

ESSEXVILLE- HAMPTON PUBLIC SCHOOLS

PROJECT SPECIFICATION

Verellen Elementary Roof Project

**612 West Borton Road
Essexville, Michigan 48732**

J William Jensen, PE

13576 S Horrell Road, Fenton, MI 48430

810-701-8768: bill@jwjensenpe.com

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J. William Jensen, PE

This project includes the removal and replacement of existing roofing systems and installation of new insulation on the roof deck.

SECTION 07 54 23**TPO MECHANICALLY FASTENED ROOFING SYSTEM****PART 1 GENERAL**

The project, **VERELLEN ELEMENTARY SCHOOL** located in **Essexville, MI**, includes the provision of a complete TPO Mechanically Attached Membrane Roofing System for the areas indicated on the drawings.

The new addition and an adjoining lower roof are **NOT IN THE SCOPE**.

1.01 SUMMARY

- A. Furnish and install elastomeric sheet roofing system, including:
 - 1. Roofing manufacturer's requirements for the specified warranty.
 - 2. Preparation of roofing substrates.
 - 3. Wood nailers for roofing attachment.
 - 4. Insulation.
 - 5. Cover boards.
 - 6. Elastomeric membrane roofing.
 - 7. Metal roof edging and copings.
 - 8. Flashings.
 - 9. Walkway pads.
 - 10. Other roofing-related items specified or indicated on the drawings or otherwise necessary to provide a complete weatherproof roofing system.
- B. Disposal of demolition debris and construction waste is the responsibility of Contractor. Perform disposal in manner complying with all applicable federal, state, and local regulations.
- C. Comply with the published recommendations and instructions of the roofing membrane manufacturer.
- D. Commencement of work by the Contractor shall constitute acknowledgement by the Contractor that this specification can be satisfactorily executed, under the project conditions and with all necessary prerequisites for warranty acceptance by roofing membrane manufacturer. No modification of the Contract Sum will be made for failure to adequately examine the Contract Documents or the project conditions.

1.02 RELATED SECTIONS

- A. Section 06 10 00 - Rough Carpentry: Wood nailers associated with roofing and roof insulation.
- B. Section 07 62 00 - Sheet Metal Flashing and Trim: Formed metal flashing and trim items associated with roofing.
- C. Section 07 72 00 - Roof Accessories: Roof hatches, vents, and manufactured curbs.
- D. Section 22 10 00 - Plumbing Piping and Roof Drains.

1.03 REFERENCES

- A. Referenced Standards: These standards form part of this specification only to the extent they are referenced as specification requirements.
 - 1. ASTM C 1177/C 1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2004.
 - 2. ASTM C 1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2013.

3. ASTM C 1549 - Standard Test Method for Determination of Solar Reflectance near Ambient Temperature Using a Portable Solar Reflectometer; 2009.
4. ASTM D 638 - Standard Test Method for Tensile Properties of Plastics; 2010.
5. ASTM D 1004 - Standard Test Method for Initial Tear Resistance of Plastic Film and Sheeting; 2009.
6. ASTM D 3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2000.
7. ASTM D6878/D6878M - Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing; 2011a.
8. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2013a.
9. ASTM E 136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 2012.
10. FM 1-28 - Design Wind Loads; Factory Mutual System; 2007.
11. FM 1-29 - Roof Deck Securement and Above Deck Roof Components; Factory Mutual System; 2006.
12. PS 1 - Construction and Industrial Plywood; 2009.
13. PS 20 - American Softwood Lumber Standard; 2010.
14. SPRI ES-1 - Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems; 2007. (ANSI/SPRI ES-1).

1.04 SUBMITTALS

- A. Product Data:
 1. Provide membrane manufacturer's printed data sufficient to show that all components of roofing system, including insulation and fasteners, comply with the specified requirements and with the membrane manufacturer's requirements and recommendations for the system type specified; include data for each product used in conjunction with roofing membrane.
 2. Where UL or FM requirements are specified, provide documentation that shows that the roofing system to be installed is UL-Classified or FM-approved, as applicable; include data itemizing the components of the classified or approved system.
 3. Installation Instructions: Provide manufacturer's instructions to installer, marked up to show exactly how all components will be installed; where instructions allow installation options, clearly indicate which option will be used.
- B. Shop Drawings: Provide:
 1. The roof membrane manufacturer's standard details customized for this project for all relevant conditions, including flashings, base tie-ins, roof edges, terminations, expansion joints, penetrations, and drains.
- C. Pre-Installation Notice: Copy to show that manufacturer's required Pre Installation Notice (PIN) has been accepted and approved by the manufacturer.
- D. Executed Warranty.

1.05 QUALITY ASSURANCE

- A. Applicator Qualifications: Roofing installer shall have the following:
 1. Current MANUFACTURER Master Contractor status.
 2. At least five years experience in installing specified system.
 3. Capability to provide payment and performance bond to building owner.

J. William Jensen, PE
810-701-8768
bill@jwjensenpe.com

- B. Pre-Installation Conference: Before start of roofing work, Contractor shall hold a meeting to discuss the proper installation of materials and requirements to achieve the warranty.
 - 1. Require attendance with all parties directly influencing the quality of roofing work or affected by the performance of roofing work.
 - 2. Notify OWNER and ENGINEER well in advance of meeting.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver products in manufacturer's original containers, dry and undamaged, with seals and labels intact and legible.
- B. Store materials clear of ground and moisture with weather protective covering.
- C. Keep combustible materials away from ignition sources.

1.07 WARRANTY

- A. Comply with all warranty procedures required by manufacturer, including notifications, scheduling, and inspections.
- B. Warranty: **15 year**, Limited Warranty covering membrane, roof insulation, and membrane accessories.

Warranty Duration	Membrane Thickness, required minimums
15 year	.045 TPO

Limit of Liability: No dollar limitation.

- a. Scope of Coverage: Repair leaks in the roofing system caused by:
 - b. Ordinary wear and tear of the elements.
 - c. Manufacturing defect in manufacturer branded materials.
 - d. Defective workmanship used to install these materials.
 - e. Damage due to winds up to 80 mph.
- 2. Not Covered:
 - a. Damage due to winds in excess of 80 mph.
 - b. Damage due to hurricanes or tornadoes.
 - c. Hail.
 - d. Intentional damage.
 - e. Unintentional damage due to normal rooftop inspections, maintenance, or service.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturer(s) - Roofing System: **Firestone Building Products Co., Carlisle Syntec Systems, Garland Roofing Company, and Tremco Roofing Products.**
- B. Roofing systems manufactured by others may be acceptable provided the roofing system is completely equivalent in materials and warranty conditions and the manufacturer meets the following qualifications:
 - 1. Specializing in manufacturing the roofing system to be provided.
 - 2. Minimum ten years of experience manufacturing the roofing system to be provided.
 - 3. Able to provide a no dollar limit, single source roof system warranty.
 - 4. ISO 9002 certified.

- 5. Able to provide isocyanate insulation.
- C. Manufacturer of Insulation and Cover Board: TO BE SUBMITTED
- D. Manufacturer of Metal Roof Edging: TO BE SUBMITTED
- E. Substitution Procedures: See Instructions to Bidders.
 - 1. Submit evidence that the proposed substitution complies with the specified requirements.

2.02 ROOFING SYSTEM DESCRIPTION

- A. Roofing System:
 - 1. Membrane: Thermoplastic Polyolefin (TPO).
 - 2. Thickness: .045 mil
 - 3. Membrane Attachment: Mechanically attached.
 - 4. Slope: Deck is sloped but not enough; provide additional slope of 1/4 inch per foot (1:48) by means of tapered insulation.
 - 5. Comply with applicable local building code requirements.
 - 6. Provide assembly having Underwriters Laboratories, Inc. (UL) Class A, Fire Hazard Classification.
 - 7. Provide assembly complying with Factory Mutual Corporation (FM) Roof Assembly Classification, FM DS 1-28 and 1-29, and meeting minimum requirements of FM 1- 90 wind uplift rating.
- B. Vapor Barrier over deck/deck cover: NOT REQUIRED
- C. Insulation:
 - 1. Total System R Value: **30**, minimum.
 - 2. Maximum Board Thickness: 2 inches (50 mm); use as many layers as necessary; stagger joints in adjacent layers.

System R Value	Total Iso Insulation Thickness, nominal
<u>30 R</u>	<u>5.25 inches</u>

- 3. Base Layer: Polyisocyanurate foam board, non-composite.
 - a. Attachment: Mechanical through fastening.
- 4. Top Layer: Polyisocyanurate foam board, non-composite.
 - a. Attachment: Mechanical through fastening.
 - a. .
- C. Cover Board: Gypsum-Based Cover Board:
 - 1. Thickness: 0.25 inch (6.4mm).
 - 2. R-Value: negligible.
 - a. Attachment: Mechanical through fastening.

2.03 TPO MEMBRANE MATERIALS

- A. Membrane: Flexible, heat weldable sheet composed of thermoplastic polyolefin polymer and ethylene propylene rubber; complying with ASTM D 6878, with polyester weft inserted reinforcement and the following additional characteristics:
 - 1. Thickness: 0.045 inch (1.52 mm) plus/minus 10 percent, with coating thickness over reinforcement of 0.024 inch (0.61 mm) plus/minus 10 percent.
 - 2. Puncture Resistance: 265 lb. (1174 N), minimum, when tested in accordance FTM 101C Method 2031.
 - 3. Solar Reflectance: 0.79, minimum [0.84, minimum Reflection white], when tested in accordance with ASTM C 1549. [white]
 - 4. Color: White
 - 5. Acceptable Product: UltraPly TPO by Firestone, or similar Carlisle, Garland or Tremco

- A. Membrane Fasteners: Type and size as required by roof membrane manufacturer for roofing system and warranty to be provided; use only fasteners furnished by roof membrane manufacturer.
- B. Curb and Parapet Flashing: Same material as membrane, with encapsulated edge which eliminates need for seam sealing the flashing-to-roof splice; precut to 18 inches (457 mm) wide.
- C. Formable Flashing: Non-reinforced, flexible, heat weldable sheet, composed of thermoplastic polyolefin polymer and ethylene propylene rubber.
 - 1. Thickness: 0.060 inch (1.52 mm) plus/minus 10 percent.
 - 2. Tensile Strength: 1550 psi (10.7 MPa), minimum, when tested in accordance with ASTM D 638 after heat aging.
 - 3. Elongation at Break: 650 percent, minimum, when tested in accordance with ASTM D 638 after heat aging.
 - 4. Tearing Strength: 12 lbf (53 N), minimum, when tested in accordance with ASTM D 1004 after heat aging.
 - 5. Color: Same as field membrane.
 - 6. Acceptable Product: UltraPly TPO Flashing by Firestone.
- E. Tape Flashing: 5-1/2 inch (140 mm) nominal wide TPO membrane laminated to cured rubber polymer seaming tape, overall thickness 0.065 inch (1.6 mm) nominal.
- F. Pourable Sealer: Two-part polyurethane, two-color for reliable mixing; Pourable Sealer by Firestone.
- G. Seam Plates: Steel with barbs and Galvalume coating; corrosion-resistance complying with FM 4470.
- H. Termination Bars: Aluminum bars with integral caulk ledge; 1.3 inches (33 mm) wide by 0.10 inch (2.5 mm) thick.
- I. Cut Edge Sealant: Synthetic rubber-based, for use where membrane reinforcement is exposed.
- J. General Purpose Sealant: EPDM-based, one part, white general purpose sealant.
- K. Molded Flashing Accessories: Unreinforced TPO membrane pre-molded to suit a variety of flashing details, including pipe boots, inside corners, outside corners, etc.
- L. Roof Walkway Pads: Non-reinforced TPO walkway pads, 0.130 inch (3 mm) by 30 inches (760 mm) by 40 feet (12.19 m) long with patterned traffic bearing surface.
- M. Yellow Safety Strip: To designate areas of caution on the roof or around rooftop objects. 5.5 inches wide (140 mm) by 100 feet long (30 m) strip and nominal 30 mil (0.76 mm) thick yellow TPO membrane laminated to a white, cured, seam tape. Compatible with TPO and EPDM.

2.04 ROOF INSULATION AND COVER BOARDS

- A. Polyisocyanurate Board Insulation: Closed cell polyisocyanurate foam with black glass reinforced mat laminated to faces, complying with ASTM C 1289 Type II Class 1, with the following additional characteristics:
 - 1. Thickness: As indicated elsewhere.
 - 2. Size: 48 inches (1220 mm) by 96 inches (2440 mm), nominal.
 - 3. Exception: Insulation to be attached using adhesive or asphalt may be no larger than 48 inches (1220 mm) by 48 inches (1220 mm), nominal.
 - 4. R-Value (LTTR): 1.0 inch (25 mm) Thickness: 5.7 R, minimum.
 - 5. Compressive Strength: 20 psi (138 kPa) when tested in accordance with ASTM C 1289.
 - 6. Ozone Depletion Potential: Zero; made without CFC or HCFC blowing agents.
 - 7. Recycled Content: 19 percent post-consumer and 15 percent post-industrial, average.
 - 8. Acceptable Product: TO BE SUBMITTED
 - 8. Acceptable material per ASTM D3273)

- B. Gypsum-Based Cover Board: Non-combustible, water resistant gypsum core with embedded glass mat facers, complying with ASTM C 1177/C 1177M, and with the following additional characteristics:
1. Size: 48 inches (1220 mm) by 96 inches (2440 mm), nominal.
 2. Exception: Board to be attached using adhesive or asphalt may be no larger than 48 inches (1220 mm) by 48 inches (1220 mm), nominal.
 3. Thickness: 0.25 inch (6.4mm).
 4. Surface Water Absorption: 2.5 g, maximum, when tested in accordance with ASTM C 473.
 5. Spanning Capability: Recommended by manufacturer for following minimum flute spans:
 6. Surface Burning Characteristics: Flame spread of 0, smoke developed of 0, when tested in accordance with ASTM E 84.
 7. Combustibility: Non-combustible, when tested in accordance with ASTM E 136.
 8. Factory Mutual approved for use with FM 1-60 and 1-90 rated roofing assemblies.
 9. Mold Growth Resistance: Zero growth, when tested in accordance with ASTM D 3273 for minimum of 4 weeks.
- C. Insulation Fasteners: Type and size as required by roof membrane manufacturer for roofing system and warranty to be provided; use only fasteners furnished by roof membrane manufacturer.

2.05 METAL ACCESSORIES

- A. Metal Roof Edging and Fascia: Continuous metal edge member serving as termination of roof membrane and retainer for metal fascia; watertight with no exposed fasteners; mounted to roof edge nailer.
1. Wind Performance:
 - a. Membrane Pull-Off Resistance: 100 lbs/ft (1460 N/m), minimum, when tested in accordance with ANSI/SPRI ES-1 Test Method RE-1, current edition.
 - b. Fascia Pull-Off Resistance: At least the minimum required when tested in accordance with ANSI/SPRI ES-1 Test Method RE-2, current edition.
 - c. Provide product listed in current Factory Mutual Research Corporation Approval Guide with at least FM 1-270 rating.
 2. Description: Two-piece; 45 degree sloped galvanized steel sheet edge member securing top and bottom edges of formed metal fascia.
 3. Fascia Face Height: 5 inches (127 mm).
 4. Edge Member Height above Nailers: 1-1/4 inches (31 mm).
 5. Length: 144 inches (3650 mm).
 6. Functional Characteristics: Fascia retainer supports while allowing for free thermal cycling of fascia.
 7. Aluminum Bar: Continuous 6063-T6 alloy aluminum extrusion with pre-punched slotted holes; miters welded; injection molded EPDM splices to allow thermal expansion.
 8. Anchor Bar Cleat: 20 gage, 0.036 inch (0.9 mm) G90 coated commercial type galvanized steel with pre-punched holes.
 9. Curved Applications: Factory modified.
 10. Fasteners: Factory-provided corrosion resistant fasteners, with drivers; no exposed fasteners permitted.
 11. Special Shaped Components: Provide factory-fabricated pieces necessary for complete installation, including miters, scuppers, and end caps; minimum 14 inch (355 mm) long legs on corner pieces.
 12. Scuppers: Welded watertight.
 13. Accessories: Provide matching brick wall cap, downspout, extenders, and other special fabrications as shown on the drawings.
- B. Parapet Copings: Formed metal coping with galvanized steel anchor/support cleats for capping

any parapet wall; watertight, maintenance free, without exposed fasteners; butt type joints with concealed splice plates; mechanically fastened as indicated; Firestone PTCF.

1. Wind Performance:
 - a. At least the minimum required when tested in accordance with ANSI/SPRI ES-1 Test Method RE-3, current edition.
 - b. Provide product listed in current Factory Mutual Research Corporation Approval Guide with at least FM 1-90 rating.
2. Description: Coping sections allowed to expand and contract freely while locked in place on anchor cleats by mechanical pressure from hardened stainless steel springs factory attached to anchor cleats; 8 inch (200 mm) wide splice plates with factory applied dual non-curing sealant strips capable of providing watertight seal.
3. Material and Finish: 24 gage, 0.024 inch (0.06 mm) thick galvanized steel with Kynar 500 finish in manufacturer's standard color; matching concealed joint splice plates; factory-installed protective plastic film.
4. Dimensions:
 - a. Wall Width: As indicated on the drawings.
 - b. Piece Length: Minimum 144 inches (3650 mm).
 - c. Curved Application: Factory fabricated in true radius.
5. Anchor/Support Cleats: 20 gage, 0.036 inch (0.9 mm) thick prepunched galvanized cleat with 12 inch (305 mm) wide stainless steel spring mechanically locked to cleat at 72 inches (1820 mm) on center.
6. Special Shaped Components: Provide factory-fabricated pieces necessary for complete installation, including miters, corners, intersections, curves, pier caps, and end caps; minimum 14 inch (355 mm) long legs on corner, intersection, and end pieces.
7. Fasteners: Factory-furnished; electrolytically compatible; minimum pull out resistance of 240 pounds (109 kg) for actual substrate used; no exposed fasteners.

2.07 ACCESSORY MATERIALS

- A. Wood Nailers: PS 20 dimension lumber, Structural Grade No. 2 or better Southern Pine, Douglas fir; or PS 1, APA Exterior Grade plywood; pressure preservative treated.
 1. Width: 3-1/2 inches (90 mm), nominal minimum, or as wide as the nailing flange of the roof accessory to be attached to it.
 2. Thickness: Same as thickness of roof insulation.

PART 3 INSTALLATION

3.01 GENERAL

- A. Install roofing, insulation, flashings, and accessories in accordance with roofing manufacturer's published instructions and recommendations for the specified roofing system. Where manufacturer provides no instructions or recommendations, follow good roofing practices and industry standards. Comply with federal, state, and local regulations.
- B. Obtain all relevant instructions and maintain copies at project site for duration of installation period.
- C. Do not start work until Pre-Installation Notice has been submitted to manufacturer as notification that this project requires a manufacturer's warranty.
- D. Perform work using competent and properly equipped personnel.
- E. Temporary closures, which ensure that moisture does not damage any completed section of the new roofing system, are the responsibility of the applicator. Completion of flashings, terminations, and temporary closures shall be completed as required to provide a watertight condition.
- F. Install roofing membrane only when surfaces are clean, dry, smooth and free of snow or ice; do

not apply roofing membrane during inclement weather or when ambient conditions will not allow proper application; consult manufacturer for recommended procedures during cold weather. Do not work with sealants and adhesives when material temperature is outside the range of 60 to 80 degrees F (15 to 25 degrees C).

- G. Protect adjacent construction, property, vehicles, and persons from damage related to roofing work; repair or restore damage caused by roofing work.
 - 1. Protect from spills and overspray from bitumen, adhesives, sealants and coatings.
 - 2. Particularly protect metal, glass, plastic, and painted surfaces from bitumen, adhesives, and sealants within the range of wind-borne overspray.
 - 3. Protect finished areas of the roofing system from roofing related work traffic and traffic by other trades.
- H. Until ready for use, keep materials in their original containers as labeled by the manufacturer.
- I. Consult membrane manufacturer's instructions, container labels, and Material Safety Data Sheets (MSDS) for specific safety instructions. Keep all adhesives, sealants, primers and cleaning materials away from all sources of ignition.

3.02 EXAMINATION

- A. Examine roof deck to determine that it is sufficiently rigid to support installers and their mechanical equipment and that deflection will not strain or rupture roof components or deform deck.
- B. Verify that surfaces and site conditions are ready to receive work. Correct defects in the substrate before commencing with roofing work.
- C. Examine roof substrate to verify that it is properly sloped to drains.
- D. Verify that the specifications and drawing details are workable and not in conflict with the roofing manufacturer's recommendations and instructions; start of work constitutes acceptable of project conditions and requirements.

3.03 PREPARATION

- A. Take appropriate measures to ensure that fumes from adhesive solvents are not drawn into the building through air intakes.
- B. Prior to proceeding, prepare roof surface so that it is clean, dry, and smooth, and free of sharp edges, fins, roughened surfaces, loose or foreign materials, oil, grease and other materials that may damage the membrane.
- C. Fill all surface voids in the immediate substrate that are greater than 1/4 inch (6 mm) wide with fill material acceptable insulation to membrane manufacturer.
- D. Seal, grout, or tape deck joints, where needed, to prevent bitumen seepage into building.

3.04 INSULATION AND COVER BOARD INSTALLATION

- A. Install insulation in configuration and with attachment method(s) specified in PART 2, under Roofing System.
- B. Install only as much insulation as can be covered with the completed roofing system before the end of the day's work or before the onset of inclement weather.
- C. Lay roof insulation in courses parallel to roof edges.
- D. Neatly and tightly fit insulation to all penetrations, projections, and nailers, with gaps not greater than 1/4 inch (6 mm). Fill gaps greater than 1/4 inch (6 mm) with acceptable insulation. Do not leave the roofing membrane unsupported over a space greater than 1/4 inch (6 mm).
- E. Mechanical Fastening: Using specified fasteners and insulation plates engage fasteners through

J. William Jensen, PE
810-701-8768
bill@jwjensenpe.com

insulation into deck to depth and in pattern required by Factory Mutual for FM Class specified in PART 2 and membrane manufacturer, whichever is more stringent.

3.06 SINGLE-PLY MEMBRANE INSTALLATION

- A. Beginning at low point of roof, place membrane without stretching over substrate and allow to relax at least 30 minutes before attachment or splicing; in colder weather allow for longer relax time.
- B. Lay out the membrane pieces so that field and flashing splices are installed to shed water.
- C. Install membrane without wrinkles and without gaps or fishmouths in seams; bond and test seams and laps in accordance with membrane manufacturer's instructions and details.
- D. Install membrane mechanically attached to the substrate using fasteners and edge securement as specified and as required by membrane manufacturers.
- E. Mechanical Attachment: Install fasteners in the seams, covered by membrane.
 - 1. Lay out fasteners in compliance with FM Class specified in PART 2, as recommended by membrane manufacturer, and as indicated, whichever is most stringent.
 - 2. Properly engage fasteners in the deck with head flush with the countersunk portion of seam plate.
- F. Edge Securement: Secure membrane at all locations where membrane terminates or goes through an angle change greater than 2 in 12 inches (1:6) using mechanically fastened reinforced perimeter fastening strips, plates, or metal edging as indicated or as recommended by roofing manufacturer.
 - 1. Exceptions: Round pipe penetrations less than 18 inches (460 mm) in diameter and square penetrations less than 4 inches (200 mm) square.
 - 2. Metal edging is not merely decorative; ensure anchorage of membrane as intended by roofing manufacturer.

3.07 FLASHING AND ACCESSORIES INSTALLATION

- A. Install flashings, including laps, splices, joints, bonding, adhesion, and attachment, as required by membrane manufacturer's recommendations and details.
- B. Metal Accessories: Install metal edgings, gravel stops, and copings in locations indicated on the drawings, with horizontal leg of edge member over membrane and flashing over metal onto membrane.
 - 1. Follow roofing manufacturer's instructions.
 - 2. Remove protective plastic surface film immediately before installation.
 - 3. Install water block sealant under the membrane anchorage leg.
 - 4. Flash with manufacturers recommended flashing sheet unless otherwise indicated.
 - 5. Where single application of flashing will not completely cover the metal flange, install additional piece of flashing to cover the metal edge.
 - 6. If the roof edge includes a gravel stop and sealant is not applied between the laps in the metal edging, install an additional piece of self-adhesive flashing membrane over the metal lap to the top of the gravel stop; apply seam edge treatment at the intersections of the two flashing sections.
 - 7. When the roof slope is greater than 1:12, apply seam edge treatment along the back edge of the flashing.
- C. Scuppers: Set in sealant and secure to structure; flash as recommended by manufacturer.
- D. Roofing Expansion Joints: Install as shown on drawings and as recommended by roofing manufacturer.
- E. Flashing at Walls, Curbs, and Other Vertical and Sloped Surfaces: Install weathertight flashing at all walls, curbs, parapets, curbs, skylights, and other vertical and sloped surfaces that the roofing

membrane abuts to; extend flashing at least 8 inches (200 mm) high above membrane surface.

1. Use the longest practical flashing pieces.
2. Evaluate the substrate and overlay and adjust installation procedure in accordance with membrane manufacturer's recommendations.
3. Complete the splice between flashing and the main roof sheet with specified splice adhesive before adhering flashing to the vertical surface.
4. Provide termination directly to the vertical substrate as shown on roof drawings.

F. Roof Drains:

1. Taper insulation around drain to provide smooth transition from roof surface to drain. Use specified pre-manufactured tapered insulation with facer or suitable bonding surface to achieve slope; slope not to exceed manufacturer's recommendations.
2. Position membrane, then cut a hole for roof drain to allow 1/2 to 3/4 inch (12 to 19 mm) of membrane to extend inside clamping ring past drain bolts.
3. Make round holes in membrane to align with clamping bolts; do not cut membrane back to bolt holes.
4. Apply sealant on top of drain bowl where clamping ring seats below the membrane
5. Install roof drain clamping ring and clamping bolts; tighten clamping bolts to achieve constant compression.

G. Flashing at Penetrations: Flash all penetrations passing through the membrane; make flashing seals directly to the penetration.

1. Pipes, Round Supports, and Similar Items: Flash with specified pre-molded pipe flashings wherever practical; otherwise use specified self-curing elastomeric flashing.
2. Pipe Clusters and Unusual Shaped Penetrations: Provide penetration pocket at least 2 inches (50 mm) deep, with at least 1 inch (25 mm) clearance from penetration, sloped to shed water.
3. Structural Steel Tubing: If corner radii are greater than 1/4 inch (6 mm) and longest side of tube does not exceed 12 inches (305 mm), flash as for pipes; otherwise, provide a standard curb with flashing.
4. Flexible and Moving Penetrations: Provide weathertight gooseneck set in sealant and secured to deck, flashed as recommended by manufacturer.

3.08 FINISHING AND WALKWAY INSTALLATION

- A. Install walkways at access points to the roof, around rooftop equipment that may require maintenance, and where indicated on the drawings.
- B. Walkway Pads: Adhere to the roofing membrane, spacing each pad at minimum of 1.0 inch (25 mm) and maximum of 3.0 inches (75 mm) from each other to allow for drainage.
 1. If installation of walkway pads over field fabricated splices or within 6 inches (150 mm) of a splice edge cannot be avoided, adhere another layer of flashing over the splice and extending beyond the walkway pad a minimum of 6 inches (150 mm) on either side.
 2. Prime the membrane, remove the release paper on the pad, press in place, and walk on pad to ensure proper adhesion.

3.09 FIELD QUALITY CONTROL

- A. Inspection by Manufacturer: Provide final inspection of the roofing system by a Technical Representative employed by roofing system manufacturer specifically to inspect installation for warranty purposes (i.e. not a sales person).
- B. Perform all corrections necessary for issuance of warranty.

3.10 CLEANING

- A. Clean all contaminants generated by roofing work from building and surrounding areas, including bitumen, adhesives, sealants, and coatings.

- B. Repair or replace building components and finished surfaces damaged or defaced due to the work of this section; comply with recommendations of manufacturers of components and surfaces.
- C. Remove leftover materials, trash, debris, equipment from project site and surrounding areas.

3.11 PROTECTION

- A. Where construction traffic must continue over finished roof membrane, provide durable protection and replace or repair damaged roofing to original condition.

END OF SECTION