installations are contiguous.
 - 1) Cost of retesting is Contractor's responsibility.
 - c. Testing agency shall prepare survey report indicating locations of initial discontinuities, if any.
 6. High-Voltage Spark Testing: Testing agency shall survey entire **[roof area,] [flashings,] [and] [parapet walls]** to locate discontinuity in the roof membrane using an electrically charged metal "broom head."
 - a. Perform tests before overlying construction is placed.
 - b. After testing, repair areas of discontinuities, repeat tests, and make further repairs until roofing and flashing installations are contiguous.
 - 1) Cost of retesting is Contractor's responsibility.
 7. Testing agency shall prepare survey report indicating locations of initial discontinuities, if any.
 - C. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion, in presence of Architect, and to prepare inspection report. [Furnish manufacturer's report within 7 days of written request. Schedule in advance with the key parties, including the Owner, Architect, Manufacturer and Contractor.](#)
 - D. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.
 - E. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.
- 3.16 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 system, inspect roofing system 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.



WMU Design Guidelines

- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

3.17 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: **<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: _____.
7. Warranty Period: **<Insert time>**.
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 Roofing Installer will, at Roofing Installer's 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 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;
 - 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.



WMU Design Guidelines

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.

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

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

END OF SECTION 07 5323