



# SPFA-104

## Spray Polyurethane Foam Systems for New and Remedial Roofing

Spray Polyurethane Foam Alliance

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## ABOUT SPRAY POLYURETHANE FOAM ALLIANCE (SPFA)

Founded in 1987, the Spray Polyurethane Foam Alliance (SPFA) is the voice, and educational and technical resource, for the spray polyurethane foam industry. A 501(c)6 trade association, the alliance is composed of contractors, manufacturers, and distributors of polyurethane foam, related equipment, and protective coatings; and who provide inspections, surface preparations, and other services. The organization supports the best practices and the growth of the industry through a number of core initiatives, which include educational programs and events, the SPFA Professional Installer Certification Program, technical literature and guidelines, legislative advocacy, research, and networking opportunities. For more information, please use the contact information and links provided in this document.

## DISCLAIMER

**This document was developed to aid building construction and design professionals in choosing spray-applied polyurethane foam systems. The information provided herein, based on current customs and practices of the trade, is offered in good faith and believed to be true to the best of SPFA’s knowledge and belief.**

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Individual manufacturers and contractors should be consulted for specific information. Nominal values which may be provided herein are believed to be representative but are not to be used as specifications nor assumed to be identical to finished products. SPFA does not endorse the proprietary products or processes of any individual manufacturer, or the services of any individual contractor.

## DOCUMENT HISTORY

Date	Sections Modified	Description of Changes
October 2008		
August 2015	All	Administrative changes
January 2021	Cover and Header	New SPFA Logo
February 2021	Six foam surface photos	Added approximate scale for each photo.

## ROOFING COMMITTEE

### Mission Statement

The mission of the Roofing Committee is to provide a wide range of technical service to the SPF (spray polyurethane foam) industry such as, but not limited to:

- (1) Review existing documents and serve as a clearing house to ensure the “Continuity of Value” of technical information published by SPFA and others concerning roofing system products and services to the SPF industry;
- (2) Review, research, develop, and issue documents concerning new products, systems and services for SPF roofing applications; and
- (3) To identify, explore, develop, and communicate an understanding of roofing technical issues facing to the SPF industry.

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## **DESIGN CONSIDERATIONS**

### **GENERAL CONSIDERATIONS**

The performance of a spray-applied polyurethane foam roofing system can be affected by all the component parts of a roof structure, as well as the atmospheric conditions inside and outside the structure.

Proper structural design, specification review, and contractor and material selection, coupled with the compatibility and positioning of the various components of a roof structure, are a necessity to produce a successful roofing system.

Consult with the respective material suppliers and the successful contractor to receive written confirmation of their agreement to all facets of the roofing system, including, but not limited to, material selection, drainage, expansion joints, load design, flashing details, deck preparation, etc.

### **SURFACE/DECK PREPARATION, PROCEDURES, AND CONSIDERATIONS**

Spray polyurethane foam (SPF) can be successfully applied to most surfaces. However, the following general practices must be observed on all decks that are receiving SPF. See SPFA-138, "Guideline for Roof Assembly Evaluation for Spray Polyurethane Foam Roof System."

#### **(1) General Surface/Deck Preparation Procedures**

- a. The roof deck shall be securely fastened to the building structure and conform to proper load limits defined by the applicable building code. Special attention should be focused on the deflection rate under all types of roof conditions, including, but not limited to, foot traffic, mechanical equipment utilization, and live and dead loads.
- b. When either or both a primer and a vapor retarder are specified, there must be adequate adhesion between all components of the system to secure the entire system against wind uplift and movement.
- c. Prior to application of primer, vapor retarder, or polyurethane foam, the deck shall be properly cured, dry, and free of loose dirt or any contaminants that may interfere with proper adhesion of any of these respective components.
- d. Deck contaminants, depending on their severity and quantity, may be removed by use of air pressure, vacuum equipment, hand-power broom, chemical solvents, sandblasting, manual scraping, etc.

#### **(2) Wood Surfaces/Decks**

- a. A pre-treatment with a primer is necessary to achieve maximum adhesion of the polyurethane foam to a wood deck.

- b. Joints in excess of 1/4 in. in width shall be sealed prior to the application of the respective primer, vapor retarder, or polyurethane foam.

### (3) Metal Surfaces/Decks

- a. A pitch of 1/4 in. in 12 in. or more is recommended.
- b. A structural metal deck should not be lighter than 22 gauge.
- c. Sloped metal roof panels should not be lighter than 29 gauge.
- d. All joints should be correctly lapped, sealed, and fastened.
- e. Underlayment, if specified for the smoother application of polyurethane foam should be of sufficient width and thickness to span or fill flutes. Fastening shall be in accordance with applicable code requirements.

### (4) Concrete Surfaces/Decks

- a. In all cases, concrete should be free of laitance and chemical release agents.
- b. Priming is required on concrete surfaces, and it is recommended that due to the water of hydration that is present, poured concrete decks be permitted to cure for 28 days prior to the application of sprayed polyurethane foam.
- c. All joints should be filled and/or taped.
- d. SPF is not recommended for lightweight or insulating concretes unless tests have been made to determine that adequate adhesion can be obtained or an overlayment is installed.

## SELECTION OF PRIMER

Consult the foam manufacturer for the manufacturer's recommendations for proper primer selection according to the surface to be sprayed.

## SELECTION OF THE POLYURETHANE FOAM SYSTEM

A wide range of polyurethane foam systems is available in various densities, each exhibiting different temperature limitations, combustibility characteristic, etc. The use of these systems in combination with each other or with other conventional insulation products offers a wide range of economical installations.

As a purchaser, you should understand that most published data is run on laboratory-produced samples. The thickness of polyurethane foam sprayed, number of passes, temperatures of substrate, ambient temperatures, etc., have a pronounced effect on all properties.



From a fire safety standpoint, polyurethane foams can be used safely. It is important, however, that all persons associated with the design, fabrication, storage, and installation of polyurethane foam products understand the materials and environments involved.

Polyurethane foam insulation is combustible and should be treated as such. The flame spread rating provided for polyurethane products using small scale tests is not intended to reflect the hazards presented by this or any other materials under actual fire conditions. Care must be taken to ensure that the foam is not exposed to heat or flame.

### **SELECTION OF PROTECTIVE COATING**

When spray-applied polyurethane foam is applied externally, as an integral part of the roofing system, it must be given a protective covering for weather protection.

Typically, the required protection is attained through application of an elastomeric liquid applied coating system, following the manufacturer's recommendations.

The protective coating shall be a system that will cure to form a water-resistant protective membrane. The dry-film thickness (DFT) of the protective coating shall be in compliance with the coating manufacturer's specification.

The properties of the cured protective coating shall meet the minimum design characteristics of the generic type specified. The protective coating shall be specifically manufactured for the weather protection of polyurethane foam as used in roofing applications.

You, as a specifier, should consider the following items in the selection of the coating materials.

#### **(1) Physical Characteristics**

- a. Chemical resistance
- b. Water vapor permeance
- c. Tensile and elongation properties
- d. Retention of physical properties upon aging
- e. UV resistance

#### **(2) Performance Characteristics**

- a. Environment in which to be used (abuse, hail resistance, etc.)
- b. Life expectancy
- c. Ease of maintenance
- d. History of similar applications or laboratory data relating to the application in question
- e. Adhesion to the polyurethane foam
- f. Combustibility characteristics, individually and in combination with the selected

- polyurethane foam systems
- g. Ability to withstand foot traffic
- h. Aesthetic qualities

## MAINTENANCE PROCEDURES

It is strongly recommended that maintenance procedures, including annual inspections, be established with your selected contractor for any roofing system to yield its full value.

Contact the respective manufacturers/suppliers and contractors for their recommended maintenance procedures.

## RECOMMENDED GUIDE SPECIFICATIONS FOR NEW AND REMEDIAL ROOFING

**NOTE:** This guide is designed to help the specifier achieve a successful polyurethane foam and coating roofing system. It is the responsibility of the specifier to consult with the manufacturer of the material specified as to the manufacturer's specific recommendations.

### PART 1 – GENERAL

This guide discusses the application of a seamless, sprayed-in-place polyurethane foam with a protective coating for use as an insulated roofing system for new or retrofit roofing. Your contractor, the selected system's manufacturer, and the code agencies can assist you, as each project must be assessed individually.

#### 1.01 SCOPE OF WORK

Furnish all labor, materials, tools, and equipment necessary for the application of a polyurethane foam roofing system, including accessory items, subject to the general provisions of the contract.

#### 1.02 RELATED WORK SPECIFIED ELSEWHERE

Cast-in-place Concrete	Section 03300
Metal Decking	Section 05300
Rough Carpentry	Section 06100
Insulation	Section 07200
Membrane Roofing	Section 07500
Flashing and Sheet Metal	Section 07600
Roof Specialties and Accessories	Section 07700
Skylights	Section 07800

Mechanical  
Electrical

Division 15  
Division 16

### 1.03 QUALITY ASSURANCE

- (1) Contractor Qualifications: The proposed contractor should provide information concerning projects similar in nature to the one proposed, including location and person to be contacted. Some manufacturers of SPF systems and/or protective coatings have approval programs and/or licensing methods that could be required.
- (2) Manufacturer Qualifications: Polyurethane foam and protective coating manufacturers shall show evidence of sufficient financial resources and manufacturing facilities to furnish the materials for this project. References shall be required, and sufficient project lists, warranties, and code approvals shall be submitted for verification.
- (3) Inspections: The polyurethane foam and protective coating manufacturers are to provide qualified representatives to monitor and inspect the installation of their products. Third-party inspection of the installation is recommended. A list of SPFA inspector members is available.

### 1.04 SUBMITTALS

- (1) Manufacturers are to provide published data sheets or letters of certification that their products comply with the materials specified. This is to include primers (if required), polyurethane foam, and protective coatings.
- (2) Shop drawings on sheet metal, accessories, or other fabricated items.
- (3) Manufacturer's application or installation instructions.
- (4) Contractor/applicator certification from the polyurethane foam supplier and/or protective coatings manufacturers and evidence of contractor/applicator qualification and experience. (See Section 1.03A.)
- (5) A specimen copy of the applicable warranty for the project. (See Section 1.03B.)
- (6) Approval and information guides for applicable local or national codes and/or insurance acceptability, if required.
- (7) Safety and handling instructions for storage, and the handling and use of the materials to include appropriate Materials Safety Data Sheets (MSDS).
- (8) Field Quality Control Procedures to be utilized by the contractor/applicator to ensure proper preparation and installation of polyurethane foam and protective coatings, detail work, and follow-up inspection.
- (9) SPFA sprayed polyurethane foam surface visual guide.

### 1.05 MATERIALS, DELIVERY AND STORAGE

- (1) Materials shall be delivered in the manufacturer's original, tightly sealed containers, or unopened packages, all clearly labeled with the manufacturer's name, product

identification, safety information, and batch or lot numbers where appropriate. Where materials are covered by a referenced specification, the labels shall bear the specification number, type, and class, as applicable.

- (2) Containers shall be stored out of the weather and direct sunshine where the temperatures are within the limits specified by the manufacturer.
- (3) All materials shall be stored in compliance with local fire and safety requirements.

#### **1.06 ENVIRONMENTAL CONDITIONS**

- (1) The polyurethane foam applications shall not proceed during periods of inclement weather. Do not apply the polyurethane foam below the temperature and/or above the humidity for ambient air and substrate specified by the manufacturer.
- (2) Do not apply protective coatings when there is ice, frost, surface moisture, or other visible dampness present on the surface to be coated. Prior to applying the coatings, check the polyurethane foam to ensure that the surface is dry. Apply protective coatings in accordance with the coating manufacturer's application instructions.
- (3) Wind barriers may be used if wind conditions could affect the quality of the polyurethane foam or protective coating installation.

### 1.07 SEQUENCING AND SCHEDULING

In new construction projects, the SPF is installed when the deck, parapet walls, rough openings, and curbs are completed. The type of skylight used will determine when skylights should be installed. Plumbing vents, drains, and electrical penetrations should all be in place. There should not be any other tradespeople working on the roof when the SPF and coating are being installed.

### 1.08 WARRANTY

Warranty agreements vary in duration and content. If a warranty is desired, establish parameters as a prerequisite to the execution of a contract.

### 1.09 SAFETY REQUIREMENTS

- (1) See CPI Bulletin AX-205, “Working with MDI and Polymeric MDI: What You Should Know.”
- (2) Refer to the appropriate Materials Safety Data Sheets (MSDS).
- (3) Before applying SPF or coating, any potential sources of air entry into the building must be sealed.

## PART 2 — PRODUCTS

### 2.01 POLYURETHANE FOAM

- (1) The polyurethane foam to be applied shall be a two-component system made by combining an isocyanate A-component with a polyol B-component and shall possess the following physical characteristics:

PROPERTIES	ASTM TEST	METRIC UNITS	U.S. UNITS
Density	D1622	40 kg/m <sup>3</sup> (min)	2.5 pcf or lbs/ft. <sup>3</sup> (min)
Compressive Strength	D1621	270 kPa (min)	40 psi or lbs/in. <sup>2</sup> (min)
Open Cell Content	D2856	10% (max)	10% (max)
R-Value	C177, C518, C1363	As reported	As reported
Flammability	E84*	Not more than 75 FSI	

**Table 1:** Closed Cell Type Polyurethane Foam

\*This standard is used solely to measure and describe the properties of products in response to heat and flame under controlled laboratory conditions This numerical flame spread rating is not intended to reflect hazards presented by this or any other material under actual fire conditions.

- (2) Polyurethane Foam Primers: Primers used shall be as recommended by the manufacturer of the spray foam materials specified.
- (3) Fire Safety Requirements: See CPI Bulletin AX-230, “Fire Safety Guidelines for Use of Rigid Polyurethane and Polyisocyanate Foam Insulation in Building Construction.”

**2.02 PROTECTIVE COATING**

- (1) The elastomeric coating system may be one or more of the following types:
  - a. Acrylics (See ASTM D 6083, “Standard Specification for Liquid Applied Acrylic Coating Used in Roofing.”)
  - b. Silicones (See ASTM D 6694, “Standard Specification for Liquid-Applied Silicone Coating Used in Spray Polyurethane Foam Roofing.”)
  - c. Polyurethanes (See ASTM D 6947, “Standard Specification for Liquid Applied Moisture Cured Polyurethane Coating Used in Spray Polyurethane Foam Roofing System.”)
  - d. Butyls
- (2) Physical Properties: The elastomeric coating system shall possess the following physical characteristics:

PROPERTIES	TEST METHOD	VALUE (see note below)
Tensile Strength	ASTM D 412	
Elongation	ASTM D 412	
Hardness, Shore “A”	ASTM D 2240	
Tear Resistance (lb per lineal inch)	ASTM D 624	
Ultra Violet Light Exposure		
Moisture Vapor Transmission	ASTM E 96, Procedure E	
Fire Resistance of System**	ASTM E 108 or UL 790	

**NOTE:** The specifier shall list the physical properties of the chosen elastomeric coating system.

\*\*This standard is used solely to measure and describe the properties of products in response to heat and flame under controlled laboratory conditions. This numerical flame spread rating is not intended to reflect hazards presented by this or any other material under actual fire conditions.

- (3) General: It is recommended that the coating system be elastomeric in nature (at least

100% elongation). Elastomeric coating systems include both vapor retarder and non-vapor retarder systems.

A vapor retarder coating is one that has a permeance of 1 perm or less based on ASTM 96-E (perm inch method). A non-vapor retardant coating has a permeance greater than 1 perm. For further information about perm rating and coating selection, see SPFA-118, “Water Vapor Transmission and Spray Polyurethane Foam.”

**NOTE:** Special consideration should be given to those applications, such as freezers and coolers, which may exceed conventional moisture vapor drive conditions.

For further information about protective coatings, see SPFA-102, “A Guide for Selection of Protective Coatings over Sprayed Polyurethane Foam Roofing Systems.”

### 2.03 ACCESSORIES AND MISCELLANEOUS MATERIALS

- (1) Flashings and waterproof coverings for expansion joints shall be compatible with the specified polyurethane foam and elastomeric coating system and shall be as recommended by the manufacturers of the systems specified.
- (2) Miscellaneous materials such as adhesives, elastomeric caulking compounds, metal, vents, and drains shall be a composite part of the roof system and shall be those recommended by the system's manufacturer.
- (3) Granules (optional): When used, granules shall be of the size and type and applied in the topcoat as recommended by the coating manufacturer.
- (4) Boardstock: If boardstock is required over metal decks, fasten to achieve the necessary wind uplift requirements.

## PART 3 – EXECUTION

### 3.01 GENERAL

Guidelines as outlined by the manufacturer issuing the warranty shall be the final specification authority.

### 3.02 SURFACE PREPARATION AND PRIMING

- (1) Built-up Roof (Retrofit)
  - a. All loose gravel, dust, and residue shall be removed using power vacuum equipment, a power sweeper, air blowing, or other suitable means.
  - b. The roof shall be thoroughly inspected or tested to determine if moisture is present within the roof assembly. Saturated insulation must be removed and replaced with compatible materials.
  - c. The existing roof shall be thoroughly inspected for adhesion between felts, insulation, and deck. Areas of poor adhesion should be fastened. Blisters, buckles, wrinkles, and fishmouths shall be cut out and/or fastened.
  - d. All soft mastic or other materials that impede polyurethane adhesion shall be removed or covered with a mechanically fastened recover board.
  - e. Remove or refasten all loose baseflashing, counterflashing, and gravel stops as required.
  - f. The need may exist for structural design analysis to determine expansion joint requirements. Existing expansion joints should be inspected and repaired if necessary.
  - g. Lightning rods shall be masked prior to foaming. Lightning rod cables shall not be embedded in the polyurethane foam and should be removed prior to foaming. Electrical and mechanical conduits should be relocated or raised above the



finished roof surface. Lightning protection equipment and electrical work must be performed by qualified personnel.

(2) Metal Deck

- a. The metal roof deck shall be constructed of a minimum 22 gauge steel. Construction shall conform to local building codes.
- b. Ferrous Metal: Sandblast iron and steel surfaces that are not primed, shop-painted, or otherwise protected in accordance with SSPC SP-6, "Commercial Blast Cleaning." Remove loose rust and unsound primer from shop-primed iron and steel surfaces by scraping or wire brushing.
- c. Non-ferrous Metal: Clean and/or prime galvanized metal, aluminum, and stainless steel surfaces as recommended by the manufacturer issuing the warranty.
- d. If the metal surface is free of loose scale, rust, and weathered or chalking paint, it can be cleaned using a compressed air jet, vacuum equipment, and a hand or power broom to remove loose dirt. Grease, oil, or other contaminants shall be removed with proper cleaning solutions.
- e. Fluted metal decks require a suitable method of covering or filling the flutes prior to polyurethane foam application. Flutes may be covered with mechanically fastened boardstock or open weave mesh fabric, or filled with precut boardstock or spray-applied polyurethane foam.

(3) Concrete

- a. Remove loose dirt, dust, and debris by using a compressed air jet, vacuum equipment, or brooming. Oil, grease, form release agents, or other contaminants shall be removed with proper cleaning solutions.
- b. All joint openings in concrete decks that exceed 1/4 in. shall be grouted or caulked prior to application of polyurethane foam.
- c. Priming is required on concrete surfaces, and it is recommended that poured concrete decks be permitted to cure for 28 days prior to the application of primer or SPF.
- d. SPF is not recommended for lightweight or insulating concretes unless tests have been made to determine that adequate adhesion can be obtained or unless an overlayment is installed.

(4) Wood

- a. Plywood shall be exterior grade not less than 1/2 in. thick and nailed firmly in place. Attachment must meet building code requirements for resistance to wind uplift.
- b. Plywood shall contain no more than 18% water, as measured in accordance with ASTM D 4444-84, or ASTM D 4442-84.
- c. All untreated and unpainted surfaces shall be primed with an exterior grade primer. Priming is required to minimize moisture absorption and eliminate

- potential polyurethane foam adhesion problems.
- d. Plywood joints in excess of 1/4 in. shall be taped or filled with a suitable sealant material.
  - e. The deck shall be free of loose dirt, grease, oil, or other contaminants prior to priming or foam application. Remove loose dirt or debris by the use of a compressed air jet, vacuum equipment, or brooming. No washing shall be permitted.
  - f. Tongue and Groove, Sheathing, and Planking: Due to the frequency of joints, possibility of variable openings, and effects of aging and shrinking, these surfaces must be overlaid with a minimum 1/4 in. thick exterior grade plywood or suitable covering.
- (5) Other Surfaces (e.g., gypsum board, polyisocyanurate board)
- a. These materials are generally used over fluted metal decks and must be fastened to achieve necessary wind uplift requirements.
  - b. Boards shall be firmly butted together along all the edges without gaps or openings. Joints exceeding 1/4 in. shall be caulked with a suitable sealant material.
  - c. Special care must be taken to prevent these materials from getting wet in storage on the jobsite and prior to being protected by polyurethane foam after installation. Moisture exposure will damage these materials and may be a cause for replacement.
  - d. Remove loose dirt and debris by using a compressed air jet, vacuum equipment, or light brooming. No power-brooming is permitted due to the possibility of damage.
  - e. The installed materials shall be protected from spills of contaminants such as oil, grease, solvents, etc., because these materials cause soiling that cannot be readily removed from the board surfaces.

### 3.03 POLYURETHANE FOAM APPLICATION

#### (1) Inspection

- a. Prior to application of the foam, the surface shall be inspected to ensure that the conditions required by Section 3.02 have been met.
- b. The substrate shall have sufficient slope to eliminate excessive ponding water. Ponding is defined as, “the accumulation of water in low-lying areas that exceeds the manufacturer’s specification and/or contract documents.” If the substrate does not have sufficient slope, then the ponding water must be eliminated by building in slope by the application of polyurethane foam, channeling the polyurethane foam, by the proper placement of drains, or a combination thereof.
- c. The polyurethane foam application shall not proceed during periods of inclement weather. The applicator shall not apply the polyurethane foam below the temperature and/or humidity for ambient air and substrate specified by the

manufacturer. Wind barriers may be used if wind conditions could affect the quality of installation.

(2) Application

- a. The SPF shall be applied in accordance with the manufacturer's specification and instructions.
- b. Areas to be built-up to remove ponding water are to be filled in with SPF before the specified thickness of the polyurethane foam is applied to the entire roof surface.
- c. The SPF must be applied in a minimal pass thickness of 1/2 in.
- d. SPF thickness shall be a minimum of 1 in. (or more if specified). The polyurethane foam shall be applied uniformly over the entire surface with a tolerance of plus 1/4 in. per inch of thickness minus 0 in., except where variations are required to ensure proper drainage or to complete a feathered edge.
- e. The spray polyurethane foam shall be uniformly terminated a minimum of 4 in. above the roofline at all penetrations (except drains, parapet walls, or building junctions). Foamed-in-place cants shall be smooth and uniform to allow positive drainage.
- f. **When detailing skylights or high walls, it is particularly important not to cover weep holes with SPF or coating.**
- g. Prior to application of the foam, the surface shall be inspected to ensure that the conditions required by Section 3.02 have been met.
- h. The substrate shall have sufficient slope to eliminate excessive ponding water. Ponding is defined as, "the accumulation of water in low-lying areas that exceeds the manufacturer's specification and/or contract documents." If the substrate does not have a sufficient slope, then the ponding water must be eliminated by building in slope by the application of polyurethane foam, by channeling the polyurethane foam, by the proper placement of drains, or by a combination thereof.
- i. The polyurethane foam application shall not proceed during periods of inclement weather. The applicator shall not apply the polyurethane foam below the temperature and/or humidity for ambient air and substrate specified by the manufacturer. Wind barriers may be used if wind conditions could affect the quality of installation.
- j. The SPF shall be applied in accordance with the manufacturer's specification and instructions.
- k. Areas to be built-up to remove ponding water are to be filled in with SPF before the specified thickness of polyurethane foam is applied to the entire roof surface.
- l. The SPF must be applied in a minimal pass thickness of 1/2 in.
- m. SPF thickness shall be a minimum of 1 in. (or more if specified). The polyurethane foam shall be applied uniformly over the entire surface with a tolerance of plus 1/4 in. per inch of thickness minus 0 in., except where variations are required to ensure proper

drainage or to complete a feathered edge.

- n. The SPF shall be uniformly terminated a minimum of 4 in. above the roofline at all penetrations (except drains, parapet walls, or building junctions). Foamed-in-place cants shall be smooth and uniform to allow positive drainage.
- o. The full thickness of polyurethane foam in any area shall be completed prior to the end of each day. If due to weather conditions more than 24 hours elapse between polyurethane foam and coating application, the polyurethane foam shall be inspected for UV degradation, oxidation, or contamination. If any of the foregoing conditions exist, the surface shall be prepared in conformity with the recommendations of the manufacturer issuing the warranty.

### (3) Surface Finish

- a. The final SPF surface shall be smooth, orange peel, coarse orange peel, or verge of popcorn in texture. Polyurethane foam surfaces termed “popcorn” or “treebark” are not acceptable. These areas shall be removed and refoamed to an acceptable surface. (See surface texture photos.)
- b. Any damage or defects to the polyurethane foam surface shall be repaired prior to the protective coating application.
- c. The polyurethane foam surface shall be free of moisture, frost, dust, debris, oils, tars, grease, or other materials that will impair the adhesion of the protective coating.

## 3.04 PROTECTIVE COATING APPLICATION

### (1) Inspection

- a. Prior to the application of the protective coating, the polyurethane foam shall be inspected for suitability of base coat application as per Section 3.03. The polyurethane foam shall be clean, dry, and sound.

### (2) Application

#### a. Base Coat

- i. The base coat shall be applied on the same day as the polyurethane foam application when possible. In no case shall less than 2 hours elapse between the application of the polyurethane foam and the application of the base coat. If more than 24 hours elapse prior to the application of base coat, the polyurethane foam shall be inspected for UV degradation.
- ii. The polyurethane foam shall be free of dust, dirt, contaminants, and moisture before the application of the base coat.
- iii. The base coat shall be applied at a uniform thickness with the rate of application being governed by the polyurethane foam surface texture. Coatings shall be applied at such a rate as to give the minimum dry-film

- thickness specified by the protective coating manufacturer.
- iv. The coating shall be allowed to cure and be inspected for pinholes, thinly coated areas, uncured areas, or other defects. Any defects should be repaired prior to subsequent applications. The base coat shall be free of dirt, dust, water, or other contaminants before the application of the topcoat.
  - v. The coating application shall not proceed during periods of inclement weather. The applicator shall not apply the protective coating below the temperature and/or above the humidity for ambient air and substrate specified by the manufacturer. Wind barriers may be used if wind conditions could affect the quality of installation.
- b. Topcoat and/or Subsequent Coat
- i. Application – Subsequent coating should be applied in a timely manner to ensure proper adhesion between coats. The surface texture of the polyurethane foam will affect the dry-film thickness—additional material may be required in areas with a coarse foam profile.
  - ii. Inspection – The cured dry-film thickness of the finished multiple-coat application shall be checked by taking slit samples and examining the samples under magnification. Areas that are found to have less than the thickness specified shall require additional coating.

### **3.05 GRANULE APPLICATION (OPTIONAL)**

Granules, when specified, should be embedded in the topcoat. Apply the granules into the final layer of the coating while it is still wet. Granules should be applied at a rate and using a method based on the manufacturer's recommendations. The color and type of granules shall be approved by the specifier.

### **3.06 WALKWAYS**

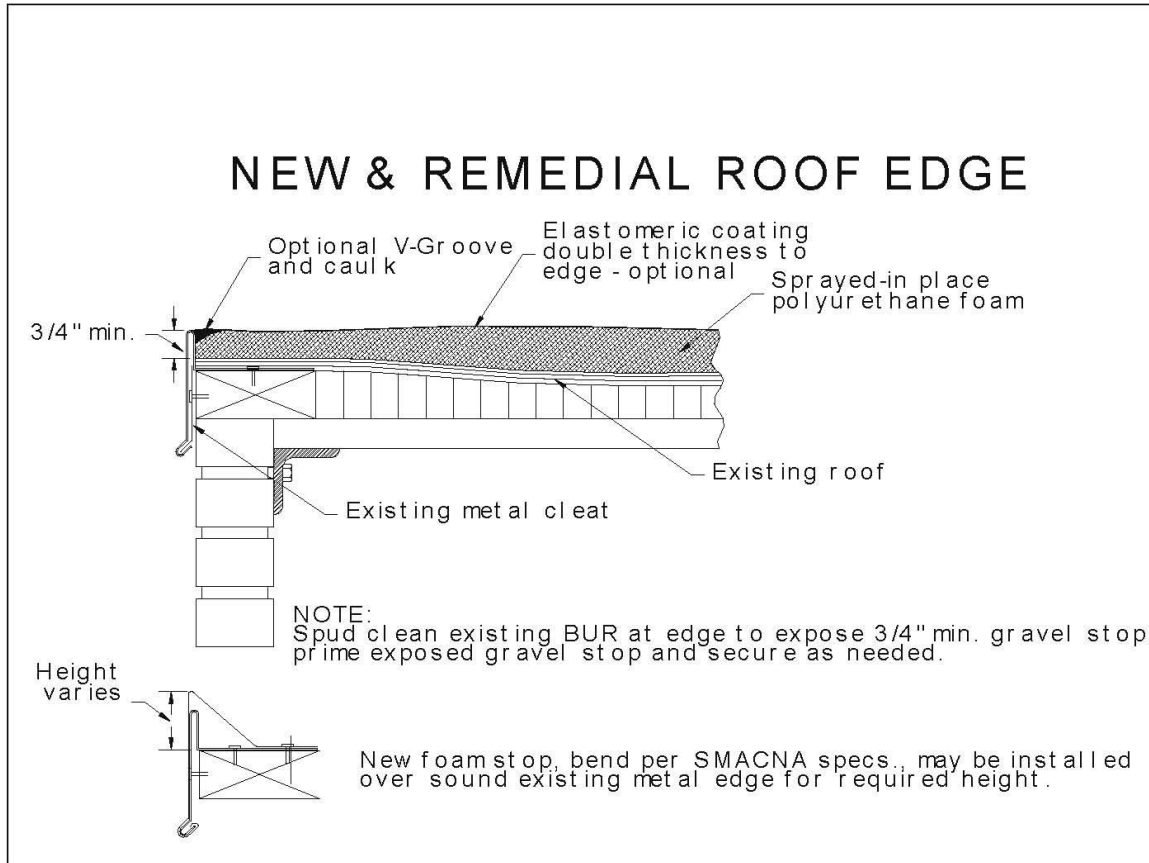
Walkways may be installed for heavy traffic areas and around frequently serviced rooftop units. Breathable walk pads should be installed as recommended by the coating manufacturer.

### **3.07 SAFETY REQUIREMENTS**

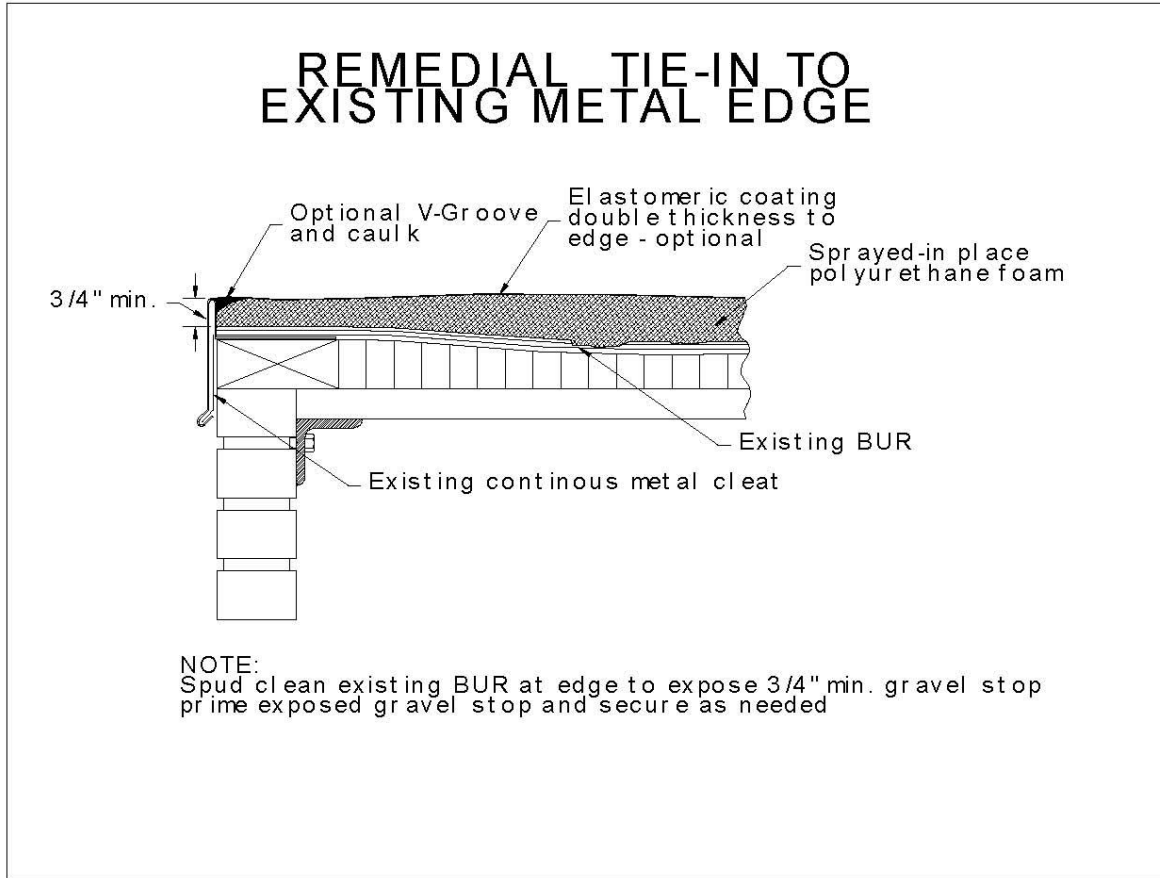
- (1) See CPI Bulletin AX-205, "Working with MDI and Polymeric MDI: What You Should Know."
- (2) Refer to appropriate Materials Safety Data Sheets (MSDS) for additional safety information.
- (3) Before starting to apply SPF or coating, any potential sources of air entry into the building must be sealed.

## Detail Drawings

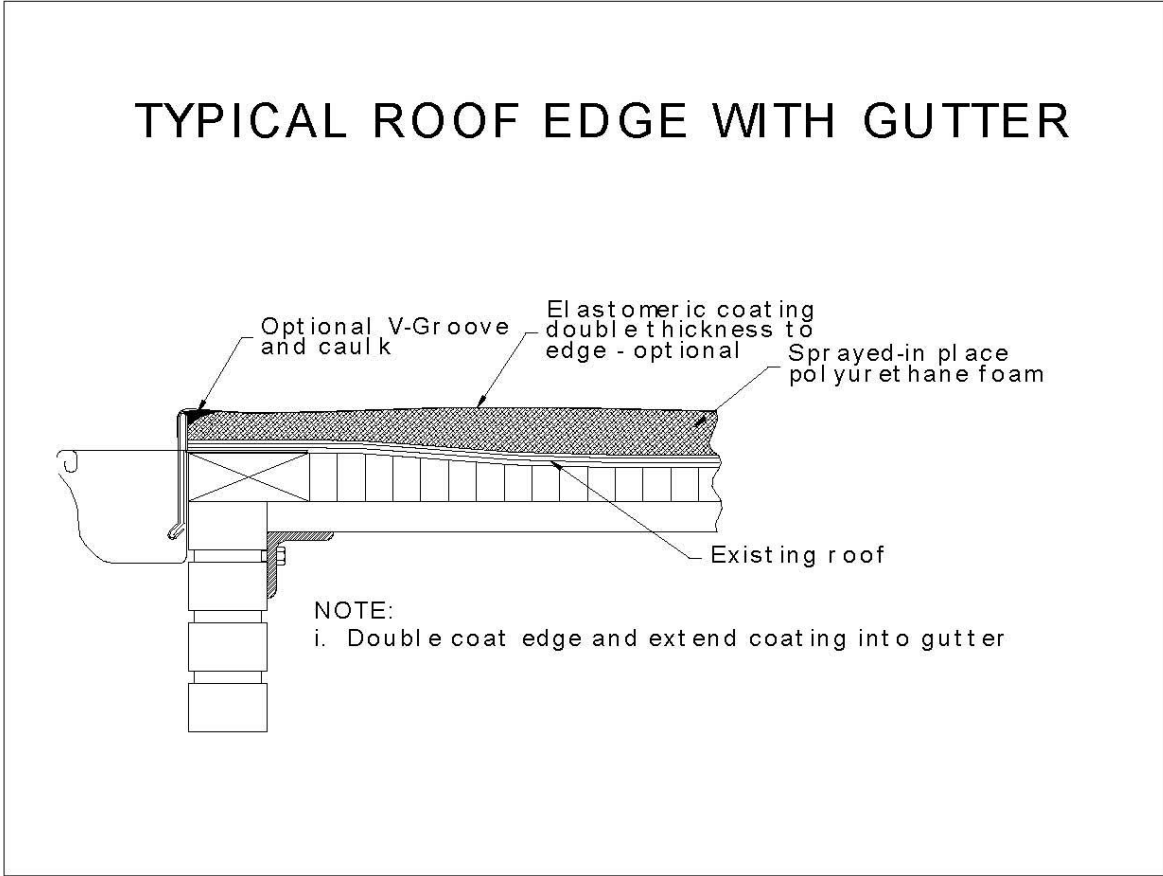
**DETAIL DRAWING 1: NEW & REMEDIAL ROOF EDGE**



**DETAIL DRAWING 2: REMEDIAL TIE-IN TO EXISTING METAL EDGE**

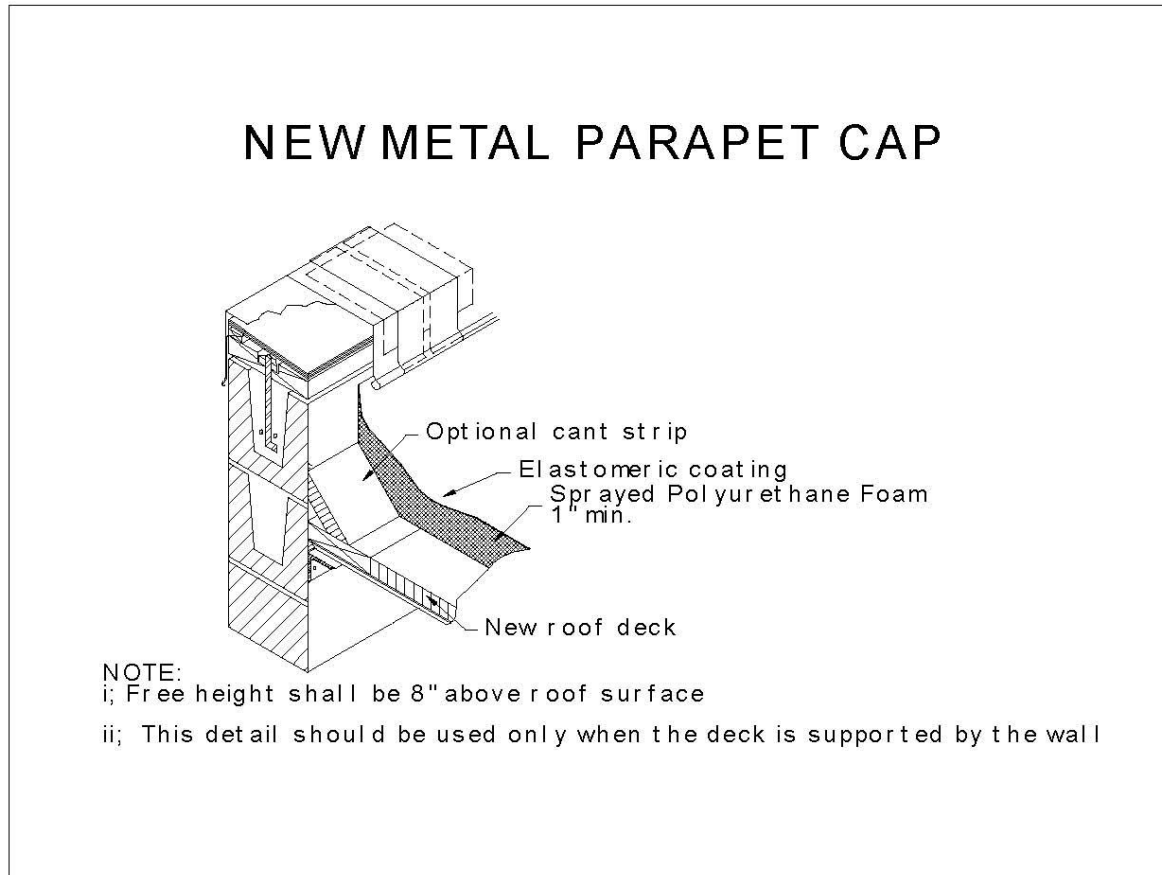


**DETAIL DRAWING 3: TYPICAL ROOF EDGE WITH GUTTER**

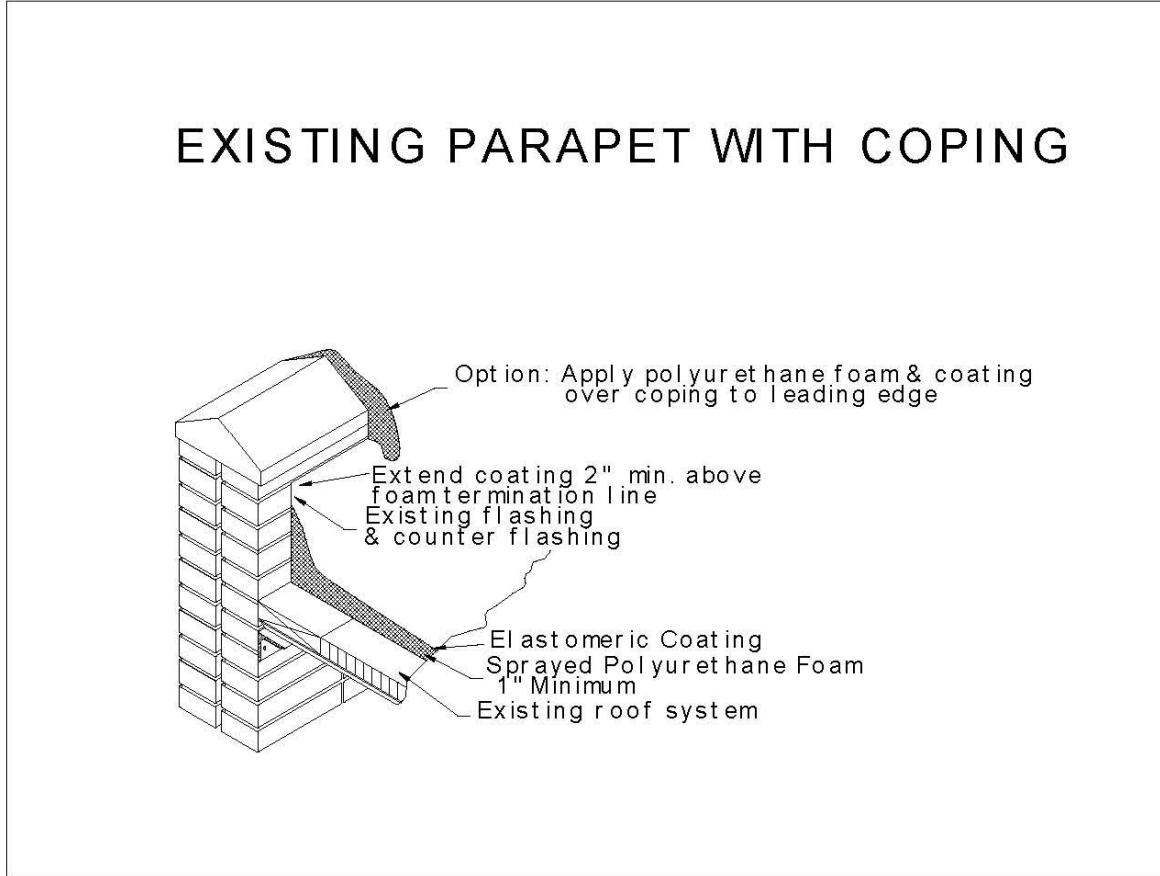




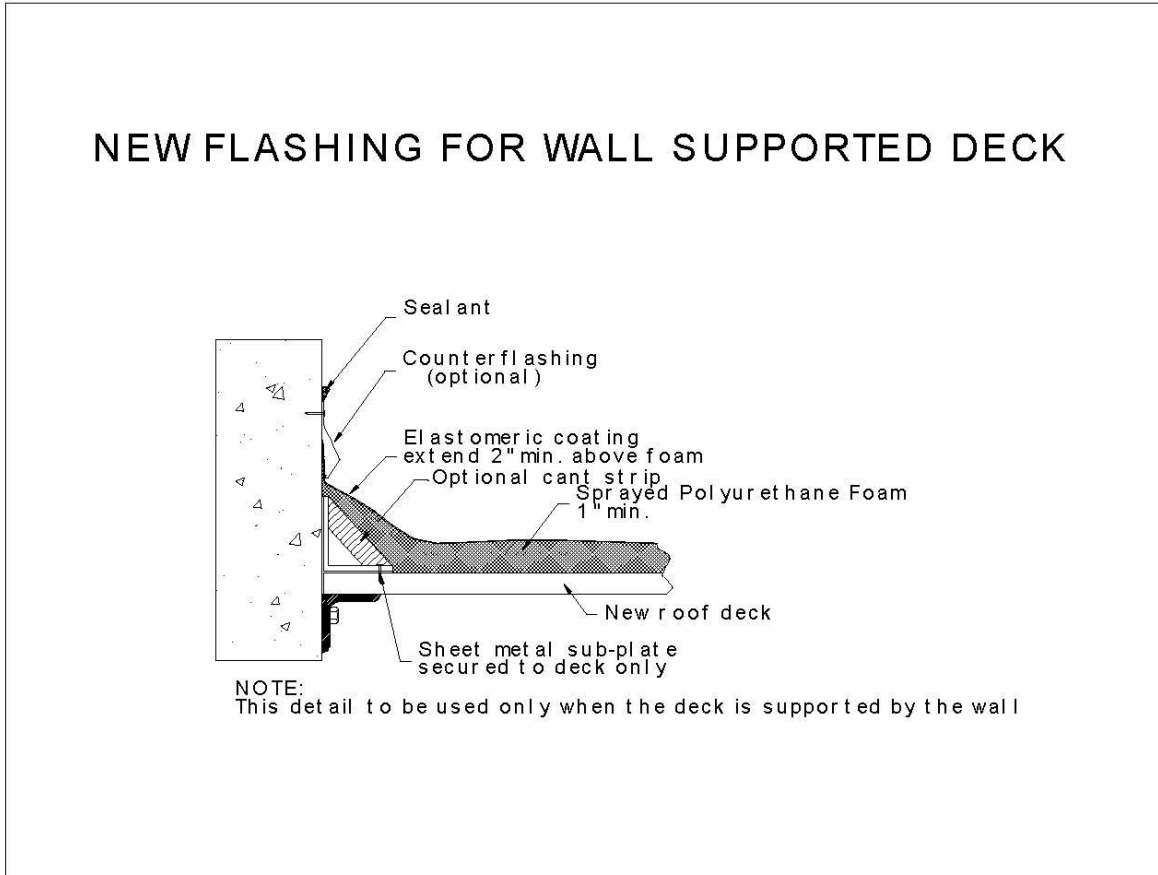
**DETAIL DRAWING 4: NEW METAL PARAPET CAP**



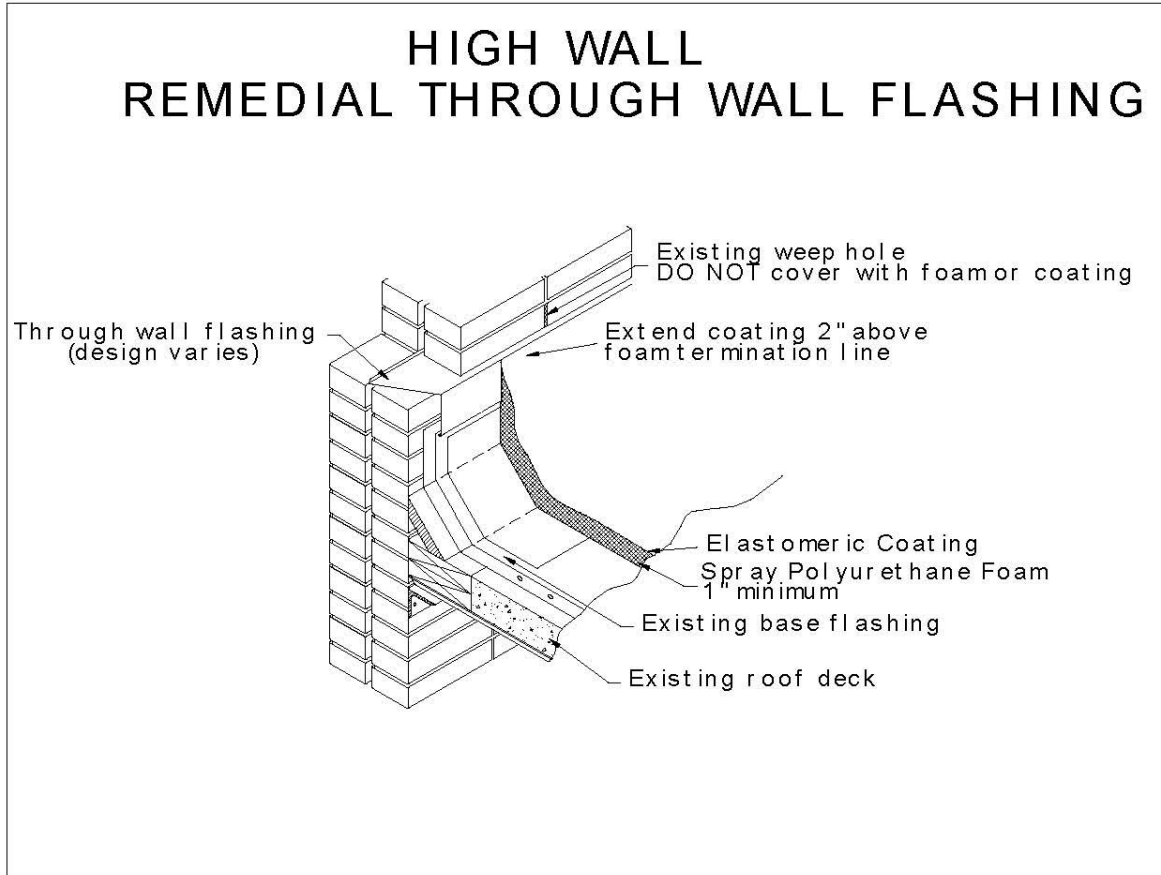
**DETAIL DRAWING 5: EXISTING PARAPET WITH COPING**



**DETAIL DRAWING 6: NEW FLASHING FOR WALL SUPPORTED DECK**

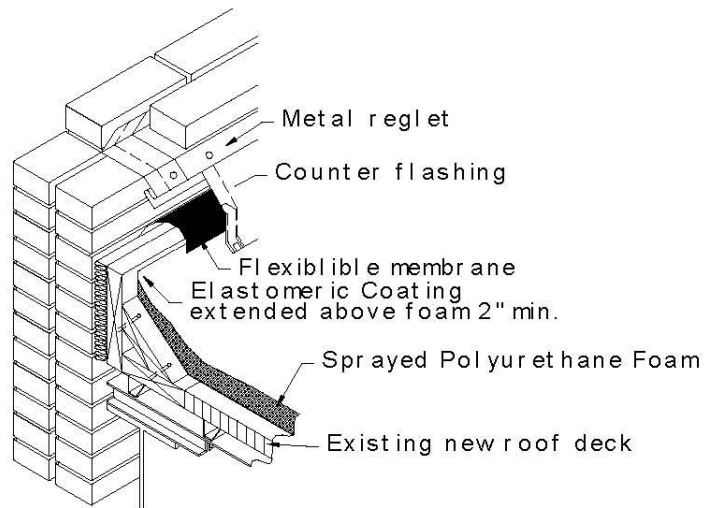


**DETAIL DRAWING 7: HIGH WALL REMEDIAL THROUGH WALL FLASHING**



**DETAIL DRAWING 8: FLASHING FOR NEW NON-WALL SUPPORTED DECK**

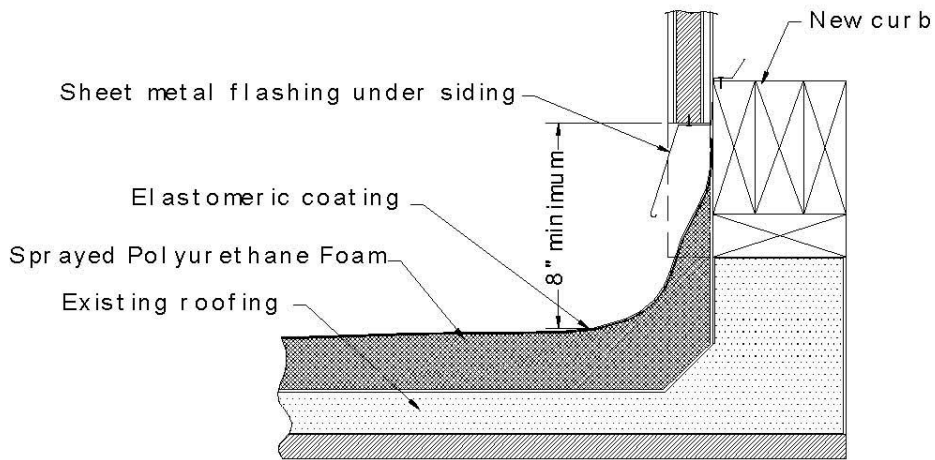
## FLASHING FOR NEW, NON-WALL SUPPORTED DECK



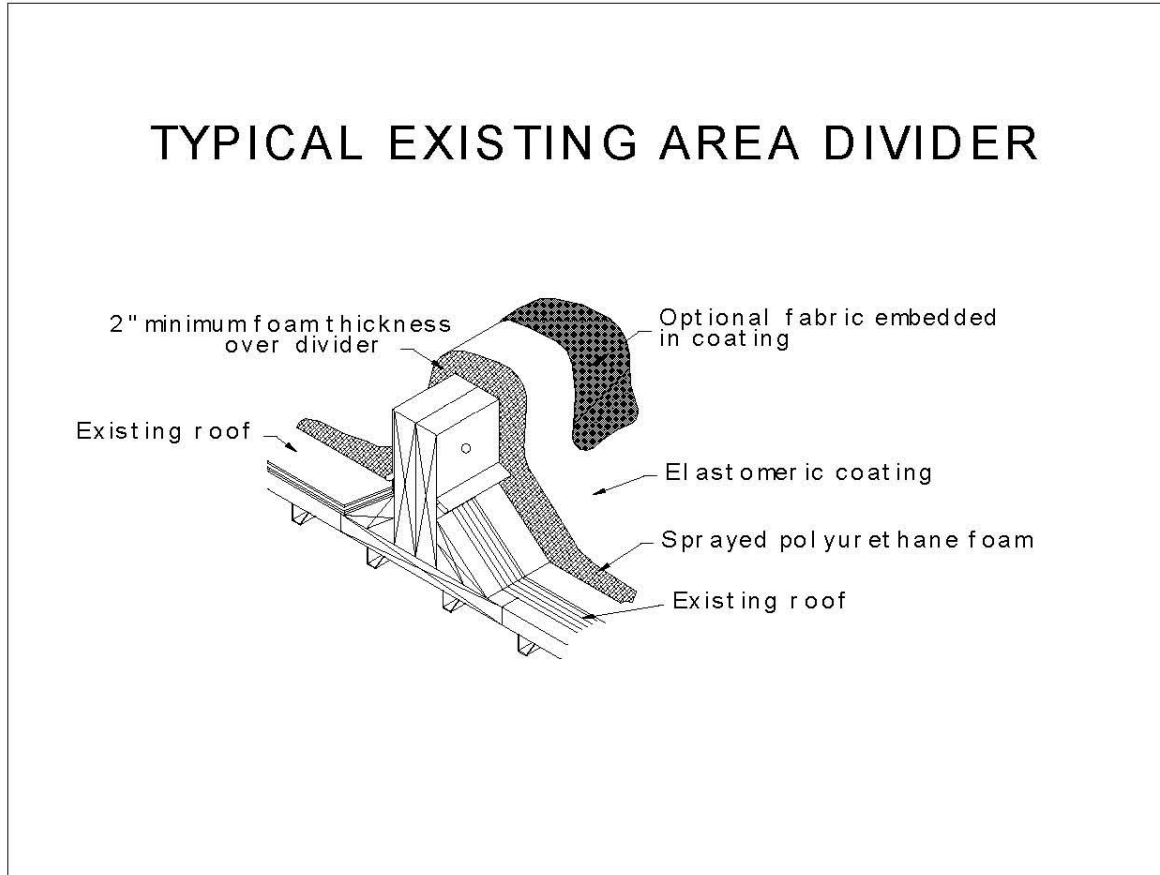
NOTE:  
Free height should be  
8" above new roof surface

**DETAIL DRAWING 9: NEW OR REMEDIAL SIDING OR HIGH WALL**

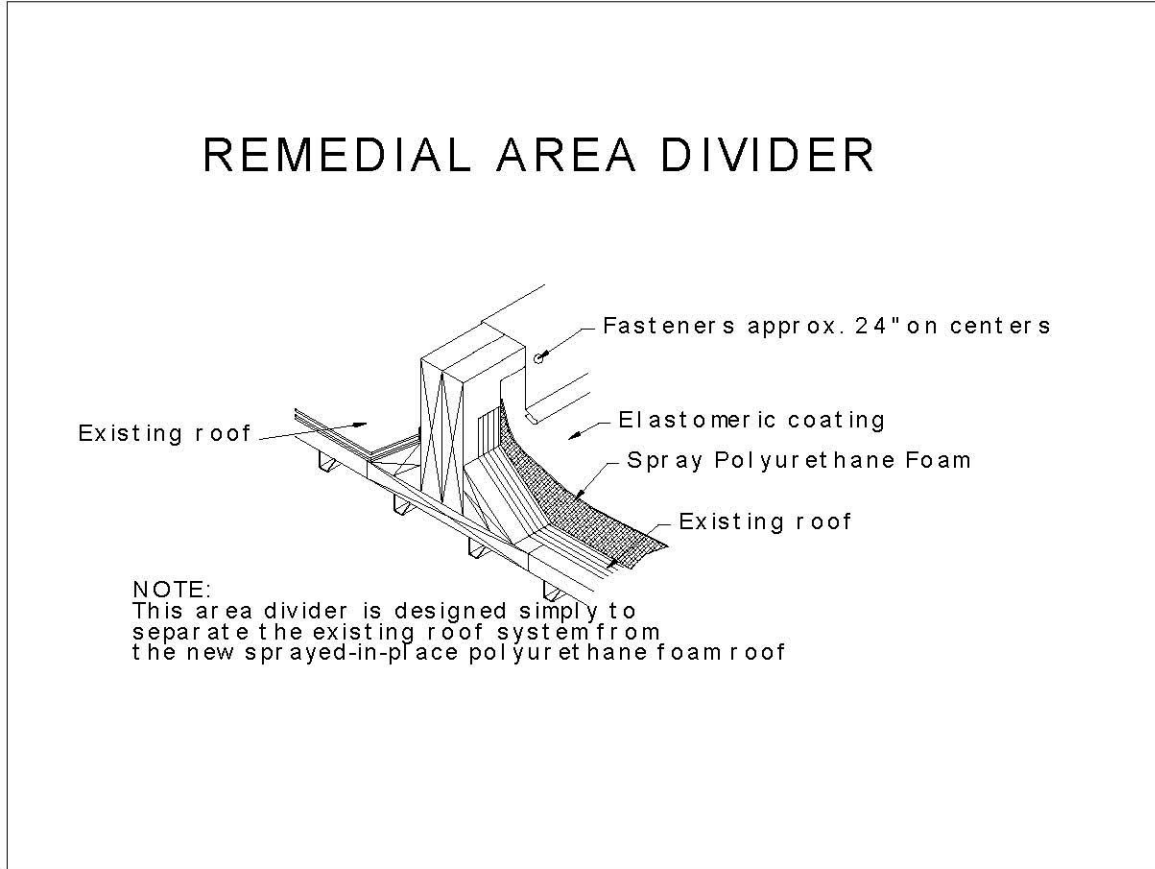
# NEW OR REMEDIAL SIDING OR HIGH WALL



**DETAIL DRAWING 10: TYPICAL EXISTING AREA DIVIDER**

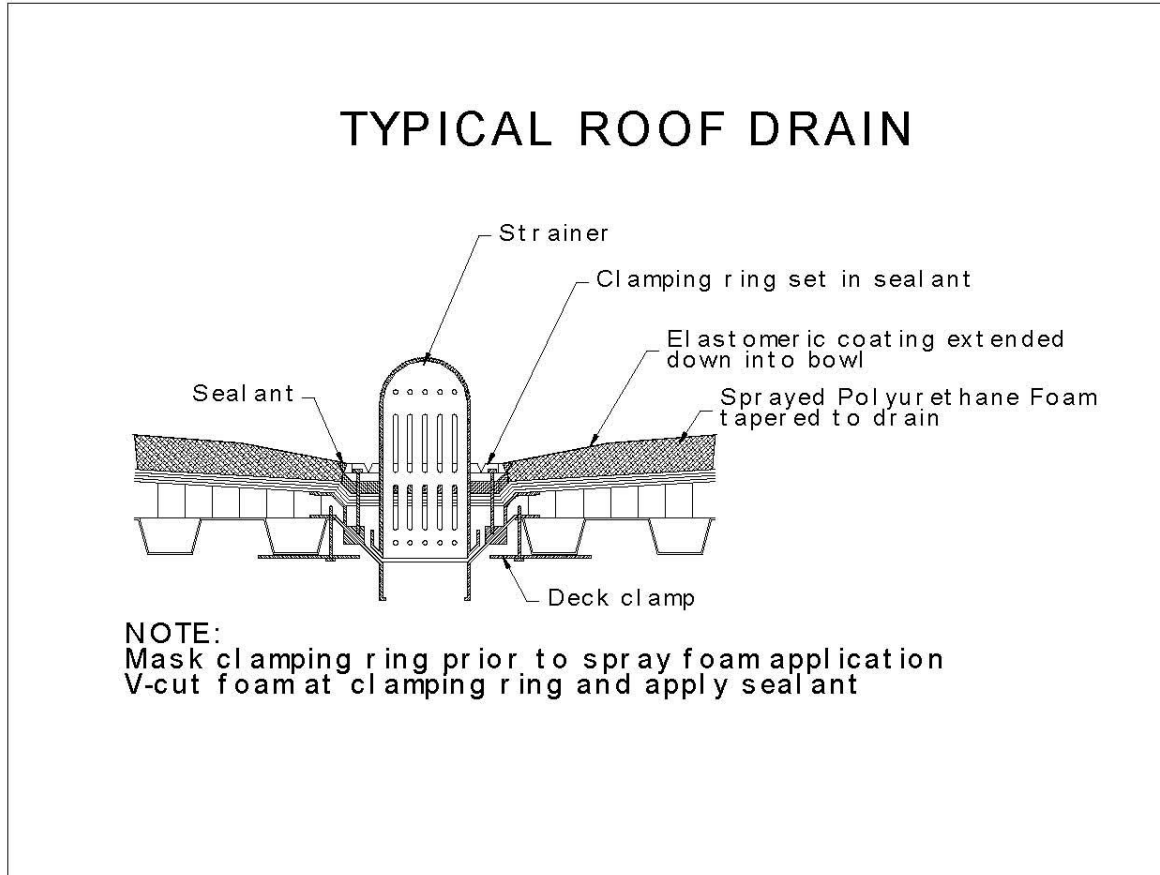


**DETAIL DRAWING 11: REMEDIAL AREA DIVIDER**

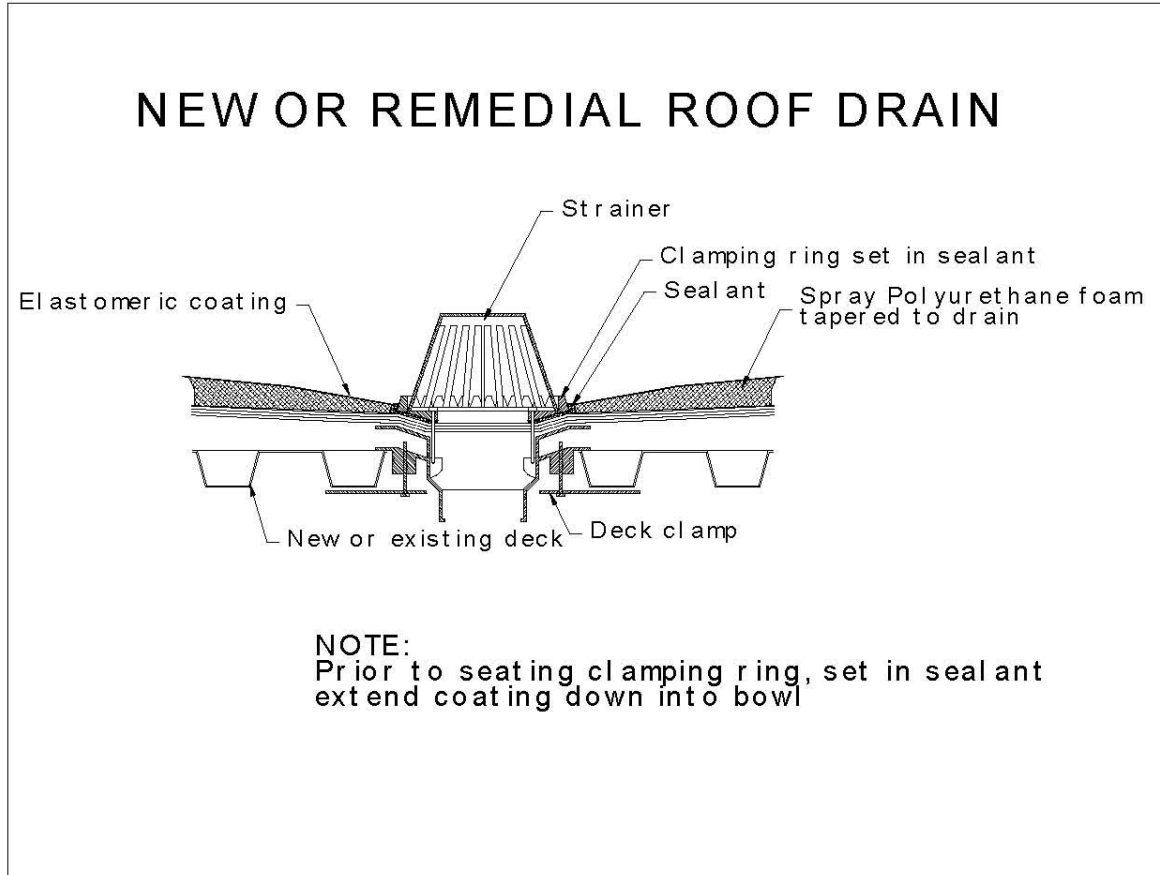




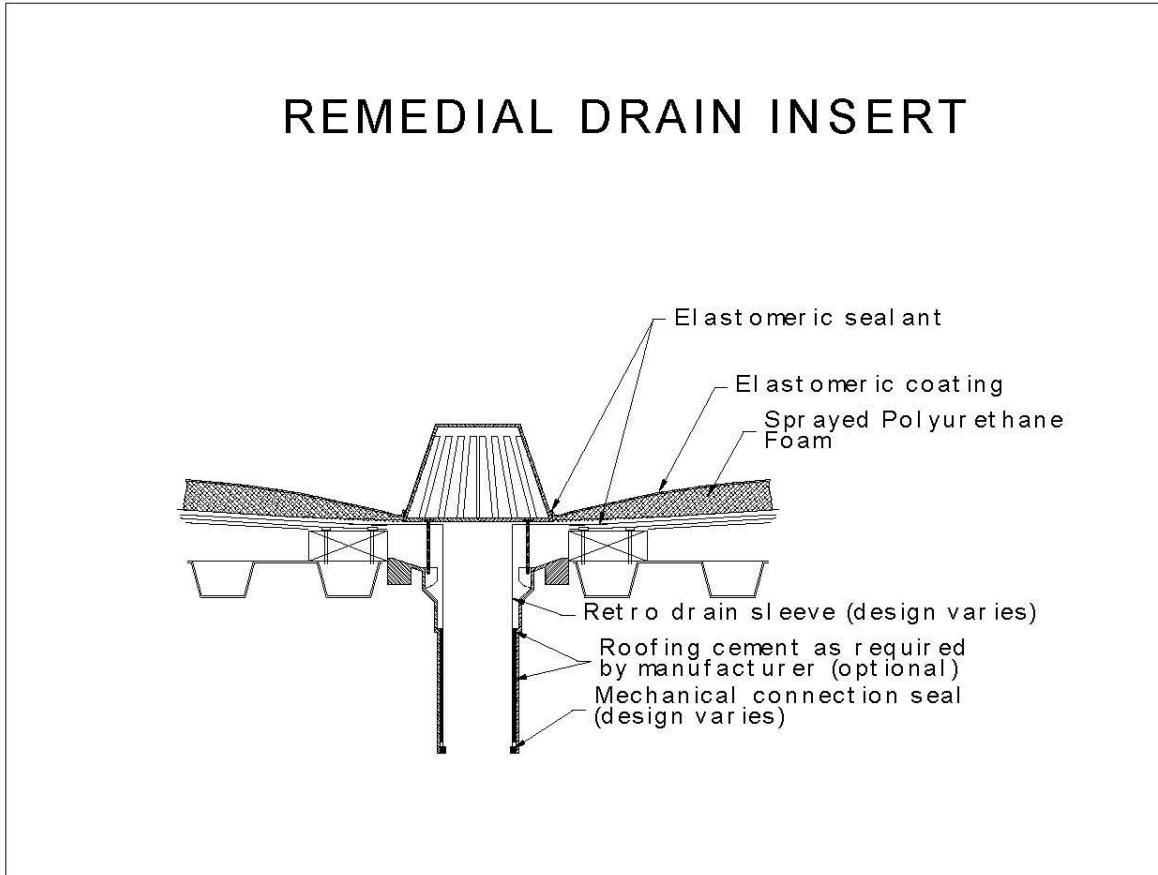
**DETAIL DRAWING 12: TYPICAL ROOF DRAIN**



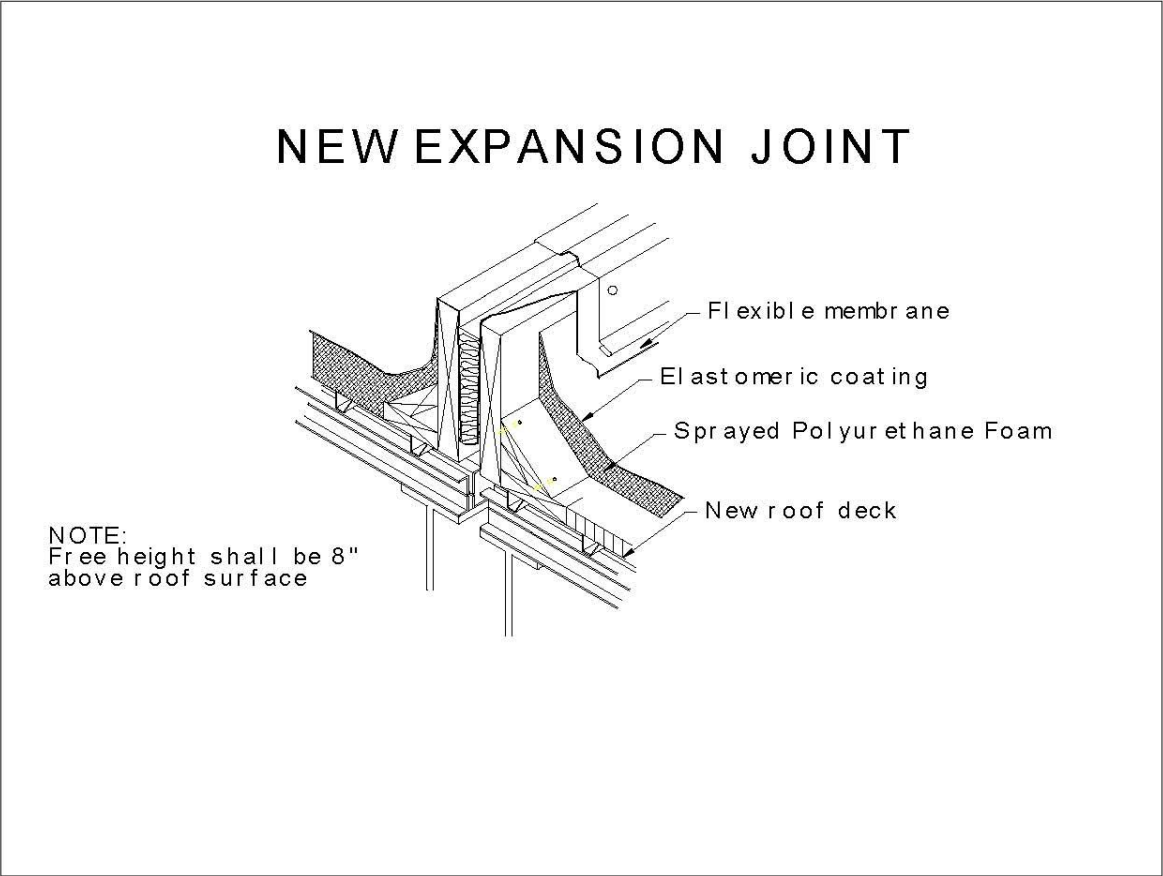
**DETAIL DRAWING 13: NEW OR REMEDIAL ROOF DRAIN**



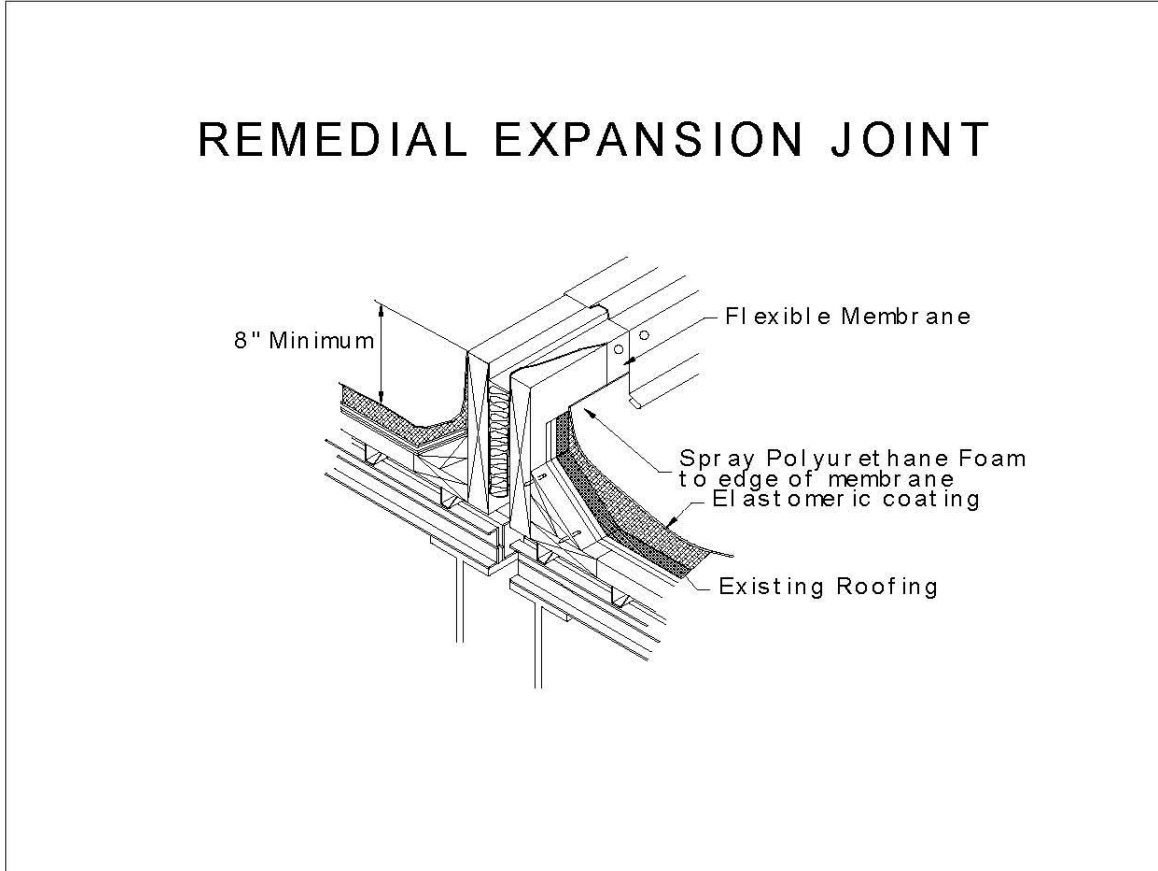
**DETAIL DRAWING 14: REMEDIAL DRAIN INSERT**



**DETAIL DRAWING 15: NEW EXPANSION JOINT**

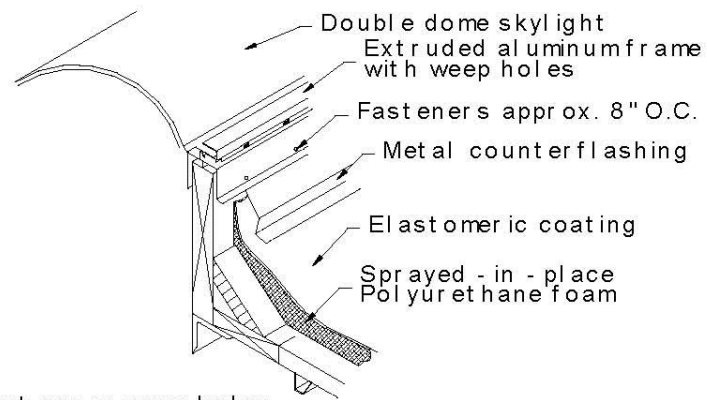


**DETAIL DRAWING 16: REMEDIAL EXPANSION JOINT**



**DETAIL DRAWING 17: SKYLIGHT, HATCH OR SMOKE VENT CURB**

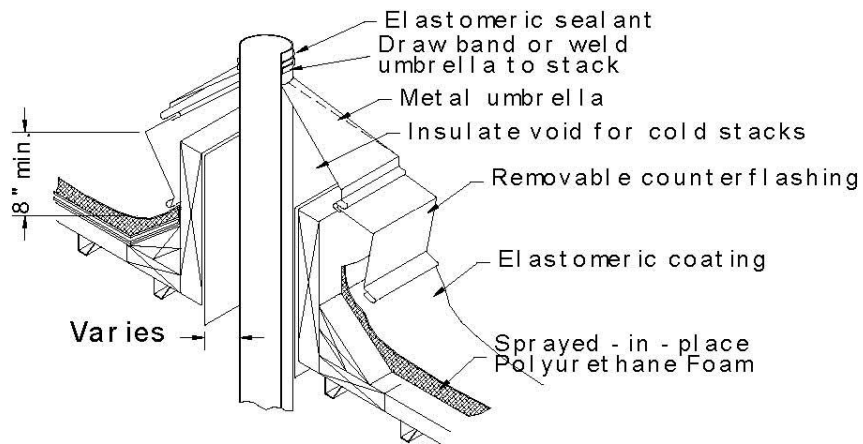
# SKYLIGHT, HATCH OR SMOKE VENT CURB



**NOTE:**  
On skylights, do not cover weep holes with polyurethane foam or coating

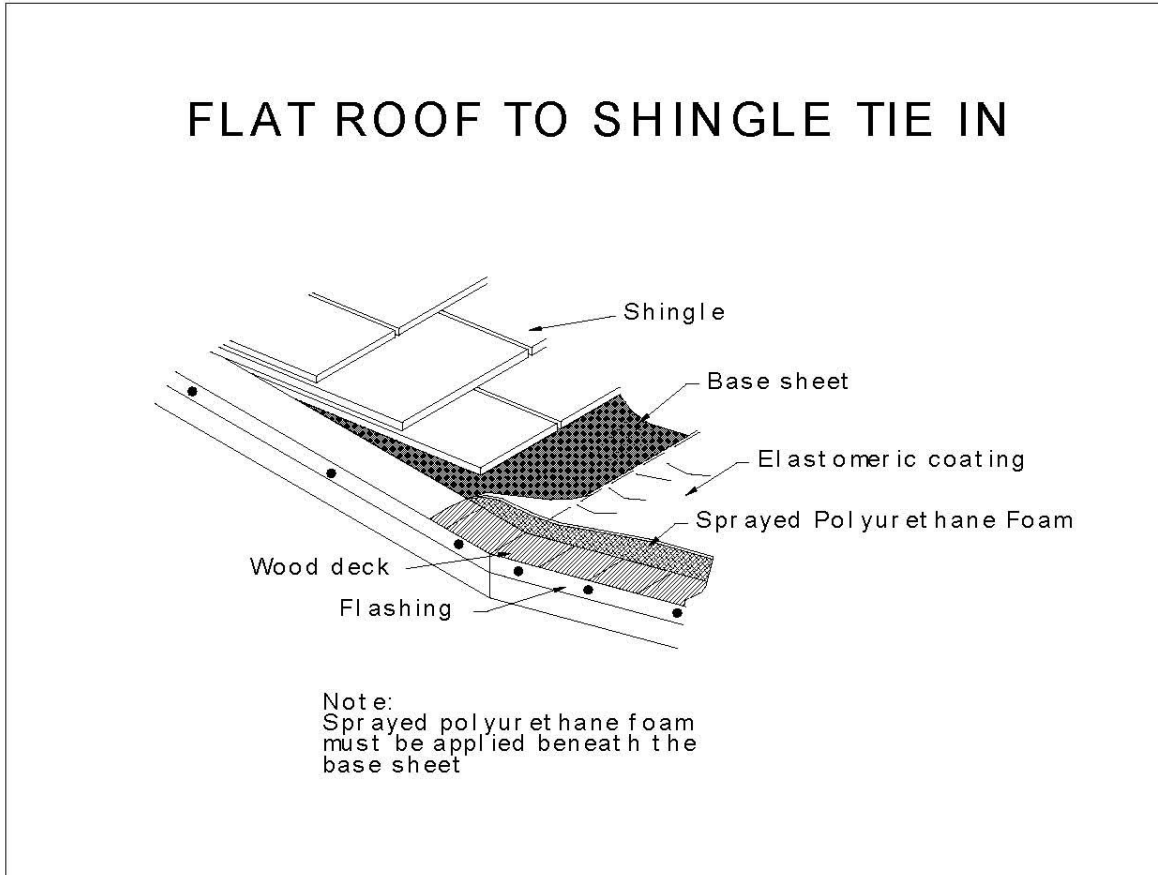
**DETAIL DRAWING 18: NEW OR REMEDIAL HOT STACK FLASHING**

# NEW OR REMEDIAL HOT STACK FLASHING



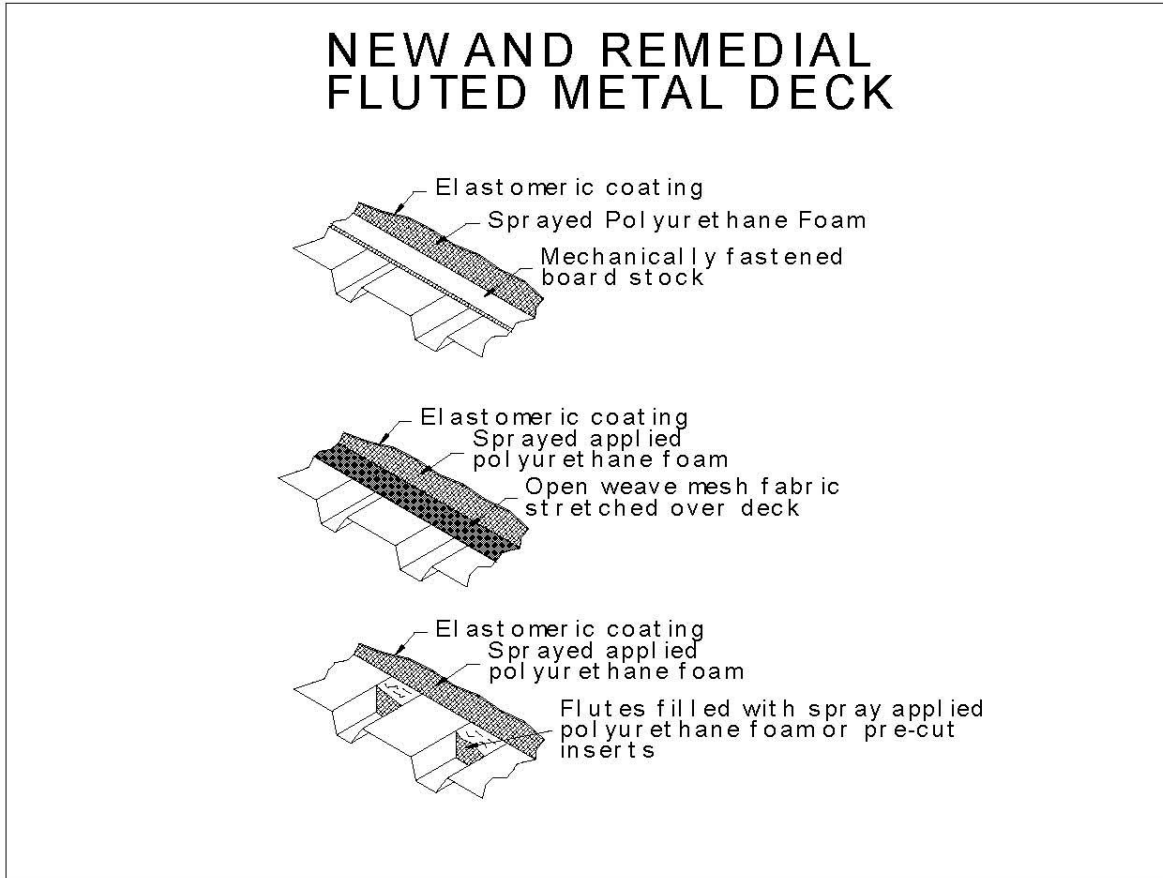
**NOTE:**  
The metal sleeve and the clearance necessary will depend on the temperature of the material handled by the stack

**DETAIL DRAWING 19: FLAT ROOF TO SHINGLE TIE IN**

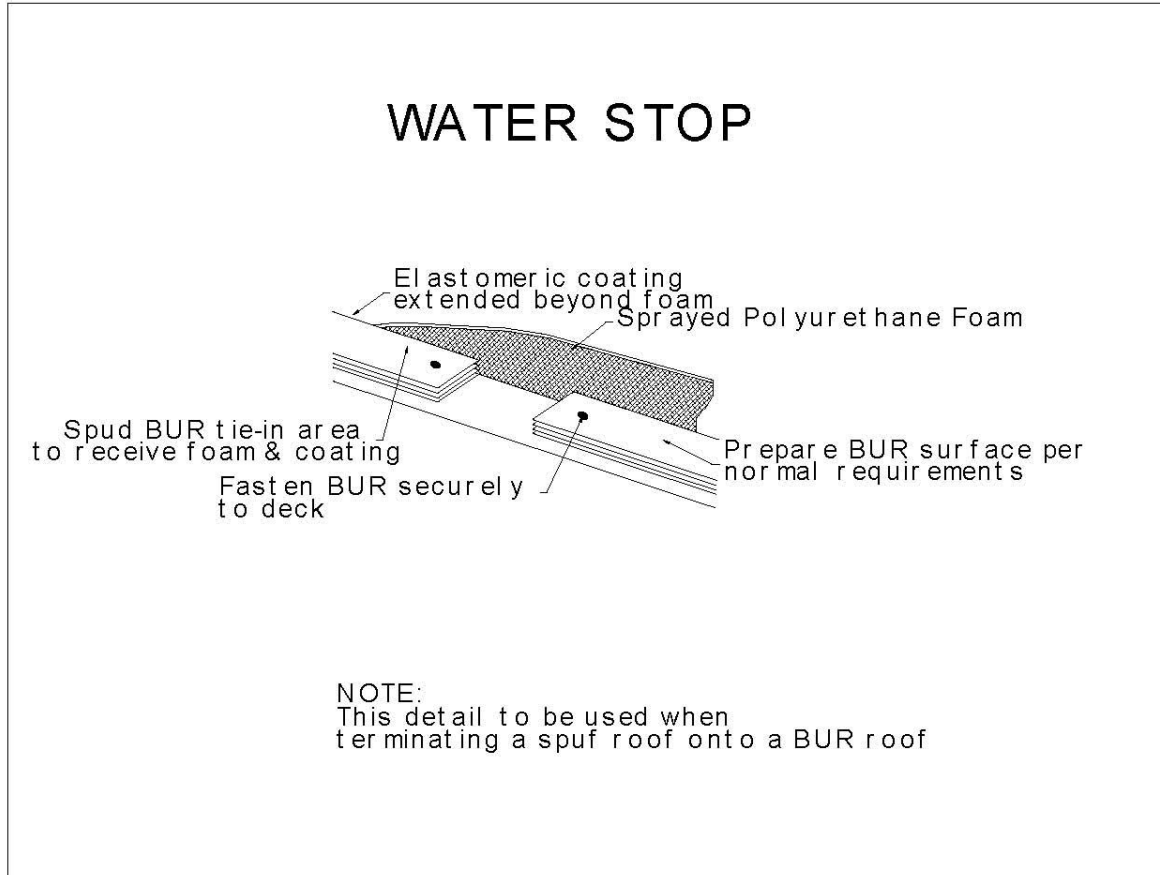




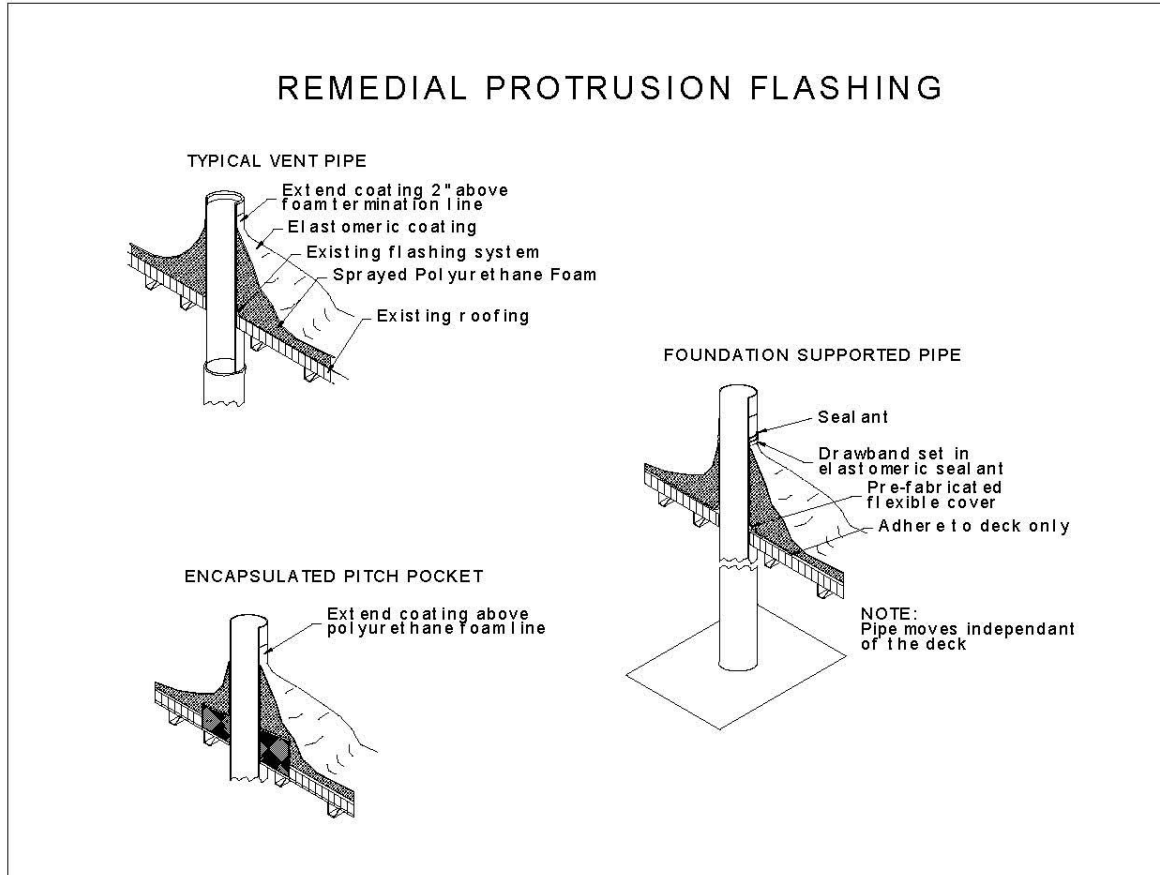
**DETAIL DRAWING 20: NEW AND REMEDIAL FLUTED METAL DECK**



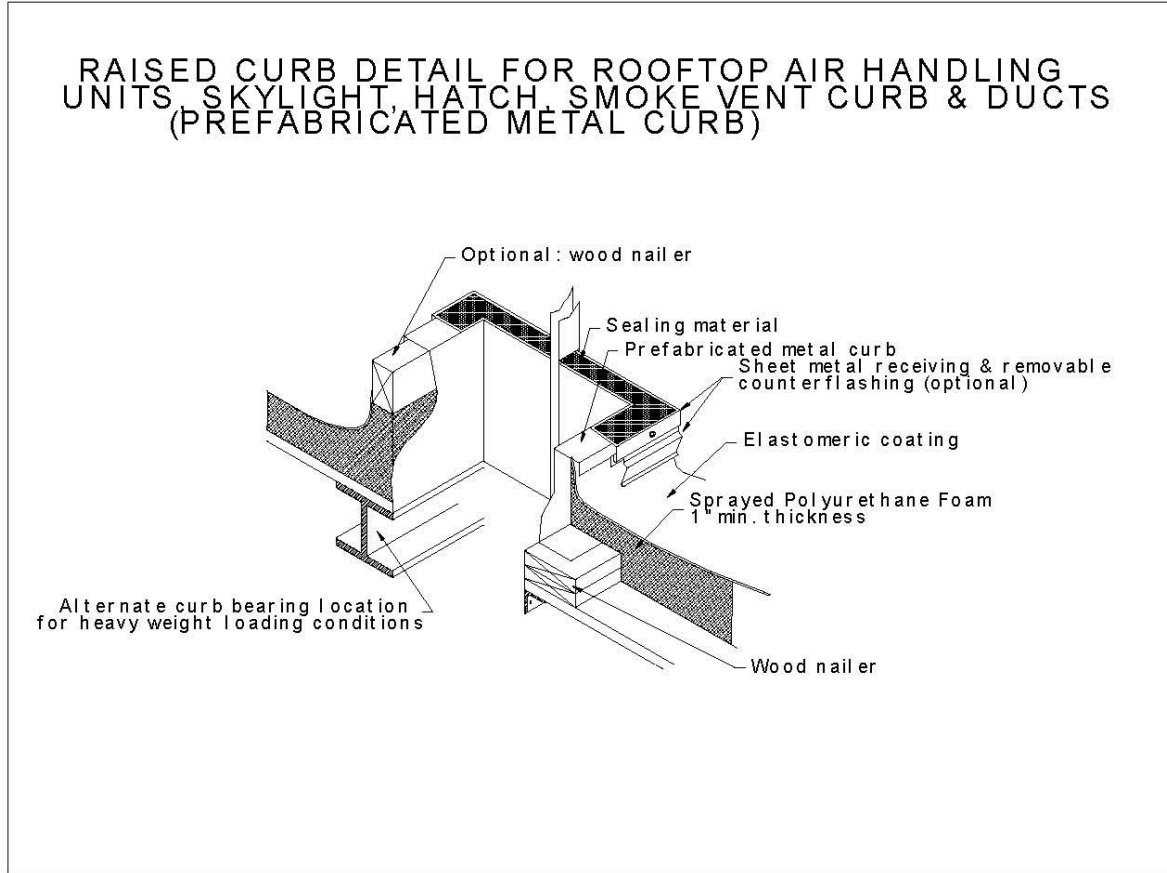
**DETAIL DRAWING 21: WATER STOP**



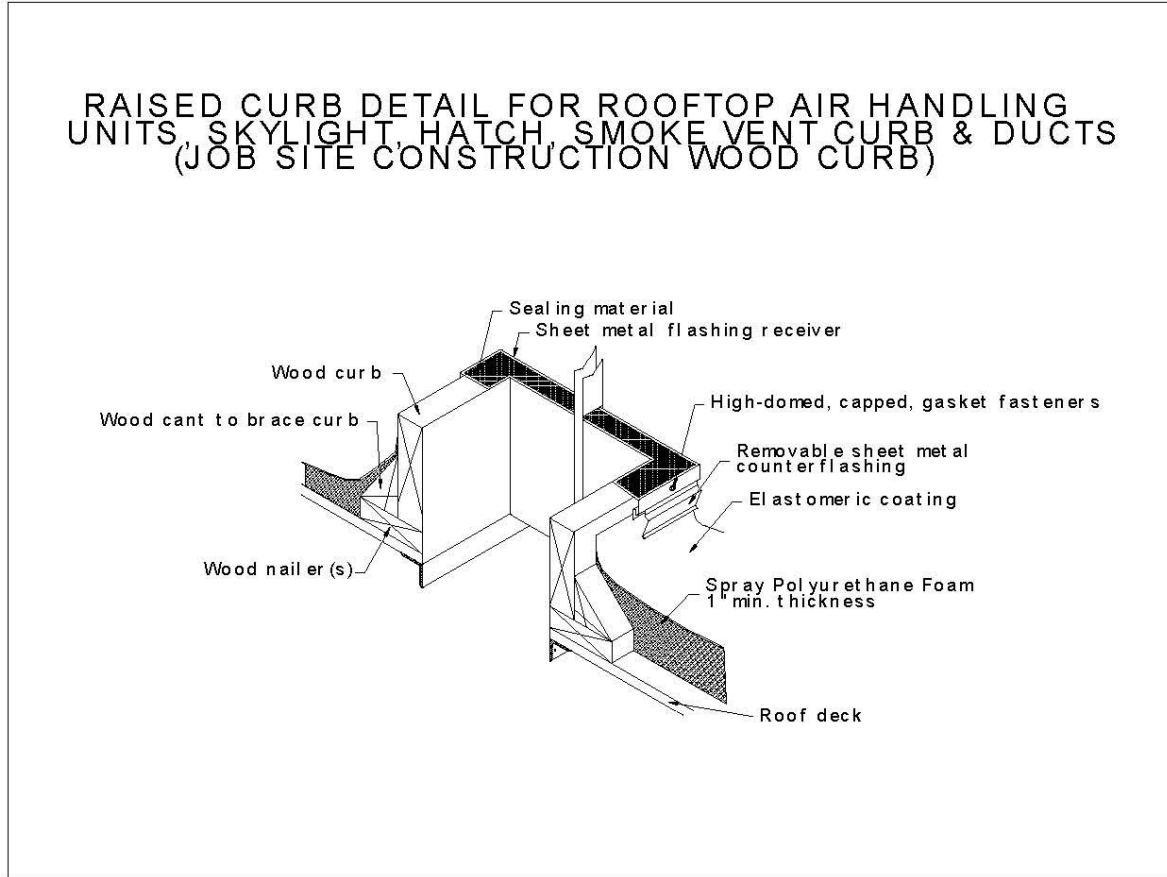
**DETAIL DRAWING 22: REMEDIAL PROTRUSION FLASHING**



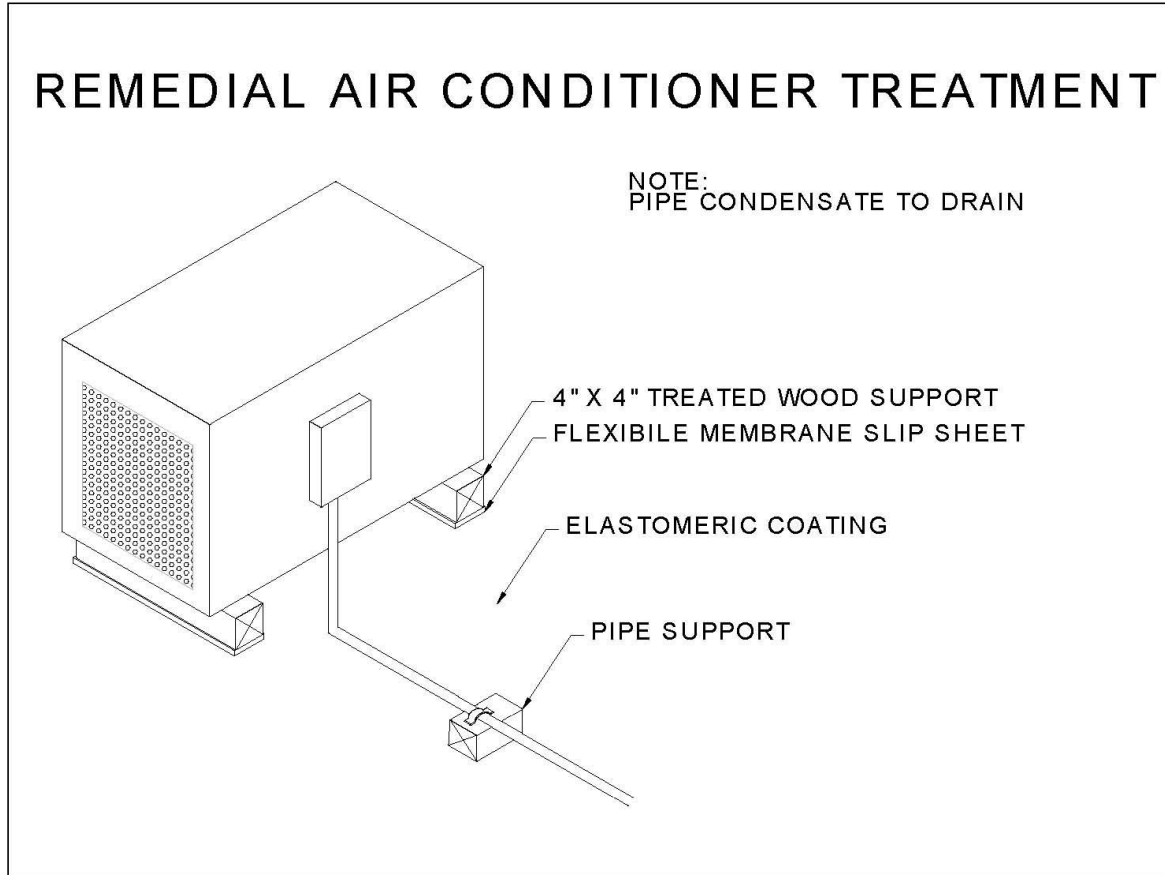
**DETAIL DRAWING 23: RAISED CURB DETAIL (PREFABRICATED METAL CURB)**



**DETAIL DRAWING 24: RAISED CURB DETAIL (JOB SITE CONSTRUCTION WOOD CURB)**



**DETAIL DRAWING 25: REMEDIAL AIR CONDITIONER TREATMENT**



## Surface Texture of Spray Polyurethane Foam

SPF (spray polyurethane foam) surface texture is the resulting surface from the final pass of SPF. The following terms are used to describe the types of SPF surfaces: smooth, orange peel, coarse orange peel, verge of popcorn, popcorn, and treebark.

In SPF roofing applications, the texture of the sprayed foam is important in the performance of the roofing system. The rougher the texture, the more coating is required to provide the minimum dry-film thickness specified. When the surface becomes too rough or uneven, it is difficult to successfully provide the minimum specified coating thickness to all surface areas of the foam.

### SURFACE TEXTURE OR FINISH

- (4) The SPF surface must be free of moisture, frost, dust, debris, oils, tars, grease, or other materials that will impair adhesion of the protective coating.
- (5) Any damage or defects to the SPF surface must be repaired prior to the application of the protective covering.
- (6) The final SPF surface texture will fall under one of the following labels:

- 1. Smooth
- 2. Orange peel
- 3. Coarse orange peel
- 4. Verge of popcorn
- 5. Popcorn
- 6. Treebark

- (7) Textures numbered 1–3 are acceptable for the application of a protective coating. Number 4, verge of popcorn, is acceptable if properly coated. Textures numbered 1–4 are acceptable for aggregate covered surfaces. Numbers 5–6 are not acceptable. They must be removed and refoamed to an acceptable surface.

Acceptable (1, 2, 3)	If Properly Coated (4)	Unacceptable (5 and 6)
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See the following pages for photos and a complete description of the surface textures. The 1 cm scale shown in each image is approximate.

### SMOOTH SURFACE TEXTURE (1)

Description: The surface shows spray undulation and is ideal for receiving a protective coating.





**ORANGE PEEL SURFACE TEXTURE (2)**

Description: The surface shows a fine texture and is compared to the exterior skin of an orange. This surface is considered acceptable for receiving a protective coating.



### COARSE ORANGE PEEL SURFACE TEXTURE (3)

Description: The surface shows a texture where nodules and valleys are approximately the same size and shape. This surface is acceptable for receiving a protective coating because of the roundness of the nodules and valleys.



#### **VERGE OF POPCORN TEXTURE (4)**

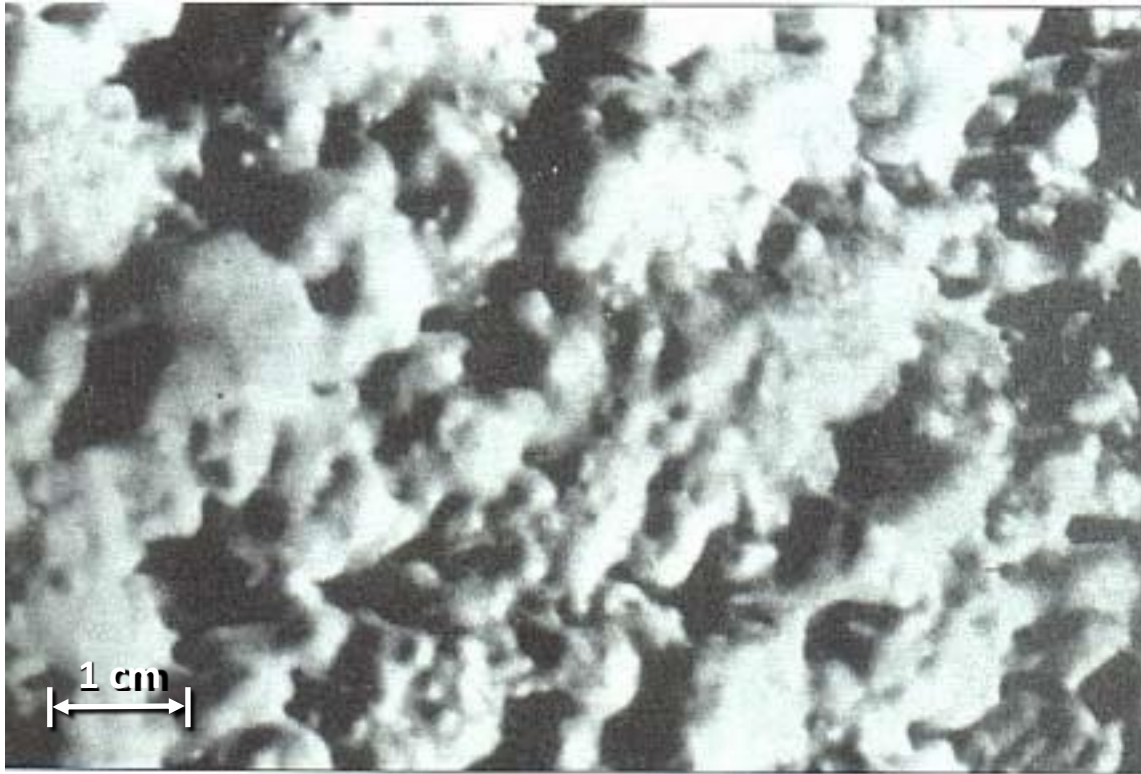
Description: The verge of popcorn surface texture is the roughest texture suitable for receiving the protective coating. The surface shows a texture where nodules are larger than valleys, with the valleys relatively curved. This surface is acceptable for receiving a protective coating only because of the relatively curved valleys. However, the surface is considered undesirable because of the additional amount of coating material required to protect the surface properly.





**POPCORN SURFACE TEXTURE (5)**

Description: The surface shows a coarse texture where valleys form sharp angles. This surface is unacceptable for proper coating and protection.



**TREEBARK SURFACE TEXTURE (6)**

Description: The surface shows a coarse texture where valleys form sharp angles. This surface is unacceptable for proper coating and protection.

