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Johns Manville is providing this specification to the user as a courtesy to utilize in their determination of the optimal system for their project’s specific needs.  By utilizing the general information provided herein, the user agrees such information will not be relied upon as a substitute for professional engineering design and/or documentation required by building code, contract or applicable law. The information in this specification must be reviewed/approved by a project designer before use.  The user of this information assumes sole responsibility for its use of this specification.  Additional information, such as Data Sheets, SDS, Application Guides and other literature on the Johns Manville products used in this specification, can be found https://www.jm.com/en/commercial-roofing/sbs-roofing-systems/.

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SECTION 075216

STYRENE-BUTADIENE-STYRENE (SBS) MODIFIED BITUMINOUS MEMBRANE ROOFING

1. GENERAL
   * + 1. SECTION INCLUDES
          1. SBS-modified bituminous membrane roofing.
          2. Cover board.
          3. Roof insulation.
          4. Vapor retarder.
          5. Base sheet.
          6. Sheathing paper.
          7. Substrate board.
       2. Related Sections
          1. **Division 03 Section “Lightweight Insulating Concrete” for lightweight insulating concrete.**
          2. **Division 03 Section “Concrete” for concrete.**
          3. **Division 05 Section "Steel Decking" for steel roof deck.**
          4. Division 06 Section "Miscellaneous Rough Carpentry" for wood nailers, cants, curbs, and blocking **[and for wood-based, structural-use roof deck panels].**
          5. Division 07 Section "Sheet Metal Flashing and Trim" for flashings and counter flashings.
          6. Division 22 Section "Storm Drainage Piping Specialties" for roof drains.
       3. REFERENCES
          1. Roofing Terminology: Refer to the following publications for definitions of roofing work related terms in this Section:

ASTM D 1079 “Standard Terminology Relating to Roofing and Waterproofing.”

Glossary of NRCA’s “The NRCA Roofing and Waterproofing Manual.”

Roof Consultants Institute “Glossary of Building Envelope Terms.”

International Building Code (IBC)

American Society of Civil Engineers (ASCE-7) Minimum Design Loads for Buildings & Other Structures

* + - * 1. Sheet Metal Terminology and Techniques: SMACNA “Architectural Sheet Metal Manual.”
        2. Hot Roofing Asphalt: Roofing asphalt heated to temperature recommended by roofing manufacturer to flux modified roofing membrane, measured at the mop cart or mechanical spreader immediately before application.
      1. DESIGN Criteria
         1. General: Installed roofing membrane system shall remain watertight; and resist specified wind uplift pressures, thermally induced movement, and exposure to weather without failure.
         2. Material Compatibility: Roofing materials shall be compatible with one another under conditions of service and application required, as demonstrated by roofing system manufacturer based on testing and field experience.
         3. Installer shall comply with current code requirements based on authority having jurisdiction.
         4. Wind Uplift Performance: Roofing system shall meet the intent of systems that have been successfully tested by a qualified testing and inspecting agency to resist wind uplift pressure calculated in accordance with ASCE 7.
         5. FMG Listing: Roofing membrane, base flashings, and component materials shall comply with requirements in FMG 4450 and FMG 4470 as part of a roofing system and that are listed in FMG's “RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FMG markings.

Roofing system shall comply with RoofNav #:

Fire/Windstorm Classification: Class **[1][NC]**A-Insert number

Hail Resistance: [MH] [SH] [VSH]

* + - * 1. 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, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.

Exterior Fire-Test Exposure: Class **[A] [B] [C]**; UL 790, for application and roof slopes indicated.

* + - 1. SUBMITTALS
         1. Product Data: Manufacturer’s data sheets for each product to be provided.
         2. Detail Drawings: Provide roofing system details and details of attachment to other Work, including:

Base flashings and membrane terminations.

Tapered insulation, including slopes.

Crickets, saddles, and tapered edge strips, including slopes.

Insulation fastening and adhesive patterns.

* + - * 1. Verification Samples: Provide for each product specified.
        2. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturers product who is eligible to receive manufacturers special warranty.
        3. Maintenance Data: Refer to Johns Manville’s latest published documents on www.JM.com.
        4. Guarantees: Provide manufacturer’s current guarantee specimen.
        5. Roofing sub-contractor shall provide a copy of the final System Assembly Letter issued by Johns Manville Roofing Systems indicating that the products and system to be installed shall be eligible to receive the specified manufacturer's guarantee when installed by a certified JM contractor in accordance with our application requirements, inspected and approved by a JM Technical Representative.
        6. Prior to roofing system installation, roofing sub-contractor shall provide a copy of the Guarantee Application Confirmation document issued by Johns Manville Roofing Systems indicating that the project has been reviewed for eligibility to receive the specified guarantee and registered.
      1. QUALITY ASSURANCE
         1. Installer Qualifications: Qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product who is eligible to receive the specified manufacturer's guarantee.
         2. Manufacturer Qualifications: Qualified domestic U.S. owned and based manufacturer that has [UL listing] [FMG approval] or accredited testing agency for roofing system identical to that used for this Project.
         3. Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 329.
         4. Test Reports:

Roof drain and leader test or submit plumber’s verification.

Core cut, if required.

Roof deck fastener pullout test, if required.

* + - * 1. Moisture Survey, if Required:

Submit prior to installation, results of a non-destructive moisture test of roof system completed by approved third party. Utilize one of the approved methods:

Infrared Thermography

Nuclear Backscatter

* + - * 1. Source Limitations: Obtain all components from the single source roofing manufacturer guaranteeing the roofing system. All products used in the system shall be labeled by the single source roofing manufacturer issuing the guarantee.
        2. Provide evidence of CERTA training for any installer of torch-applied modified bitumen membrane. Copies of certifications are required prior to award and shall be maintained on the jobsite for inspection at any time.
      1. DELIVERY, STORAGE, AND HANDLING
         1. Deliver roofing materials in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storage.
         2. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer.
         3. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
         4. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.
      2. PROJECT CONDITIONS
         1. Weather Limitations: Proceed with installation only when current and forecasted weather conditions permit roofing system to be installed in accordance with manufacturer's written instructions and guarantee requirements.
      3. guarantee
         1. Provide manufacturer's system guarantee equal to Johns Manville's Peak Advantage No Dollar Limit Roofing System Guarantee.

Single-source special guarantee includes roofing plies, base flashings, liquid applied flashing, roofing membrane accessories, [**roofing membrane**], [**roof insulation**], [**fasteners**], **[adhesives],** [**cover board**], [**substrate board**], [**vapor retarder**], [**base sheet],** [**walkway products**], [**manufacturer’s expansion joints**], [**manufacturer’s edge metal products**], and other approved single-source components of roofing system marketed by the manufacturer.

Guarantee Period: [**10**] [**15**] [**20**] [**25**] [**30**] years from date of Substantial Completion.

Contractor is required to list “**INSERT FIRM NAME**” as the Specifier/Consultant of record in the appropriate fields (“Specifier Account”) when applying for the manufacturer’s warranty.

* + - * 1. Installer’s Guarantee: Submit roofing Installer's guarantee, signed by Installer, covering Work of this Section, including all components of roofing system, for the following guarantee period:

Guarantee Period: [**Two**] [**Five**] years from date of Substantial Completion.

* + - * 1. Existing Guarantees: Guarantees on existing building elements should not be affected by scope of work.

Installer is responsible for coordinating with building owner’s representative to verify compliance.

1. PRODUCTS
   * + 1. Base ply and cap-SHEET MATERIALS
          1. Roofing Membrane Sheet: SBS-modified asphalt sheet; smooth surfaced; suitable for application method specified.

ASTM D 6164, Grade S, Type [I] or [II], polyester-reinforced, Basis of design: **[DynaLastic 180 S] [DynaLastic 250 S] [DynaBase PR] [DynaWeld 180 S] [DynaWeld 250 S] [DynaGrip Base PR SD/SA] [DynaGrip Base PR SA/SA] [DynaGrip Base PR P/SA]**

ASTM D 6163, Grade S, Type [I] or [II], glass-fiber-reinforced, Basis of design: **[DynaBase] [DynaBase XT] [DynaBase HW] [DynaWeld Base] [DynaWeld Base XT]** **[JM CleanBond Utility Sheet]**

ASTM D 6162, Grade S, Type [I]or [III], composite polyester- and glass-fiber-reinforced, Basis of design: **[Dynaply T1] [DynaPly T1 HW] [DynaMax Smooth] [DynaMax FR Smooth] [DynaMax FR Smooth HW] [DynaMax FR Smooth Plus]**

ASTM D 4601, Basis of design: **[DynaGrip Base P/SA] [DynaGrip Base SA/SA] [DynaGrip Base SD/SA] [JM BaseGrip SD/SA] [JM CleanBond Base]**

* + - * 1. Roofing Membrane Cap Sheet: SBS-modified asphalt sheet; granular surfaced; suitable for application method specified.

ASTM D 6164, Grade G, Type [I] or [II], polyester-reinforced, Basis of design: **[DynaLastic 180] [DynaLastic 180 FR] [DynaLastic 180 FR CR G] [DynaLastic 250] [DynaLastic 250 FR] [DynaLastic 250 FR CR G] [DynaWeld Cap 180] [DynaWeld Cap 180 FR] [DynaWeld Cap 250] [DynaWeld Cap 250 FR]] [DynaWeld Cap - 180 FR CR G] [DynaWeld Cap – 250 FR CR G]**

ASTM D 6163, Grade G, Type [I] or [II], glass-fiber-reinforced, Basis of design: **[DynaGlas] [DynaGlas 30 FR] [DynaGlas FR] [DynaGlas FR CR G] [DynaWeld Cap] [DynaWeld Cap FR] [DynaWeld Cap FR CR G] [JM CleanBond Cap] [DynaGlas FR XT] [DynaGlas FR XT CR G] [DynaWeld Cap FR XT] [DynaWeld Cap FR XT CR G]**

ASTM D 6162, Grade G, Type [I] or [III], composite polyester- and glass-fiber-reinforced, Basis of design: **[DynaKap T1] [DynaKap FR T1] [DynaKap FR T1 CR G] [DynaKap FR T1 HW] [DynaKap FR T1 HW CR G] [DynaMax FR] [DynaMax FR CR G] [DynaMax FR HW] [DynaMax FR HW CR G]** **[DynaMax FR Plus]**

Basis of design: **[DynaGrip Cap] [DynaGrip Cap PR]**

* + - 1. FLASHING SHEET MATERIALS
         1. Backer Sheet: ASTM D 4601, Type II, asphalt-impregnated and coated, glass-fiber sheet, dusted with fine mineral surfacing on both sides. Basis of design: PermaPly 28
         2. Backer Sheet**:** SBS-modified asphalt sheet; smooth surfaced; suitable for application method specified.

ASTM D 6164, Grade S, Type I, polyester-reinforced, Basis of design: **[DynaLastic 180 S]** **[DynaWeld 180 S] [DynaBase PR] [DynaGrip Base PR SA/SA] [DrynaGrip Base PR P/SA] [DynaGrip Base PR SD/SA]**

ASTM D 6163, Grade S, Type I, glass-fiber-reinforced, Basis of design: **[DynaBase] [DynaBase HW] [DynaWeld Base] [JM CleanBond Utility Sheet]**

ASTM D 6162, Grade S, Type II, composite polyester- and glass-fiber-reinforced, Basis of design: [DynaPly T1]

[ASTM D 4601], Basis of design: **[DynaGrip Base P/SA] DynaGrip Base SA/SA [DynaGrip Base SD/SA] [JM BaseGrip SD/SA]**

Polyester-reinforced Basis of design: **[JM CleanBond Polyester Base Flashing]**

* + - * 1. Flashing Sheet: SBS-modified asphalt sheet; granular surfaced; suitable for application method specified.

ASTM D 6164, Grade G, Type [I] or [II], polyester-reinforced, Basis of design: **[DynaLastic 180 FR] [DynaLastic 180 FR CR G] [DynaLastic 250 FR] [DynaLastic 250 FR CR G] [DynaWeld Cap 180] [DynaWeld Cap 180 FR] [DynaWeld Cap 250] [DynaWeld Cap 250 FR] [DynaWeld Cap - 180 FR CR G] [DynaWeld Cap – 250 FR CR G]**

ASTM D 6163, Grade G, Type I, glass-fiber-reinforced, Basis of design: **[DynaWeld Cap FR] [DynaWeld Cap FR CR G]**

ASTM D 6162, Grade G, Type I, composite polyester- and glass-fiber-reinforced, Basis of design: **DynaKap FR T1] [DynaKap T1]**

ASTM D 6221, Grade G, Type I, composite polyester- and glass-fiber-reinforced, Basis of design: **[DynaFlex] [DynaFlex CR G]**

ASTM D 6298, embossed aluminum foil surfaced, glass-fiber-reinforced, Basis of design: **[DynaClad] [DynaClad Copper]**

ASTM D 4601, Base of design: **[JM CleanBond Polyester Cap Flashing]**

Base of design: **[DynaGrip Cap] [DynaGrip Cap PR]**

* + - * 1. Liquid Applied Flashing: A liquid and fabric reinforced flashing system created with a stitch bonded polyester scrim and a two-component, moisture cured, elastomeric, liquid applied flashing material, consisting of an asphalt extended urethane base material and an activator. Basis of design: PermaFlash System
        2. High Wall Sheet Flashing Membrane: Basis of Design:

**JM PVC: 60 mils, nominal; internally or scrim reinforced**

**JM TPO: 60 mils, internally or scrim reinforced**

JM EPDM: 60 mils, **[non-reinforced] [internally or scrim reinforced]**

Adhesive Basis of Design: **[JM Membrane Bonding Adhesive (TPO & EPDM)] [JM PVC Membrane Adhesive Low VOC] [All Season Sprayable Bonding Adhesive (TPO & EPDM)]**

* + - 1. AUXILIARY ROOFING Materials
         1. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with built-up roofing.
         2. Roofing Asphalt: ASTM D 312-15, Type IV.
         3. Asphalt Primer: ASTM D 41. Basis of design: JM Asphalt Primer
         4. Asphalt Roofing Cement: ASTM D 4586, type I, asbestos free, of consistency required by roofing system manufacturer for application. Basis of design: MBR Utility Cement
         5. Mastic Sealant: As required by Johns Manville.
         6. Cold-Applied Flashing Adhesive: Roofing system manufacturer's asphalt-based, one-part, asphalt-based, trowel-grade mastic, cold-applied adhesive specially formulated for compatibility and use with flashing applications. Basis of design: MBR Utility Cement
         7. Cold-Applied Adhesive: ASTM D3019, Type III, Grade 2. asphalt-based, asbestos-free, cold-applied adhesive specially formulated for compatibility and use with membrane applications. Basis of design: MBR Cold Application Adhesive
         8. One-part, solvent-free, moisture-curing, elastomeric cold-application adhesive specially formulated for compatibility and use with SBS membrane applications. Basis of design: DynaSet 1k
         9. Cold-Applied Adhesive: Roofing system manufacturer's asphalt-based, two-component, asbestos-free, cold-applied adhesive specially formulated for compatibility and use with membrane applications. Basis of design: MBR Bonding Adhesive
         10. Cold-Applied Adhesive: One-part, elastomeric cold-application adhesive specially formulated for compatibility and use with membrane applications. Basis of design: Premium Cold Application Adhesive
         11. Cold-Applied Flashing Adhesive: Roofing system manufacturer's asphalt-based, two-part, elastomeric, liquid-applied, cold-applied adhesive specially formulated for compatibility and use with flashing applications. Basis of design: MBR Flashing Cement
         12. Fasteners: Factory-coated steel fasteners and metal plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roofing membrane components to substrate, tested by manufacturer for required pullout strength, and provided by the roofing system manufacturer. Basis of design: **[UltraFast Fasteners and Plates] [All Purpose Fasteners and Plates] [High Load Fasteners and Plates]**
         13. Metal Termination Bars: Manufacturer's standard predrilled stainless-steel or aluminum bars, with anchors. Basis of design: JM Termination Systems
         14. Roofing Granules: Ceramic-coated roofing granules matching specified cap sheet, provided by roofing system manufacturer. **[Roofing Granules] [CR Roofing Granules]**
         15. Self-Adhered Primer: One-part penetrating primer solution to enhance the adhesion of self-adhering membranes. Basis of design: **[SA Primer] [SA Primer Low VOC]**
         16. Miscellaneous Accessories: Provide miscellaneous accessories recommended by roofing system manufacturer.
      2. Reflective coating
         1. Elastomeric Coating: ASTM D 6083. A multipurpose, acrylic elastomeric coating for use over a variety of substrates. Basis of design: **[TopGard 4000] [TopGard 5000]**
         2. Elastomeric Coating: ASTM D 6083. A multipurpose, acrylic elastomeric coating for use over a variety of substrates. Basis of design: JM Coating Acrylic
         3. Elastomeric Base Coating: Water borne epoxy formulated base coat, that helps prevent bleed through over asphalt substrates. Basis of design: JM Coating Universal Base
         4. Base Coat: One-part acrylic elastomeric with bleed-blocking properties for coating over asphalt surfaces. Basis of design: TopGard Base Coat.
      3. WALKWAYS
         1. Walkway Pads: Mineral-granule-surfaced, reinforced modified asphalt composition, slip-resisting pads, manufactured as a traffic pad for foot traffic provided by roofing system manufacturer, with a pad size of 32-inch x 32-inch. Basis of design: [DynaTred Walkway]
      4. Cover board
         1. Perlite Board: ASTM C 728, Type **[1] [2] [3**]; composed of expanded perlite, cellulosic fibers, binders and waterproofing agents with top surface seal-coated. Basis of design: **[1/2” Retro-Fit Board] [RetroPlus Roof Board] [3/4” Fesco Board] [1” Fesco Board]** **[1/2" DuraBoard] [3/4" DuraBoard] [1" DuraBoard]**
         2. Gypsum Board:  ASTM C 1177, Heavy duty coated glass-mat facer **[with Eonic primed face]**, water-resistant gypsum substrate for adhered roof applications, **[1/4 inch (6 mm)] [1/2 inch (13 mm)] [5/8 inch (16 mm)]** thick.  Basis of design: **[DEXcell FA Glass Mat Roof Board] [Dens Deck Prime Roof Board]**
         3. Gypsum Fiber Board: ASTM C 1278, non-faced, gypsum and cellulose fiber substrate, **[1/4 inch (6 mm)] [3/8 inch (9.5 mm)] [1/2 inch (13 mm)] [5/8 inch (16 mm)]** thick. Basis of design: Securock Gypsum-Fiber Roof Board
         4. Cement Roof Board:  ASTM C 1325, lightweight cementitious core with fiberglass mesh surfacing and reinforced edges, 7/16 inch (11 mm) thick.  Basis of design: **[DEXcell Cement Roof Board] [Securock Cement Roof Board]**
         5. High-Density Polyisocyanurate: ASTM C 1289, Type II, Class 4, Grade 1, High-density Polyisocyanurate technology bonded in-line to inorganic coated glass facers with greater than 80 lbs of compressive strength. Basis of design: ProtectoR HD

Thickness: 1/2 inch (13 mm)

R-value: 2.5

* + - * 1. Polyisocyanurate Board: ASTM C 1289, Type II, Class **1**, Grade **3 (25 psi)**, polyisocyanurate bonded in-line to inorganic coated glass facer. Basis of design: **[SeparatoR CGF]**
      1. rOOF INSULATION
         1. General: Provide preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.
         2. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class **[1] [2], Grade [2 (20 psi)] [3 (25 psi)],** Basis of design: **[ENRGY 3] [ENRGY 3 25 PSI] [ENRGY 3 CGF] [ENRGY 3 25 PSI CGF]**

Provide insulation package with minimum R Value: **[insert R Value] [minimum required by applicable code].**

Provide insulation package with minimum thickness: [insert thickness].

Provide insulation package in multiple layers.

Minimum Long-Term Thermal Resistance (LTTR): 5.7 per inch.

Determined in accordance with CAN/ULC S770 at 75ºF (24ºC)

* + - 1. Tapered insulation
         1. Tapered Insulation: ASTM C 1289, Type II, Class **[1] [2],** Grade **[2 (20 psi)] [3 (25 psi)],** provide factory-tapered insulation boards fabricated to slope of **[1/4 inch per 12 inches (1:48)]**, unless otherwise indicated. Basis of design: **[Tapered ENRGY 3] [Tapered ENRGY 3 25 PSI] [Tapered ENRGY 3 CGF] [Tapered ENRGY 3 25 PSI CGF]**
      2. INSULATION ACCESSORIES
         1. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.
         2. Provide saddles, crickets, tapered edge strips, and other insulations shapes where indicated for sloping to drain. Fabricate to slopes indicated. Basis of design: Tapered Fesco Edge Strip.
         3. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roof insulation to substrate, and furnished by roofing system manufacturer. Basis of design: **[UltraFast Fasteners and UltraFast Plates] [All Purpose Fasteners and UltraFast Plates] [Lite-Deck Fasteners and Plates]**
         4. Polymer Fasteners: Glass-reinforced nylon fasteners with ¼" square drive and 1” head with Galvalume®\*-coated 3” metal stress plates, designed to lock into the fastener head. Fasteners designed for fastening roof insulation to substrate and furnished by roofing system manufacturer. Basis of design: Polymer Auger Fasteners and Plates
         5. Urethane Adhesive: Manufacturer’s two component polyurethane adhesive formulated to adhere insulation to substrate. Basis of design: **[JM Two-Part Urethane Insulation Adhesive (UIA)] [JM Two-Part Urethane Insulation Adhesive - Canister (UIA)] [JM One-Step Foamable Adhesive] [Roofing Systems Urethane Adhesive (RSUA)]**
         6. Insulation Cant Strips: ASTM C 728, perlite insulation board. Basis of design: FesCant Plus
         7. Wood Nailer Strips: Comply with requirements in Division 06 Section **"**Miscellaneous Rough Carpentry**."**
      3. VAPOR RETARDER
         1. Glass-Fiber Felts: ASTM D 2178, Type IV, asphalt-impregnated, glass-fiber felt. Basis of design: GlasPly IV.
         2. SBS-modified asphalt sheet; smooth surfaced; suitable for application method specified.

ASTM D 6164, Grade S, TypeI, polyester-reinforced, Basis of design: **[DynaLastic 180 S] [DynaBase PR] [DynaWeld 180 S] [DynaGrip Base PRSD/SA]**

ASTM D 6164, Grade S, Type II, polyester-reinforced, Basis of design: **[DynaWeld 250 S] [DynaLastic 250 S]**

ASTM D 6163, Grade S, Type I, glass-fiber-reinforced, Basis of design: **[DynaWeld Base] [DynaBase HW] [DynaBase]**

* + - * 1. Self-Adhered SBS Vapor Retarder: ASTM D 4601, glass-fiber-reinforced], SBS-modified asphalt sheet; sand surfaced; suitable for application method specified. Basis of design: DynaGrip Base SD/SA.
        2. Asphalt Primer: ASTM D 41. Basis of design: Asphalt Primer
        3. Self-Adhered SBS Vapor Retarder: Tri-laminate woven polyethylene, nonslip UV protected top surface; suitable for application method specified. Basis of design: **JM Vapor Barrier SA.**
        4. Self-Adhered SBS Vapor Retarder: Glass-fiber-reinforced, tri-laminate woven polyethylene, nonslip UV protected top surface suitable for application method specified. Minimum thickness of 1.0mm. Basis of design: **JM Vapor Barrier SAR**
        5. Self-Adhered Primer: One-part penetrating primer solution to enhance the adhesion of self-adhering membranes. Basis of design: **[SA Primer] [SA Primer Low VOC] [JM All Season Sprayable Bonding Adhesive]**.
        6. Polyethylene Vapor Retarder: ASTM D 4397, [6 mils (0.15 mm)] [10 mils (0.25 mm)] thick, minimum, with maximum permeance rating of 0.13 perm (7.5 ng/Pa x s x sq. m).
      1. BASE-SHEET MATERIALS
         1. Base Sheet: ASTM D 4601, Type II non-perforated, asphalt-impregnated and -coated, glass-fiber sheet, dusted with fine mineral surfacing on both sides. Basis of design: **[PermaPly 28] [GlasBase Plus]**
         2. Base Sheet: ASTM D 4897, Type II, venting, non-perforated, heavyweight, asphalt-impregnated and -coated, glass-fiber base sheet with coarse granular surfacing or embossed venting channels on bottom surface. Basis of design: Ventsulation Felt
         3. SBS Modified Base Sheet: [ASTM D 6164, Grade S, Type [I] or [II] polyester-reinforced], SBS-modified asphalt sheet; smooth surfaced; suitable for application method specified. Basis of design: **[DynaLastic 180 S] [DynaFast 180 HW] [DynaFast 180 S] [DynaFast 250 HW]**
         4. Base-Sheet Fasteners: Twin legged factory-coated steel fasteners and Galvalume metal plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening base-sheet to substrate, tested by manufacturer for required pullout strength, and provided by the roofing system manufacturer. Product: Lightweight Concrete (LWC) Base Sheet Fasteners
         5. Base-Sheet Fasteners: Tube, disk and locking staple design**,** factory-coated steel fasteners and Galvalume metal battens meeting corrosion-resistance provisions in FMG 4470, designed for fastening base-sheet to substrate, tested by manufacturer for required pullout strength, and provided by the roofing system manufacturer. Product: UltraLok Locking Impact Fastener
         6. Base Sheet 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 provided by the roofing system manufacturer. Basis of design: **[High Load Fasteners and High Load Plates] [ All Purpose Fasteners and High Load Plates.]**
         7. Base Sheet Fasteners: 32 gauge, 1-5/8” diameter tin caps with 11-gauge annular ring shank nails.
      2. SUBSTRATE BOARD
         1. Gypsum Board:  ASTM C 1177, coated glass-mat facer, water-resistant gypsum substrate for mechanically attached roof applications, **[1/4 inch (6 mm)] [1/2 inch (13 mm)] [5/8 inch (16 mm)]** thick. Basis of design: [**Securock Ultralight Glass-Mat Roof Board ] [DEXcell Glass Mat Roof Board] [Dens Deck Roof Board]**
         2. Gypsum Board:  ASTM C 1177, Heavy duty coated glass-mat facer, water-resistant gypsum substrate for adhered roof applications, **[1/4 inch (6 mm)] [1/2 inch (13 mm)] [5/8 inch (16 mm)]** thick.  Basis of design: **[DEXcell FA Glass Mat Roof Board] [Dens Deck Prime Roof Board]**
         3. Gypsum Fiber Board: ASTM C 1278, non-faced, gypsum and cellulose fiber substrate, **[1/4 inch (6 mm)] [3/8 inch (9.5 mm)] [1/2 inch (13 mm)] [5/8 inch (16 mm)]** thick. Basis of design: Securock Gypsum-Fiber Roof Board
         4. High-Density Polyisocyanurate: ASTM C 1289, Type II, Class 4, Grade 1, High-density Polyisocyanurate technology bonded in-line to inorganic coated glass facers with greater than 80 lbs of compressive strength. Basis of design: ProtectoR HD

Thickness: 1/2 inch (13 mm)

R-value: 2.5

* + - 1. Sheathing Paper
         1. Sheathing Paper: Red-rosin type, minimum 3 lb/100 sq. ft. (0.16 kg/sq. m).
      2. EDGE METAL Components
         1. Expansion Joints: Provide factory fabricated weatherproof, exterior covers for expansion joint openings consisting of flexible rubber membrane, supported by a closed cell foam to form flexible bellows, with two metal flanges, adhesively and mechanically combined to the bellows by a bifurcation process. Provide product from single-source roofing system supplier that is included in the No Dollar Limit guarantee. Basis of design: **[Expand-O-Flash] [Expand-O-Gard]**
         2. Coping System: Manufacturer’s factory fabricated coping consisting of a base piece and a snap-on cap. Provide product from single-source roofing system supplier that is included in the No Dollar Limit guarantee. Basis of design: **[Presto-Lock Coping] [Presto-Lock Gold Coping]**
         3. Shop-Fabricated Edge Metal: Custom-fabricated edge metal meeting the criterion of ANSI/SPRI ES-1. Must be approved by manufacturer technical representative. Minimum requirements:

Steel: 24 gauge minimum, fastened 6 inches on center.

Aluminum: 0.05 inch thick, fastened 6 inches on center.

* + - * 1. Metal Flashing Sheet: Metal flashing sheet is specified in Division 07 Section "Sheet Metal Flashing and Trim."
        2. Roof Edge Drainage Systems: Gutter Systems: Manufactured in section lengths not exceeding 12 feet with 0.100-inch mill aluminum internal Gutter Hangers, 24 inches on center, and 2-inch-wide formed external wind straps 6’-0” on center

1. EXECUTION
   * + 1. EXAMINATION
          1. Examine substrates, areas, and conditions for compliance with the requirements affecting performance of roofing system.

General:

Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.

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.

Steel Decks:

Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Division 05 Section "Steel Decking."

Verify that decking is visibly dry and free of moisture.

Verify that the decking is smooth and free of large cracks, holes, or sharp changes in elevation of the surface.

When applicable perform pull test with the specific fastener being used on the project to confirm the fastener resistance meets the requirements for that particular system.

Existing Standing Seam and Light Gauge Decks:

Verify that decking is visibly dry and free of moisture.

Verify that the decking is smooth and free of large cracks, holes or sharp changes in elevation of the surface.

When applicable perform pull test with the specific fastener being used on the project to confirm the fastener resistance meets the requirements for that particular system.

Provide documentation of pull-out resistance values in accordance with ANSI/SPRI FX-1 2016.

Concrete Decks:

Verify that concrete curing compounds that will impair adhesion of roofing components to roof deck have been removed.

Verify that concrete substrate is visibly dry and free of moisture.

Wood Decks:

Verify that wood decking is visibly dry and free of moisture.

Verify that wood has ability to provide minimum fastener pull-out resistance.

Provide documentation of pull-out resistance values in accordance with ANSI/SPRI FX-1 2016.

Cementitious Wood Fiber Decks (Tectum):

Verify that cementitious wood fiber substrate is visibly dry and free of moisture.

Verify that cementitious wood fiber has ability to provide minimum base sheet fastener pull-out resistance.

Provide documentation of pull-out resistance values in accordance with ANSI/SPRI FX-1 2016.

Provide documentation of adhesion resistance values in accordance with ANSI/SPRI 1A-1 2015.

Lightweight Insulating Concrete:

Verify that lightweight insulating concrete substrate is visibly dry and free of moisture.

Verify that lightweight insulating concrete has ability to provide minimum base sheet fastener pull-out resistance.

Provide documentation of adhesion resistance values in accordance with ANSI/SPRI 1A-1 2015.

Gypsum Deck:

Verify that gypsum is visibly dry, free of moisture, and that there are no signs of staining.

Inspect deck for cracking and deflection of bulb tees.

Verify that gypsum has ability to provide minimum fastener pull-out resistance.

Provide documentation of pull-out resistance values in accordance with ANSI/SPRI FX-1 2016.

Provide documentation of adhesion resistance values in accordance with ANSI/SPRI 1A-1 2015

Ensure general rigidity and proper slope for drainage.

Verify that deck is securely fastened with no projecting fasteners and with no adjacent units more than 1/16 inch (1.6 mm) out of plane relative to adjoining deck.

* + - * 1. Unacceptable panels should be brought to the attention of the General Contractor and Project Owner’s Representative and shall be corrected prior to installation of roofing system.
        2. Proceed with installation only after unsatisfactory conditions have been corrected.
      1. PREPARATION
         1. Clean and remove from substrate sharp projections, dust, debris, moisture, and other substances detrimental to roofing installation in accordance with roofing system manufacturer's written instructions.
         2. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction.
         3. If applicable, prime surface of deck with primer at a rate recommended by roofing manufacturer and allow primer to dry.
         4. Proceed with each step of installation only after unsatisfactory conditions have been corrected.
      2. Re-roof Preparation
         1. Remove all roofing membrane, surfacing, coverboards, insulation, fasteners, asphalt, pitch, adhesives, etc.

Remove an area no larger than can be re-roofed in one day.

* + - * 1. Tear out all base flashings, counterflashings, pitch pans, pipe flashings, vents, sumps, and like components necessary for application of new membrane.
        2. Remove abandoned equipment curbs, skylights, smoke hatches, and penetrations.

Install decking to match existing as directed by Owner's Representative.

* + - * 1. Raise (disconnect by licensed craftsmen, if necessary) all HVAC units and other equipment supported by curbs to conform with the following:

Modify curbs as required to provide a minimum 8" base flashing height measured from the surface of the new membrane to the top of the flashing membrane.

Secure of flashing and install new metal counterflashing prior to re-installation of unit.

Perimeter nailers shall be elevated to match elevation of new roof insulation.

* + - * 1. Immediately remove all debris from roof surface. Demolished roof system may not be stored on the roof surface.
      1. Re-cover Preparation
         1. Prepare existing roof according to roofing system manufacturer's written instructions, applicable recommendations of the roofing manufacturer, and requirements in this Section.
         2. Tear out all base flashings, counterflashings, pitch pans, pipe flashings, vents, sumps, and like components necessary for application of new membrane.
         3. Disable existing roof membrane per manufacturer’s written instruction.
         4. Remove existing membrane per manufacturer’s written instructions.
         5. Remove and replace wet, deteriorated or damaged roof insulation and decking as identified in moisture survey.
         6. Remove abandoned equipment curbs, skylights, smoke hatches, and penetrations. Install decking to match existing as directed by Owner's Representative.
         7. Raise, (disconnect by licensed craftsmen, if necessary) all HVAC units and other equipment supported by curbs to conform with the following:

Modify curbs as required to provide a minimum 8-inch base flashing height measured from the surface of the new membrane to the top of the flashing membrane.

Secure top of flashing and install new metal counterflashing prior to re-installation of unit.

Perimeter nailers shall be elevated to match elevation of new roof insulation.

* + - * 1. Immediately remove all debris from roof surface. Demolished roof system may not be stored on the roof surface.
      1. SUBSTRATE BOARD INSTALLATION
         1. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.
         2. Mechanically Fastened Substrate Board: Install substrate board and secure to deck using mechanical fasteners designed and sized for fastening specified substrate board to deck type.

Fasten substrate board to top flanges of steel deck according to recommendations in FMG's "Approval Guide" for specified Windstorm Resistance Classification.

Fasten substrate board to **[**top flanges of steel deck] [wood deck] to resist uplift pressure at corners, perimeter, and field of roof per roofing system manufacturer's written instructions.

* + - * 1. Loose Laid Substrate Board: Loose lay substrate board, staggering joints with insulation board substrate.
        2. Adhered Substrate Board: Adhere substrate board to substrate as follows:

Install in a two-part urethane adhesive according to roofing system manufacturer’s instruction.

Install to resist uplift pressure at corners, perimeter, and field of roof.

* + - 1. Sheathing Paper INSTALLATION
         1. Loosely lay sheathing paper in a single layer over all **[wood]** deck areas, side and end lapping each sheet a minimum of 2 inches and 6 inches, respectively.

Seal side and end laps with [**tape**] [**adhesive**].

* + - 1. Base-sheet installation
         1. Install one lapped base sheet course and mechanically fasten to substrate per roofing system manufacturer's written instructions.

Enhance fastening rate in perimeter and corner zones per code requirements, wind uplift system approvals or manufacturer’s guarantee requirements, whichever is more stringent.

* + - * 1. Comply with roofing system manufacturer's written instructions for installing roof insulation.
      1. VAPOR-RETARDER INSTALLATION
         1. Install polyethylene-sheet vapor retarder as a loosely laid single layer over area to receive vapor retarder, side and end lapping each sheet a minimum of 2 inches (50 mm) and 6 inches (150 mm), respectively.

Seal side and end laps.

* + - * 1. Install 2 glass-fiber felt plies lapping each sheet 19 inches (483 mm) over preceding sheet.  Embed each sheet in a solid mopping of hot roofing asphalt per manufacturer’s written instructions.
        2. Install modified bituminous vapor retarder sheet per roofing manufacturer's written instructions, starting at low point of roofing system. Extend roofing membrane sheets over and terminate beyond cants, installing as follows:

Unroll roofing membrane sheets and allow them to relax for minimum time required by manufacturer.

**Heat weld vapor retarder to substrate per roofing system manufacturer’s written instructions.**

**Adhere vapor retarder in a full mopping of hot asphalt to substrate per roofing system manufacturer’s written instructions.**

**Self-adhere vapor retarder to substrate per roofing system manufacturer’s written instructions.**

**Adhere vapor retarder in ribbons to substrate per roofing system manufacturer's written instructions.**

* + - * 1. 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.

Repair tears and voids in laps and lapped seams not completely sealed.

* + - * 1. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into membrane roofing system.
      1. INSULATION INSTALLATION
         1. Coordinate installation of roof system components so insulation and cover board are not exposed to precipitation or left exposed at the end of the workday.
         2. Comply with roofing system manufacturer's written instructions for installation of roof insulation and cover board.
         3. Install tapered insulation under area of roofing to conform to slopes indicated.
         4. Install insulation boards with long joints in a continuous straight line. Joints should be staggered between rows, abutting edges and ends per manufacturer’s written instructions. Fill gaps exceeding 1/4 inch (6 mm) with like material.
         5. 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.
         6. Trim surface of insulation boards where necessary at roof drains so completed surface is flush and does not restrict flow of water.
         7. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.
         8. **Preliminarily Fastened Insulation [for Mechanically Fastened Membrane Systems]: Install insulation with fasteners at rate required by roofing system manufacturer or applicable authority, whichever is more stringent.**

**Fasten top layer to resist uplift pressure at corners, perimeter, and field of roof.**

* + - * 1. **Adhered Insulation: Adhere each layer of insulation to substrate as follows:**

**Install each layer in a solid mopping of hot roofing asphalt according to roofing system manufacturer’s instruction.**

**Install each layer using a cold fluid-applied adhesive according to roofing system manufacturer’s instruction.**

**Install each layer in a two-part urethane adhesive according to roofing system manufacturer’s instruction.**

**Install each layer to resist uplift pressure at corners, perimeter, and field of roof.**

* + - * 1. **Loose Laid Insulation with Top Insulation Layer Mechanically Fastened: Loose lay insulation with staggered joints and secure top layer of insulation to deck using mechanical fasteners designed and sized for fastening specified board-type to deck type.**

**Fasten top layer according to requirements in FMG's "Approval Guide" for specified Windstorm Resistance Classification.**

**Fasten top layer to resist uplift pressure at corners, perimeter, and field of roof.**

* + - * 1. **Loose Laid Insulation: Loose lay all layers of insulation with staggered joints.**
        2. **Mechanically Fastened with Subsequent Layers Adhered Insulation: Secure first layer of insulation to deck using mechanical fasteners designed and sized for fastening specified board-type to deck type.**

Fasten top layer according to requirements in FMG's "Approval Guide" for specified Windstorm Resistance Classification.

**Install subsequent layers in a two-part urethane adhesive according to roofing system manufacturer’s instruction.**

**Install subsequent layers in a hot asphalt according to roofing system manufacturer’s instruction.**

**Install each layer to resist uplift pressure at corners, perimeter, and field of roof.**

* + - 1. Cover board installation
         1. Coordinate installing membrane roofing system components so cover board is not exposed to precipitation or left exposed at the end of the workday.
         2. Comply with membrane roofing system manufacturer's written instructions for installing roof cover board.
         3. Install cover board with long joints in a continuous straight line. Joints should be staggered between rows, abutting edges and ends per manufacturer’s written instructions. Fill gaps exceeding 1/4 inch (6 mm) with cover board.

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

* + - * 1. Trim surface of cover board where necessary at roof drains so completed surface is flush and does not restrict flow of water.

Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.

* + - * 1. **Preliminarily Fastened Cover Board for Mechanically Fastened Systems: Install cover board with fasteners at rate required by roofing system manufacturer or applicable authority.**
        2. **Adhered Cover Board: Adhere cover board to substrate as follows:**

**Install in a solid mopping of hot roofing asphalt according to roofing system manufacturer’s instruction.**

**Install using a cold fluid-applied adhesive according to roofing system manufacturer’s instruction.**

**Install in a two-part urethane adhesive according to roofing system manufacturer’s instruction.**

**Install to resist uplift pressure at corners, perimeter, and field of roof.**

* + - * 1. **Mechanically Fastened Cover Board: Install cover board and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof cover board to deck type.**

**Fasten according to requirements in FMG's "Approval Guide" for specified Windstorm Resistance Classification.**

**Fasten to resist uplift pressure at corners, perimeter, and field of roof.**

* + - 1. ROOFING MEMBRANE INSTALLATION, GENERAL
         1. Install roofing membrane in accordance with roofing system manufacturer's written instructions, applicable recommendations of the roofing manufacturer and requirements in this Section.
         2. Cooperate with testing and inspecting agencies engaged or required to perform services for installing roofing system.
         3. Where roof slope exceeds 1/2 inch per 12 inches (1:24), contact the membrane manufacturer for installation instructions regarding installation direction and backnailing
         4. 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 imminent.

Provide tie-offs at end of each day's work to cover exposed roofing membrane sheets and insulation.

Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.

Remove and discard temporary seals before beginning work on adjoining roofing.

* + - * 1. Asphalt Heating: Heat roofing asphalt to temperature recommended by roofing manufacturer to flux modified membrane. Do not exceed roofing asphalt manufacturer's recommended temperature limits during roofing asphalt heating. Discard roofing asphalt maintained at a temperature exceeding finished blowing temperature for more than 4 hours.
        2. Substrate-Joint Penetrations: Prevent roofing asphalt from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.
      1. SBS-MODIFIED BITUMINOUS MEMBRANE INSTALLATION
         1. Install [**base sheet**], [one] [two] modified bituminous roofing [membrane sheet[**s**], **[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, with the following installation method:

Unroll roofing membrane sheets and allow them to relax.

Install one lapped base sheet course and mechanically fasten to substrate according to roofing system manufacturer's written instructions.

Enhance fastening rate in perimeter and corner zones according to code or manufacturer, whichever is more stringent.

Side and end laps shall be installed using heat welding techniques.

Fasteners in field of sheets shall be stripped in per manufacturer’s requirements prior to installing cap sheet.

Self-adhered **[modified bituminous roofing membrane [base] [and] [cap] sheet]** to substrate according to roofing system manufacturer’s instruction.

Adhere **[modified bituminous roofing membrane[base] [and] [cap] sheet]** to substrate in a solid mopping of hot roofing asphalt applied at temperatures recommended by roofing system manufacturer.

Adhere **[modified bituminous roofing membrane [base] [and] [cap] sheet]** to substrate in cold-applied adhesive according to roofing system manufacturer’s instruction.

Heat weld **[modified bituminous roofing membrane [base] [and] [cap] sheet]** to substrate according to roofing system manufacturer’s instruction.

* + - * 1. 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.

Repair tears and voids in laps and lapped seams not completely sealed.

As required, apply roofing granules to cover exuded bead at laps while bead is hot.

* + - * 1. Install roofing membrane sheets so side and end laps shed water.
      1. FLASHING AND STRIPPING INSTALLATION
         1. 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:

Prime substrates with asphalt primer if required by roofing system manufacturer.

**Backer Sheet Application: Mechanically fasten backer sheet to walls or parapets.**

**Backer Sheet Application: Adhere backer sheet to substrate in a solid mopping of hot roofing asphalt.**

**Backer Sheet Application: Adhere backer sheet to substrate in approved adhesive applied at rate required by roofing system manufacturer.**

**Backer Sheet Application: Heat Weld backer sheet to substrate as required by roofing system manufacturer.**

**Backer Sheet Application: Self-adhere backer sheet to substrate as required by roofing system manufacturer.**

**Flashing Sheet Application: Adhere flashing sheet to substrate in a solid mopping of hot roofing asphalt. Apply hot roofing asphalt to back of flashing sheet as required by roofing system manufacturer.**

**Flashing Sheet Application: Adhere flashing sheet to substrate in approved adhesive applied at rate required by roofing system manufacturer.**

**Flashing Sheet Application: Heat weld flashing sheet to substrate as required by roofing system manufacturer.**

**Flashing Sheet Application: Self-adhere backer sheet to substrate as required by roofing system manufacturer.**

* + - * 1. Extend base flashing up walls or parapets 8 inches (200 mm) above roofing membrane. Refer to manufacturer's standard flashing details.
        2. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing.

Seal top termination of base flashing with a strip of glass-fiber fabric set in MBR Flashing cement.

* + - * 1. Roof Drains: Set [30-by-30-inch (760-by-760-mm)] <Insert size> 4 lb lead flashing sheet in a bed of MBR Flashing Cement on completed roofing membrane. Cover metal flashing with roofing membrane cap-sheet stripping and extend a minimum of 4 inches (100 mm) beyond edge of metal flashing onto field of roofing membrane. Clamp roofing membrane, metal flashing, and stripping into roof-drain clamping ring.
        2. Roof Drains: Flash drain using liquid applied flashing system. Clamp roofing membrane, flashing, and stripping into roof-drain clamping ring.

Install stripping according to roofing system manufacturer's written instructions.

* + - * 1. Flash all penetrations using liquid applied flashing system.
      1. Edge Metal Installation
         1. Examine substrates and conditions under which sheet metal flashing and trim are to be installed and verify that work may properly commence. Do not proceed with installation until unsatisfactory conditions have been corrected.
         2. Provide edge details as indicated on the Drawings. Install in accordance with the membrane manufacturer's requirements and SMACNA's "Architectural Sheet Metal Manual."
         3. Join individual sections in accordance with the membrane manufacturer's requirements and SMACNA's "Architectural Sheet Metal Manual”.
      2. Coating Installation
         1. Ensure that all surfaces are clean, dry and free of any dirt, grease, oil or other debris that may interfere with proper adhesion.
         2. Apply coating to roofing membrane and base flashings as recommended by the manufacturer. Apply in two coats allowing the first coat to completely dry before applying the second coat.
      3. WALKWAY INSTALLATION
         1. Walkway Pads: Install walkway pads using units of size indicated or, if not indicated, of manufacturer's standard size according to walkway pad manufacturer's written instructions.

Sweep away loose aggregate surfacing and set walkway pads in additional **[flood coat of hot roofing asphalt] [cold applied adhesive]**.

* + - * 1. Walkway Cap Sheet Strips: Install roofing membrane walkway cap sheet strips over roofing membrane **[in hot roofing asphalt] [in cold-applied adhesive] [by heat weld application]**.
        2. Roof-Paver Walkways: Install walkway roof pavers according to manufacturer's written instructions in locations indicated, to form walkways.
      1. FIELD QUALITY CONTROL
         1. Owner will engage a qualified independent testing and inspecting agency to perform roof tests and inspections and to prepare test reports.
         2. Final Roof Inspection: Arrange for roofing system manufacturer's technical representative to inspect roofing installation on completion and submit report to Architect.
         3. Repair or remove and replace components of roofing system where test results or inspections indicate that they do not comply with specified requirements.
         4. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
      2. PROTECTION AND CLEANING
         1. Protect roofing system from damage and wear during remainder of construction period.
         2. 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.
         3. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 075216