ADDENDUM NO. 1

April 25, 2025

Niemann Elementary School Roofing Maintenance Project
Michigan City, Indiana

TO: ALL BIDDERS OF RECORD

This Addendum forms a part of and modifies the Bidding Requirements, Contract Forms, Contract Conditions, the Specifications, and the Drawings dated April 22, 2025. Acknowledge receipt of the Addendum in the space provided on the Bid Form. Failure to do so may subject the Bidder to disqualification.

This Addendum consists of Pages ADD 1-1 and attached replacement Specification Section 07 53 23 – ETHYLENE-PROPYLENE-DIENE-MONOMER (EPDM) ROOFING.

A. SPECIFICATION SECTION 00 00 10 – TITLE PAGE

1. **Replace:**

   With the attached Title Page.

B. SPECIFICATION SECTION 07 53 23 - ETHYLENE-PROPYLENE-DIENE-MONOMER (EPDM) ROOFING

1. **Replace:**

   With the attached Specification Section.

PROJECT MANUAL VOLUME I

PROJECT:	Neimann Elementary School Roofing Maintenance Project 811 Royal Road Michigan City, IN 46360
TSC PROJECT NO.:	224000.02
OWNER:	Michigan City Area Schools 408 South Carroll Avenue Michigan City, IN 46360
DATED:	April 22, 2025
PRE-BID CONFERENCE/SITE EXAMINATION:	April 30, 2025 at 11:00AM (CST) at Neimann Elementary School 811 Royal Road Michigan City, IN 46360
BIDS RECEIVED:	May 14, 2025 at 11:00AM (CST) Michigan City Area Schools – Administration Building 408 South Carroll Avenue Michigan City, IN 46360
BIDDERS' CONTACTS:	**CONSTRUCTION MANAGER:** The Skillman Corporation 8006 Aetna Street Merrillville, IN 46410 Sr. Project Manager: Chris Muvceski Phone: 219-472-9944 Email: cmuvcesi@skillman.com

SECTION 07 53 23 - ETHYLENE-PROPYLENE-DIENE-MONOMER (EPDM) ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section may include the following:

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

1.2 REFERENCES

A. American Society of Civil Engineers: Document ASCE 7, Minimum Design Loads for Buildings and Other Structures.

B. American Society of Testing and Materials (ASTM)
1. ASTM C168 – Standard Terminology Relating to Thermal Insulation.
2. ASTM C177 – Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
3. ASTM C209 – Methods of Testing Insulating Board, Structural and Decorative.
4. ASTM C518 – Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
5. ASTM C1289 – Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
6. ASTM C1303 – Standard Test Method for Estimating the Long Term Change in the Thermal Resistance of Unfaced Closed Cell Plastic Foams by Slicing and Scaling Under Controlled Laboratory Conditions.
7. ASTM D1079 – Standard Terminology Related to Roofing and Waterproofing.
8. ASTM D1621 – Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
9. ASTM D2126 – Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
10. ASTM D2842 – Standard Test Method for Water Absorption for Rigid Cellular Plastics.
11. ASTM E84 – Flame spread.
12. ASTM E96 – Water vapor transmission.
13. ASTM E108 – Spread of Flame.

C. National Roofing Contractors Association (NRCA) – Roofing and Waterproofing Manual.

D. Sheet Metal and Air Conditioning Contractors National Association, Inc., (SMACNA) – Architectural Sheet Metal Manual.

E. Underwriters Laboratories (UL) – Roofing Materials and Systems Annual Directory.

F. National Fire Protection Association (NFPA): NFPA 241-Safeguarding Building Construction Operations.

G. Environmental Protection Agency (EPA): EPA Method 9045.

1.3 DEFINITIONS

A. Roofing Terminology: Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

B. Positive Drainage: The drainage condition in which consideration has been made during design for all loading deflections of the deck, and additional roof slope has been provided to ensure drainage of the roof area within 48 hours of rainfall, during ambient drying conditions.

C. Roof System: A system of interacting roof components generally consisting of a membrane, roof insulation and air or vapor retarder (if present) (not including the roof deck) designed to weatherproof a structure and improve thermal resistance.

1.4 PREINSTALLATION MEETINGS

A. Preliminary Roofing Meeting: Before starting roof deck construction, conduct meeting with Owner
   1. Meet with Owner, [**CM,**] roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
   2. Review methods and procedures related to roofing installation, including manufacturer's written instructions and submittals.
   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 requirements for 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 will affect roofing system.
   7. Review governing regulations and requirements for insurance and certificates if applicable.
   8. Review temporary protection requirements for roofing system during and after installation.
   9. Review roof observation and repair procedures after roofing installation.

1.5 SEQUENCING

A. Prior to and during application, all dirt, devices and dust shall be removed from surfaces by vacuuming, sweeping, blowing with compressed air or similar methods.

B. Arrange work sequence to avoid use of newly constructed roofing as a walking surface of for equipment movement and storage. Where such access is absolutely required, the Applicator shall provide all necessary protection and barriers to segregate the work area and to prevent damage to adjacent areas.
   1. Work shall begin at the furthest point from the designated spot where materials are shipped to the roof.

C. After work on roof is started, no traffic will be permitted on the roof other than necessary for the roofing application and inspection. Materials shall not be piled on to the roof to the extent that design live loads are exceeded. Roofing materials shall not be transported over unfinished or finished roofing or existing roofs.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Submit specifications, installation instructions, and general recommendations from roofing materials manufacturer for type of roofing required. Indicate data substantiating that materials comply with requirements of this specification, inclusive of accelerated weathering data.

B. Shop Drawings: For roofing system must be issued or approved by manufacturer before being submitted to CM. Include plans, elevations, sections, details, and attachments to other Work.
   1. Outline of roof and size.
   2. Location and type of all penetrations.
   3. Layout and thickness of insulation, fastener type and length.
   4. Perimeter and penetration details, including base flashings and membrane terminations.
   5. Tapered insulation, including slopes.

C. Samples for Verification: For the following products:
   1. 45 Mil membrane
   2. Cover Board

1.7 CLOSEOUT SUBMITTALS:

A. General: Closeout Submittals
   1. Maintenance Data: For roofing system.
   2. Warranties: Provide manufacturer's warranty and any special warranties.
   3. Inspection Report: Copy of roofing system manufacturer's inspection report of completed roofing installation.

1.8 QUALITY ASSURANCE

A. Qualifications
   1. Manufacturer Qualifications: A qualified manufacture that is UL listed or listed in FM Approvals' RoofNav, listed in SPRI's Directory of Roof Assemblies or Directory of Roof Assemblies (DORA) for roofing system identical to that used for this Project.
      a. Manufacturer must be in addition to attending Pre-Installation Meeting and final inspection participants in Field Quality Control inspections to verify products are being installed as recommended. Inspections shall be schedule at critical points to verify membrane perimeter and penetrations are properly terminated per written instructions and submittal documents. Refer to "Field Quality Control" article for additional manufacturers inspections.
         1) Manufacturer's inspector shall be a field technical inspector employed by the manufacturer not engaged in the sale of products. Inspector shall be experienced in the installation and maintenance of the specified roofing system, qualified to perform roofing observation and to determine installer's compliance with the requirements for the Project and the manufacturer's warranty certification.
         2) Manufacturer's inspector services shall include examination of substrates and conditions prior to membrane installation including verification of fastening of substrate to structure. Inspections shall also include observation of membrane installation, detailing, flashing, in progress work, and complete portions of the work.
         3) Manufacturer's inspector may not approve a roof installation as warrantable or acceptable if any current condition of the application of the new system does not meet the current published manufacturer's standards or submittals without review. The warrantability issue is part of the Contract Documents and does not take precedent over all contract requirements.
         4) Manufacturer's inspector shall provide a written report, roofing contractor, and CM existing conditions on day of inspection, work occurring, observation of work, workmanship and materials stored at the project site. A minimum of 5 pictures of roofing work shall be included in the reports. Reports shall be submitted within 7 days of the site visit.
   2. 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 install and receive a manufacturer's 20 year (or manufacturer longest period for specified product) no-dollar-limit warranty. Installer must verify this approval with a letter from manufacturer and supply letter even if a lesser warranty is specified.

3. Roofing and associated work shall be performed by a single firm called the "Installer" in this Section, so that there will be undivided responsibility for the specified performance of components parts including, but not limited to, the following (even though some parts may be subcontracted to others):
    a. Division 06 Section "Rough Carpentry": For wood insulation stops, wood nailers, and blocking required for installation of new roof and sheet metal.
    b. Division 07 Section "Preparation for Reroofing": For general requirements for reroofing.
    c. Division 07 Section "Sheet metal Flashing and Trim."
    d. Division 07 Section "Roof Specialties."

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.
    1. All materials delivered from manufacturers and suppliers should be carefully inspected at the time of delivery and examined during unloading. Manufacturers' product labels should be intact. Any damaged or unsuitable material should be rejected. Material that has been exposed to weather in transit or storage should be examined carefully for deterioration and damage.

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.
    2. Lids should be secured on cans of stored material.
    3. Water-based materials such as asphalt emulsions, acrylic coatings and water-based adhesives should be protected from freezing.
    4. Solvents, adhesives, and sealants should be stored at proper temperature.
    5. Store seam tapes and adhesives above 60 degrees F, unless otherwise recommended by manufacturer.
        a. Jobsite storage temperatures in excess of 90 deg F. may effect shelf life of curable materials.
        b. When the temperature is expected to fall below 40 deg F., outside storage boxes should be provided on the roof for temporary storage of liquid adhesives, sealants, primers and accessories. Containers must be rotated to maintain their temperature above 40 deg F.
            1) Prolonged exposure of pressure-sensitive flashing and tape to temperatures below 40 deg F. will cause the tape to lose tack and in extreme cases, not to bond to the substrate.

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.
    1. When moisture-sensitive materials are stored outside, they shall be placed on pallets or platforms that are raised off the ground or roof deck (at least 4 inches). Materials sensitive to moisture should be covered with water-resistant coverings that have been properly secured. Coverings that are "breathable," such as water resistant canvas tarpaulins are preferred. Cover top and sides of materials and secure cover. Remove wet products from project site.
        a. During inclement seasons, or extended periods (two weeks) it is suggested that moisture sensitive materials be stored in vans or enclosed areas protected from moisture or elevated humidity.
        b. Materials determined to be damaged or to have been subjected to adverse conditions shall be removed and replaced at contractor's expense.
    2. Protect insulation against concentrated loads, and standing loads exerting a force in excess of 50 percent of the materials compressive strength.

3. Do not expose foam core to excessive heat, sparks, or open flame.

D. Single-ply sheet materials may be stored as shipped with rolls laying horizontally or as recommended by manufacturer.
   1. When rolled materials are stored, the storage substrate should be swept to rid the surface of loose gravel, share objects and other debris that could damage the membrane material.
   2. Cover with tarps so moisture does not gather in the rolls. Unvented polyethylene tarpaulins are not accepted due to the accumulation of moisture beneath the tarpaulin in certain weather conditions that may affect the ease of membrane weld ability.

E. Provide continuous protection of products during delivery, storage, handling, and application.

F. Do not store roofing materials in concentrated areas of roof deck.
   1. Stored material should be raised up off the roof surface out of any standing water.

G. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.
   1. Average live loads on the roof during the work shall not exceed twenty pounds per square foot at any time.

H. All flammable materials shall be stored in a cool, dry area away from sparks and open flames. Closely follow precautions/instructions outlined on container or supplied by manufacturer/supplier.
   1. Liquid propane (LP) gas containers shall eb stored upright at all times.
      a. Comply with NFPA 58 "Standard for the Storage and Handling of Liquified Petroleum Gases" as well as appropriate publications of the National LP Gas Association.

1.10 FIELD CONDITIONS

A. Weather Condition Limitations:
   1. 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.
      a. Proceed only when the Installer is willing to guarantee the work as required and without additional reservations and restrictions.
   2. Apply in dry weather on a dry deck only. Where rain or inclement weather occur during application, the Work shall stop and not resume until the weather has cleared and the deck is dry.
      a. When membrane roofing materials are applied, entrapment of moisture should be prevented. Moisture in or on materials may cause membrane problems. If precipitation occurs before completely installing the roof membrane, the membrane surface in the immediate work area and the substrate should be dried or allowed to dry before work resumes.
   3. Only as much roofing as can be made weathertight each day, including all flashing and detail work, shall be installed.
      a. Uninterrupted waterstops shall be installed at the end of each day’s work and shall be completely removed before proceeding with the next day’s work. Waterstops shall not emit dangerous or unsafe fumes and shall not remain in contact with the finished roof as the installation progresses. Contaminated membrane shall be replaced at no cost to the Owner.

B. Cautions and Warnings
   1. Do not use bitumen base, oil base, or plastic roof cements with EPDM membrane.
   2. Do not install EPDM membrane directly onto asphalt.
   3. Do not expose membrane and accessories to a constant temperature in excess of 180 degrees F.

4. Splicing and bonding surfaces must be clean and dry.
5. Do not thin products.
6. Provide protection for all roof areas exposed to traffic during construction.
7. Roofing Contractor shall implement all necessary precautions to prevent debris or materials/equipment from becoming airborne due to wind conditions anticipated at site. Roofing Contractor shall conform to all regulations and precautions as required by applicable safety organizations.
8. All methods employed in performing the work, and all equipment, tools, machinery used for handling materials and executing any part of the work, shall be subject to the approval of the **CM** before the work is started, and whenever found unsatisfactory, shall be charged and improved as required.
9. Roofing System
    a. Solvents, adhesives, and primers used in the application of single-ply roofing systems are extremely flammable and/or toxic. Provide any and all crew members with appropriate safety data information and training as provided by the roofing materials manufacturer. Provide each crew member with appropriate training as it relates to the specific chemical compound they may be expected to deal with. Each crew member shall be fully aware of first aid measures to be undertaken in case of accidents, etc.
10. Note some of the steps in a self-adhering EPDM roof system installation can generate static electricity, particularly in dry working conditions. To avoid igniting flammable vapors, keep adhesives, primers and cleaners out of direct sunlight and away from the immediate work area when not in use and tell workers to discharge built-up static charge from their bodies before opening containers. Make sure a fire extinguisher is always on hand, regularly contain and remove jobsite debris and rubbish, and establish a means of egress from the roof in the event of a fire.

1.11 WARRANTY

A. Special Total System Warranty: Manufacturer's standard form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.
    1. Special “total system” warranty includes roofing membrane, base flashings, roofing accessories, roof insulation, fasteners, cover boards, substrate board, vapor retarder, and other components of membrane roofing system as required to keep the system watertight, including metal work i.e. coping and roof-edge specialties.
    2. Warranty Period: [**20**] years from date of Substantial Completion.
    3. The warranty shall guarantee the roof membrane system at wind speeds up to **[72]** mph measured at 10 meters above ground.
    4. The warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

B. Pro-rated System Warranties are not acceptable.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

B. Products of other manufacturers will be considered for acceptance provided they equal or exceed the material requirements and functional qualities of the specified product. The "Substitution Request Form" and complete technical data for evaluation must accompany requests for A/E's approval. All materials for evaluation must be received by the Project Manager and Specification Department at least 10 days prior to bid due date. Additional approved manufacturers will be issued by Addendum.

C. Source Limitations: Obtain components for roofing system from Manufacturer approved by membrane roofing manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General Performance: Installed roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing and base flashings shall remain watertight.
1. Accelerated Weathering: Roofing system shall withstand 2,000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.
2. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746, ASTM D 4272 or the "Resistance to Foot Traffic Test" in Section 5.5 of FM 4470.

B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing membrane manufacturer based on testing and field experience.

C. Roofing System Design: Provide a membrane roofing system that is listed on IBC ES-Reports or is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE 7/SEI and also as tested in accordance with FM 4474, UL 580, or UL 1897.
1. Fire/Windstorm Classification: Calculations shall not result in a roofing design less than FM Class 1A-60 requirements.

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 roof 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. Hail-Resistance Rating: FM Global Property Loss Prevention Data Sheet 1-34 [**MH**][**SH**][**VSH**].

E. SPRI's Directory of Roof Assemblies Listing: Roof membranes, base flashings, and component materials shall comply with requirements in FM Approvals 4450 and FM Approvals 4470 as part of a roofing system, and shall be listed in SPRI's Directory of Roof Assemblies for roof assembly identical to that specified for this Project.

F. Polyisocyanurate Insulation
1. Compressive Strength: [**20**][**25**] psi min.
2. Dimensional Stability – maximum dimensional change after installation (inches).
   a. Length: +/- 1/8
   b. Width: +/- 1/8
   c. Thickness: +/- 1/16
   d. Squareness: 1/16
   e. Flatness: 1/16
3. Moisture Vapor Transmission: ASTM E96, <1 perm.
4. Water Absorption: ASTM C209, <1 percent by volume.
5. Flame Spread: ASTM E84, <50.
6. Service Temperature: Minus 100 degrees to 250 degrees F.
7. Smoke Developed: ASTM E84, <450.
8. Acidity: EPA Method 9045, 6 pH minimum, 8 pH maximum.

9. Aged R-Value per Inch: ASTM C177 and C518, 5.6 R.

G. Exterior Fire-Test Exposure: ASTM E 108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

H. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated.

2.3 EPDM ROOFING MEMBRANE

A. EPDM Roofing Membrane: ASTM D 4637, **[Type II, scrim or fabric internally reinforced uniform]**, **[Type I, non-reinforced]** flexible fire-retardant sheet made from EPDM, and as follows:
1. Manufacturers:
   a. Carlisle SynTec Incorporated.
   b. Elevate (fka Firestone Building Products, Co.)
   c. Johns Manville, Inc.
   d. Versico Inc.
   e. Mule-Hide Products
2. Thickness: [**45 mils**] [**60 mils] [75 mils] [90 mils],** nominal.
3. Exposed Face Color: Black [**White on black**].
4. Performance Requirements:
   a. Underwriters Laboratory: Roof system shall be a UL Class “A” roof.
   b. Underwriters Laboratory: Roof system must have a UL 2218 Class 4 rating.

B. Fabric-Backed EPDM Sheet: ASTM D 4637, Type III, nonreinforced, EPDM sheet, laminated to a nonwoven polyester fabric backing except at selvages.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Carlisle SynTec Incorporated.
   b. Versico Roofing Systems
   c. Johns Manville, Inc.
2. Composite Thickness: [**45 mils**][
3. Exposed Face Color: [**Black**]

2.4 AUXILIARY MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing.
1. Liquid-type auxiliary materials shall meet VOC limits of authorities having jurisdiction.

B. Sheet Flashing: 45-mil thick EPDM, partially cured or cured, according to application.
1. Provide manufacturers standard pre-molded pipe flashing and corners, where possible.
2. Provide pressure-sensitive flashing, nominal 30 mil cured, pre-applied adhesive. Provide a minimum 6 inch wide roll to flash metal edging and seams where required herein.

C. Protection Sheet (Chemical): Epichlorohydrin or neoprene non-reinforced flexible sheet, 45 mil thick, recommended by EPDM manufacturer for resistance to hydrocarbons, non-aromatic solvents, grease, and oil.

D. Vented Base Sheet: ASTM 4897, Type II: non-perforated, asphalt-impregnated fiberglass reinforced, with mineral granular pattern surfacing on bottom surface.

E. Roof Vents: As recommended by roof membrane manufacturer.
1. Size: Not less than 4 inch diameter.

F. Bonding Adhesive: Manufacturer's standard bonding adhesive.

G. 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.

H. Seaming Material: Manufacturer's standard synthetic-rubber polymer primer and 3-inch wide minimum, butyl splice tape with release film or factory-applied seam tape, width as recommended by manufacturer.

I. Lap Sealant: Manufacturer's standard single-component sealant.
   1. Color to match membrane if white-on-black membrane is used.

J. Water Cutoff Mastic: Manufacturer's standard butyl mastic sealant.

K. Metal Termination Bars: Manufacturer's standard predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.
   1. Use only where indicated. In areas where metal counterflashing or surface mounted reglets are used, they must be sealed with a sealant to prevent moisture migration behind the flashing.

L. Fasteners: Membrane manufacturer to assure all warranty conditions are met and shall approve fasteners. The type of fastener shall be appropriate for the substrate to achieve maximum withdraw and anticorrosion characteristics. The membrane manufacturer approved fasteners shall also meet the following requirements.
   1. Mixing metal types and methods of contact shall be assembled in such a manner as to avoid galvanic corrosion. Fasteners for attachment of metal to masonry shall be expansion type fasteners with stainless steel pins. All concrete fasteners and anchors shall have a minimum embedment of 1-1/4 inch and shall be approved for such use by the fastener manufacturer. All miscellaneous wood fasteners and anchors used for flashings shall have a minimum embedment of 1 inch and shall be approved or such use by the fastener manufacturer.
   2. Pullout Testing: Fastener shall provide a minimum pullout resistance of 450 pounds.
   3. Static Backout Resistance: Fastener shall provide a minimum static backout resistance of 10 inch pounds.
   4. Where fasteners will be in contact with wood treated with preservative chemicals, provide fasteners and anchorage with hot dip zinc coating of G90 complying with ASTM A153 or of Type 304 or 316 stainless steel.

M. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, in-seam sealants, termination reglets, cover strips, and other accessories.
   1. Provide white flashing accessories for white EPDM membrane roofing.

N. Splash Blocks: 16-inch square by 2-inch thick precast 5000-psi concrete with mix added water repellent additive and striated top finish.

O. Protection Sheet or Mat (Puncture): .060 inch thick EPDM sheet extending minimum 6 inches beyond splash blocks, splash pans, and pavers in all directions or a 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.

P. Liquid coating, specifically formulated for coating EPDM membrane roofing, as follows:
   1. Type:
      a. Acrylic emulsion complying with ASTM D 6083.
      b. Chlorosulfonated polyethylene complying with ASTM D 3468.
   2. Color: [**Gray**]

2.5 SUBSTRATE BOARDS

A. Substrate Boards: ASTM C1177, glass mat, water resistant gypsum substrate.

1. Manufacturers:
    a. DensDeck Prime with EONIC Technology; Georgia-Pacific Gypsum.
    b. DEXcell FA; National Gypsum.
    c. Glass Rock Roof Board; CertainTeed Corporation.
    d. Securock UltraLight Coated Glass-Mat Roof Board; USG
2. Thickness: Provide 5/8 inch as part of fire resistance rated roofing system (as indicated on “Code Plans”) and over acoustical deck.
3. Factory prime, where required by roofing system manufacturer for application indicated.
    a. Coordinate face of facer material with vapor retarder adhesion requirements for fully adhered system.

B. Substrate Board (Thermal Barrier at High-Humidity Environments): ASTM C 1325, cement board, 7/16 inch thick manufactured of Portland cement, lightweight aggregate and glass mesh and able to withstand prolonged exposure to moisture.
1. Basis-of-Design: Dexcell Cement Roof Board; National Gypsum Company.

C. Fasteners: Factory-coated steel fasteners and metal plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening substrate panel to roof deck.

2.6 AIR AND VAPOR BARRIER

A. Air and Vapor Barrier: Provide one of the following as recommended by membrane manufacturer for compatibility in roofing assembly indicated.
1. Self-Adhering-Sheet Vapor Retarder: ASTM D 1970, polyethylene film laminated to layer of rubberized asphalt adhesive, nominal 40-mil total thickness; maximum permeance rating of 0.1 perm; cold-applied, with slip-resisting surface and release paper backing.
2. Self-Adhering Sheet Vapor Retarder: Polyethylene film laminated to layer of butyl rubber adhesive, nominal 30-mil total thickness; maximum permeance rating of 0.1 perm; cold applied, with slip-resisting surface and release paper backing.
3. Provide adhesive/primer supplied by air and vapor barrier manufacturer for adhesion to concrete or masonry surfaces.

2.7 VAPOR RETARDER Not Used

2.8 ROOF INSULATION Not Used

2.9 SOURCE QUALITY CONTROL

A. Test Cuts and Seam Samples
1. Take three random samples for roof applied. Sampling shall be done in accordance with manufacturer’s protocols.
2. Test cuts or seam samples may not represent the overall membrane seam construction. If test cuts or seam samples indicate defects, further sampling must be performed to establish the scope of corrective action.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
1. Material manufacturers printed installation instructions are available for information and review.
2. Safety precautions and safety data sheets (SDS’s) are available during application. The applicator shall follow all safety regulations as recommended by OSHA and other agencies.
3. Specified materials and specified quantities, as verified by on-site inspection of product labels, are at the project site and are visually suitable for application (e.g., packaging not damaged, labels intact).

4. Materials are stored according to the manufacturer's recommendations (e.g., proper temperature, covered, off ground, on pallets).
5. Equipment is in good working order and functioning properly.
6. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.
7. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
8. Verify work required for complete tie-in is in place. This includes masonry with special attention given to roof to wall transitions.
    a. Verify that all counterflashing receivers, curbs, etc., are constructed in such a manner as to provide a minimum 8 inch base flashing height measured from the finished roof's surface to the top of the base flashing membrane.
9. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Division 05 Section "Steel Decking."
10. Drainage patterns for proper roof membrane installation have been identified.

B. Proceed with installation only after unsatisfactory conditions have been corrected.
    1. Start of roof insulation shall constitute acceptance of substrates by Contractor.

3.2 PREPARATION

A. Review "Performance" and "Warranty" requirements with membrane manufacturer to ensure compliance before beginning roofing work.

B. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
    1. All wall flashing areas must be smooth and dry. Irregular wall surfaces, old BUR, stucco, gypsum, rough stone, or masonry are not suitable for flashing. These surfaces must be covered with a minimum 3/4 inch exterior grade plywood fastened to resist a minimum 200 lb. pullout force.

C. 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.
    1. Roof deck must be free of ponding water within 48 hours of rainfall. Use corrective measures to provide positive drainage.

D. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.
    1. When completion of flashings and terminations is not completed by the end of each workday, provisions must be provided to temporarily close the membrane to prevent water infiltration. Phased roofing is not acceptable.
    2. Temporarily seal loose membrane edge down slope so that the membrane edge will not buck water. Caution must be exercised to ensure that membrane is not temporarily sealed near drains in such a way as to promote water migration below membrane.

E. Perform fastener-pull 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.

3.3 APPLICATION, GENERAL

A. Application of the roofing products for installation shall be in accordance with the roofing material manufacturer's recommendations, FM Approvals' RoofNav or SPRI's Directory of Roof Assemblies assembly requirements, FM Global Property Loss Prevention Data Sheet 1-29 and additional requirements of the project specifications and drawings. Material manufacturer's recommendations related to weather (temperature, moisture, and humidity), surface preparation, and shelf life must be observed. The effect on the performance of materials, as well as installation costs and production, must be considered.

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 systems**].

D. Only install as much roofing as can be made weathertight each day, including all flashing work.
   1. Where possible, roof membrane panels shall be installed in such a fashion to create water-shedding seams.

E. Metal deck surface to receive substrate board and insulation shall be thoroughly dry. Should surface moisture occur, the Contractor shall provide the necessary equipment to dry the deck surface prior to application of roofing components.
   1. This is acceptable for the metal roof deck only. Drying of roofing components including substrate board, insulation, and cover boards is not acceptable. If any of these products have moisture in them, or have had moisture on them they shall be removed and replaced.
   2. Roof decks shall be rigid, tight, dry, and clean of dust or debris. No work shall start without testing of deck dryness at the beginning of each work day or period. It shall be the responsibility of the Contractor to maintain the deck in the proper and acceptable condition of application of the roof covering.
      a. Installer shall verify that all roof drain lines are functioning correctly (not clogged or blocked) before starting work. Applicator shall report any such blockages.

F. All new and temporary construction, including equipment and accessories, shall be secured in such a manner, at all times, as to preclude wind blow-off or wind damage.

G. Temporary water stops shall be installed at the end of each day's work, and shall be removed before proceeding with the next day's work. Temporary water stops shall be constructed to withstand protracted periods of inclement weather. Water stops shall be compatible with all materials and shall not emit dangerous or incompatible odors.

H. The Contractor is cautioned that the roof membrane may be incompatible with certain substances. Such materials shall not come into contract with the roof membrane at any time. If such contacts occur, the material shall be cut out and discarded. The Contractor shall consult material manufacturer with respect to material compatibility precautions, and recommendations.

I. Liquid materials such as solvents and adhesives shall be stored in accordance with requirements of the Safety Data Sheets provided by the respective manufacturer.

J. Contaminants, such as grease, fats, oils and solvents, shall not be allowed to come into contact with the roofing membrane.

K. If any unusual or concealed condition is discovered, stop the work and notify the [**CM**] immediately in writing.

L. Coordinate installation and transition of roofing system component serving as an air barrier with air barrier specified.

M. Quality Control (During Application) Checklist
   1. Weather and job conditions are suitable for the application.
   2. Substrate is sufficiently dry and suitably prepared to receive the insulation and roof membrane.
   3. Insulation and cover boards, if applicable, are butted together, as required, with joints staggered and offset if more than one layer is being used.
   4. Insulation is firmly attached with specified type and number of fasteners, or embedded in adhesive to substrate or underlying insulation as specified.
   5. Temporary water cut-offs are installed at the end of each day's work as required.
   6. Membrane sheets are installed so side laps and end laps that buck water are minimized.
   7. Perimeter membrane fastening complies with specifications and manufacturer's requirements.
   8. Membrane flashings are installed along with each day's completed roof area.
   9. In high-traffic areas, protection board is being used over newly completed membrane.
      a. Roof is not being abused by other trades.

3.4 SUBSTRATE BOARD Not Used

3.5 INSULATION [**AND COVER BOARD**] INSTALLATION

A. Comply with roofing system manufacturer's written instructions for installing roof insulation, including warranty requirements for installing insulation.
   1. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
   2. Size: Restrict boards installed in adhesive to 4 foot by 4 foot.

B. Roof Insulation - General: Lay in multiple layers. Edges shall be butted to provide moderate contact but not deformed or placed in surface compression. Neatly cut and fit insulation around projections and vertical surfaces. Edges shall be mitered at ridges and elsewhere to prevent open joints or irregular surfaces. Stagger end joints 6 inches in adjoining courses of base course. Stagger joints in succeeding layers with joints of layer below.
   1. Insulation shall be installed in multiple layers except a single layer may be used for one board width, around roof drains, if thickness at drain is 2-1/2 inches or less.

C. Install tapered insulation under area of roofing to conform to slopes indicated. Tapered insulation combined with tapered saddles and drainage crickets shall achieve positive drainage. Tapered saddles at a 1/2 inch per foot slope shall be placed between drains, and crickets shall be placed on the up slope side of mechanical, skylight, and other curbs to provide positive drainage. Mechanical units should not restrict flow of runoff water.
   1. Refer to NRCA Roofing and Waterproofing Manual - 2011, Figure 10-7, "Guide for Crickets and Saddles" and Figure 10-8, "Guide for Crickets."
   2. Tapered insulation shall be installed between the bottom and top layer of flat stock insulation. This will prevent stepped transitions from occurring at the edge of tapered insulation boards.
   3. Tapered insulation should originate at the valley line/low point of the roof in lieu of the center of the roof drains. The structure often causes the roof drains to be offset from the valley line/low point of the roof. Saddles/crickets shall provide positive slope towards drains and not allow ponding to occur in valley lines.
   4. Use tapered insulation to provide a 4 by 4 foot minimum, 8 by 8 foot square sump centered on drains is preferred, where possible.
      a. Do not field taper insulation.

D. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation or low-rise urethane adhesive.

1. Support the two opposite sides of each board on steel deck flanges, as close as practical to the center of the flange with a minimum bearing width of 1 inch. Trim board edges if they veer off the flange center.
2. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
3. Fill remaining gaps around projections, penetrations, and perimeters with low-rise urethane adhesive (foam), including but not limited to:
    a. Between perimeter of insulation board and nailers.
    b. Between nailers and vertical walls.
    c. Between penetrations and insulation boards.
    d. Between voids in insulation boards, inclusive of roof system slope transition conditions.
4. All voids to be filled to match full thickness of insulation boards.
5. Provide polyurethane foam sealant produced or acceptable to the roofing system/installation system manufacturer.

E. Mechanically Fastened and Adhered Insulation over Metal Deck: Install each layer of insulation and secure first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
1. Fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof. [**Where vapor-retarder is part of the roof assembly, provide a minimum of 1 fastener per 2 sq.ft**.]
    a. Fasteners shall be installed in high flute of metal deck with a minimum of 1-inch penetration.
    b. Fastener and plate setting shall be executed with an automatic setting device to ensure uniformity and correct setting torque.
2. Install subsequent layers of insulation and/or cover boards in one of the following methods:
    a. Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
    b. Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.
3. Size: Restrict boards installed in adhesive to 4 foot by 4 foot.

3.6 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 (150 mm) 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 listed roof assembly requirements for specified Windstorm Resistance Classification**] [**SPRI's Directory of Roof Assemblies listed roof assembly requirements for specified Wind Uplift Load Capacity**] and FM Global Property Loss Prevention Data Sheet 1-29, 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.

3.7 ADHERED ROOFING MEMBRANE INSTALLATION

A. Install roofing membrane over area to receive roofing according to membrane roofing system manufacturer's written instructions. In addition, the corner and perimeter areas shall have enhanced fastening in accordance with FM1-29.
   1. Unroll roofing membrane and allow to relax before installing.
   2. Install sheet according to ASTM D 5036.

B. Start installation of roofing membrane in presence of membrane roofing system manufacturer's technical personnel, and testing laboratory representative, if required.

C. Accurately align roofing membrane and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

D. Bonding Adhesive: Apply bonding adhesive to substrate and underside of roofing membrane at rate required by manufacturer and allow to partially dry before installing roofing membrane. Do not apply bonding adhesive to splice area of roofing membrane.
   1. The membrane adhesive shall be installed per the membrane manufacturer's requirements. Note: Differing insulation facers require specific application methods and qualities of adhesives. Water-based adhesives should be utilized (unless cold conditions require the use of solvent-based adhesives); inclusive of manufacturer's required fasteners and additional fastener requirements as required meeting performance requirements.
      a. Conversion to the solvent-based adhesive shall be only with permission from the A/E and manufacturer.
      b. Bidder is cautioned to include the type of bonding adhesive that the membrane manufacturer will warrant based on the conditions under which the roof will be installed.

E. Fabric-Backed Roof Membrane Adhesive: Apply to substrate at rate required by manufacturer, and install fabric-backed roof membrane.

F. In addition to adhering, mechanically fasten membrane roofing securely at terminations, penetrations, and perimeter of roofing. The roof membrane shall be secured to nailers.
   1. Membrane shall be secured at the perimeter of each roof level, roof section, expansion joint curb, skylight, interior wall, penthouse, etc., at any angle change which exceeds 2 inches in one horizontal foot and at all other penetrations in accordance with manufacturer's details.
   2. Terminate membrane under a termination bar with counterflashing, metal fascia or coping, unless otherwise noted or approved as part of submittal process.
   3. Provide premolded accessories and corners, unless otherwise noted or approved as part of the submittal process.

G. Apply roofing membrane with side laps shingled with slope of roof deck where possible, where not possible cover edge of sheet with a uniform fillet of sealant. Determine the direction of water drainage and the low point of the deck. The orientation of both ends and side laps shall be such that the direction of water flow (slope) changes to avoid backwater laps.
   1. Allow sufficient membrane to cover parapet walls and flashing details at roof edge.

H. Tape Seam Installation: Clean and prime both faces of splice areas, apply splice tape, and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of roofing membrane terminations.
   1. Apply a 6 inch strip of sheet flashing over each seam and patch all T-seams.

I. 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 weathertight seam installation.
   2. Apply lap sealant and seal exposed edges of roofing terminations.

J. Repair tears, voids, and lapped seams in roofing that does not meet requirements.

K. Spread sealant or mastic bed over deck drain flange at deck drains and securely seal roofing membrane in place with clamping ring.

L. In-Splice Attachment: Secure one edge of roofing membrane using fastening plates or metal battens centered within membrane splice and mechanically fasten membrane to roof deck. Field-splice seam.

M. Install roofing membrane and auxiliary materials to tie in to existing roofing to maintain weather tightness of transition and not void warranty of existing roof system, if applicable.

N. Apply protection sheet directly over EPDM membrane for a minimum distance of 10 feet out from kitchen exhaust vents or clusters of vents in all directions. Comply with manufacturer's installation instructions.

3.8 INSTALLATION OF SELF-ADHERED ROOFING

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 for at least 30 minutes.

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 back the leading edge of the membrane 5 to 6 feet at one end to expose the release liner without disturbing the membrane position. Never fold the membrane in half lengthwise to remove the release liner.

F. Release: Remove the split-release liner and broom membrane to initiate adhesion.

G. Roll membrane using a weighted roller.

H. Side Laps: Use seam tape for added security, apply the tape to the overlap area and roll thoroughly to ensure proper adhesion.

I. End Laps: Install a batten cover over end laps.

J. T-Joints: Clean and prime the intersection where the side and end laps meet, then carefully align and adhere the T-joint cover over the area using a seam roller.

3.9 MECHANICALLY FASTENED ROOFING MEMBRANE INSTALLATION

A. Install roofing membrane over area to receive roofing according to roofing system manufacturer's written instructions.
   1. Unroll roofing membrane and allow to relax before installing.
   2. Install roofing membrane with long dimension perpendicular to steel roof deck flutes.
   3. For in-splice attachment, install roofing with long dimension perpendicular to steel roof deck flutes.

B. Start installation of roofing membrane in presence of roofing system manufacturer's technical personnel, CM [**and testing laboratory representative, if required**].

C. Accurately align roofing membranes and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

D. In addition to adhering, mechanically fasten membrane roofing securely at terminations, penetrations, and perimeter of roofing. The roof membrane shall be secured to nailers.
   1. Membrane shall be secured at the perimeter of each roof level, roof section, expansion joint curb, skylight, interior wall, penthouse, etc., at any angle change which exceeds 2 inches in one horizontal foot and at all other penetrations in accordance with manufacturer's details.
   2. Terminate membrane under a termination bar with counterflashing, metal fascia or coping, unless otherwise noted or approved as part of submittal process.
   3. Provide premolded accessories and corners, unless otherwise noted or approved as part of the submittal process.

E. Apply roofing membrane with side laps shingled with slope of roof deck where possible, where not possible cover edge of sheet with a uniform fillet of sealant. Determine the direction of water drainage and the low point of the deck. The orientation of both ends and side laps shall be such that the direction of water flow (slope) changes to avoid backwater laps.
   1. Allow sufficient membrane to cover parapet walls and flashing details at roof edge.

F. Tape Seam Installation: Clean and prime both faces of splice areas, apply splice tape, and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of roofing membrane terminations.
   1. Apply a 6 inch strip of sheet flashing over each seam and patch all T-seams.
   2. Do not use adhesive seam installation method.

G. 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 weathertight seam installation.
   2. Apply lap sealant and seal exposed edges of roofing terminations.

H. Repair tears, voids, and lapped seams in roofing that does not meet requirements.

I. Spread sealant or mastic bed over deck drain flange at deck drains and securely seal roofing membrane in place with clamping ring.

J. In-Splice Attachment: Secure one edge of roofing membrane using fastening plates or metal battens centered within membrane splice and mechanically fasten roofing membrane to roof deck. Field-splice seam.
   1. Do not use through-method of attachment.

K. Install roofing membrane and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition and not void warranty for existing membrane roofing system, if applicable.

L. Apply protection sheet over roofing membrane directly over EPDM membrane for a minimum distance of 10 feet out from kitchen exhaust vents or clusters of vents in all directions. Comply with manufacturer’s installation instructions.

3.10 BASE FLASHING INSTALLATION

A. General: All flashings shall be installed concurrently with the roof membrane as the job progresses. No temporary flashings shall be allowed without the prior written approval of CM and membrane manufacturer. Approval shall only be for specific locations and dates. If any water is allowed to enter under the newly completed roofing, the affected area shall be removed and replaced at the Contractor/Applicator’s expense. Flashing shall be adhered to compatible dry, smooth, and solvent-resistant surfaces. Use caution to ensure adhesive fumes are not drawn into the building.

B. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.

C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.

D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Clean and prime both faces of splice areas, apply splice tape, and roll side and end laps of overlapping roofing membranes according to manufacturers' written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of roofing membrane terminations.
   1. Apply a 6 inch strip of sheet flashing or manufactured T-joint cover at all T-seams (field splice installations).

E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars, covered by counterflashing. Do not tightly butt the termination bars or cross expansion joints with a solid bar.

F. Flashing
   1. Walls, Parapets, and curbs
      a. Reinforced Universal Securement Strip
         1) Splice the EPDM deck membrane to the securement strip before bonding the membrane to the vertical surface. Membrane must be fully adhered to vertical surfaces.
   2. Metal Edge Terminations approved by ANSI/SPRI ES-1
      a. The width of the perimeter wood nailer to which the metal edge is to be secured must extend beyond the width of the metal edge deck flange.
      b. The metal edge must be secured to the wood nailer as specified by the manufacturer.
      c. All perimeter wood nailers must be totally concealed by extending the deck membrane to completely cover the nailers and extend past the bottom edge of the nailers a minimum of 3/4 inches. Membrane shall lap onto adjacent wall cladding a minimum of 3/4 inches.
      d. Prior to flashing, scrub the metal edge deck flange and membrane with splice cleaner to remove field contaminants.
   3. Expansion Joints
      a. The EPDM deck membrane must be secured on both sides of expansion joints with reinforced universal securement strip. Refer to expansion joint details for proper securement details.
      b. Membrane junctions at expansion joint intersections, expansion joint repairs, and intersections between expansion joints to wall or edging, must be flashed using 3 layers of uncured form flashing with each layer 3 inches larger than the previous layer in all directions.
   4. Roof Drains: Roof drain flashing shall be fully adhered, without seams located in tapered sump, and installed in strict accordance with the membrane manufacturer’s requirements.
      a. During the flashing operation, drain openings shall be protected against debris, etc.
      b. Provide a smooth transition from the roof surface to the drain-clamping ring. Prepare the substrate around each roof drain to avoid membrane bridging (Minimum 12 inch) at the sump area and possible distortion at the drain clamping ring.
      c. The mating surfaces between the clamping ring and drain base must be clean and have a smooth finish.
      d. Cut the membrane so it extends approximately 1/2 inch beyond the attachment points of the drain damping ring.
         1) Under no circumstances should the hole in the membrane restrict water flow or be smaller than the drain tube.
      e. The seal between the membrane and the drain base must be provided by Water Cut-Off Mastic under compression.

f. Remove all existing flashing, cement, and lead in preparation for the membrane seal (application of Water Cut-Off Mastic).
g. All bolts and/or clamps must be in place to provide compression on the Water Cut-Off Mastic.
h. Upon completion of roofing activities, check drain pipe, to ensure that drain line is free of obstruction. Any obstructions shall be removed.

5. Vent Pipes: Refer to Division 07 Section "Roof Accessories" for preformed flashing sleeves.
   a. Flash pipes with Molded Pipe Flashing where their installation is possible.
      1) Use stainless steel clamps to seal at top.
   b. Molded pipe flashing cannot be cut and patched; deck flanges cannot overlap or be installed over angle changes.
   c. Where Molded Pipe Flashing cannot be installed, apply field fabricated pipe seals using uncured flashing.
      1) Never use a wrap around detail or molded pipe flashing on a warm or hot penetration.
6. Mechanical Units and other Raised Curbs
   a. Sheet metal counterflashing shall be installed to cover the top edge and overlap the upper portion of membrane base flashings unless the integral flange of the curb mounted with adequately covers the top of the membrane flashing.
      1) Provide a 4-inch coverage of roof flashings with counterflashings.

3.11 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components, and to furnish reports to **CM**.

B. [**Owner will engage a qualified testing agency to perform.**
1. Infrared Thermography: Testing agency shall survey entire roof area using infrared color thermography according to ASTM C 1153.
   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.
2. Testing agency shall prepare survey report indicating locations of initial discontinuities, if any.

C. Manufacturers Roof Inspections: Roofing Contractor shall notify roof manufacturer in writing of schedule for Work of this Section to allow sufficient time for inspecting. Do not modify details shown in the contract documents or shop drawings without consent of manufacturer’s representative and CM. Arrange for site inspections to verify conformance with written material manufacturer’s instructions, submittals, and the Contract Documents including this section of the project specifications.
1. If the inspection reveals any defects, promptly remove and replace defection work at no additional cost to Owner.

D. Repair or remove and replace components of membrane roofing system where test results or inspections indicate that they do not comply with specified requirements.

3.12 PROTECTING AND CLEANING

A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to CM and Owner.
   1. Protect existing membrane roofing system and where continued construction traffic is anticipated.

B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements, repair substrates and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

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

3.13 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to inspect and maintain roofing system.

B. Demonstration and Training: Provide instruction, including but not limited to the following items:
   1. Review warranty requirements.
   2. Review maintenance data.
   3. Review inspection procedures including:
      a. Where to look, e.g., roof access points, walkways, rooftop mechanical units, and litter.
      b. What to look for: cuts and punctures and compressed or crushed insulation.
      c. Remedial actions, emergency repair procedures.
      d. Preventative actions.

END OF SECTION 07 53 23