

BUR Surfacing, Modified Bitumen Membranes, Single Ply Systems

Rooftop Quality Assurance

AIA
Continuing
Education
Provider

**8 IBEC Continuing Educational Hours
8 AIA Learning Units and HSW Credit**

Version 09.19.06

Surfacing Materials

- Bitumen flood coat and aggregate
- Asphalt cut-back
- Asphalt emulsion
- Reflective coating
- Decorative coating
- Mineral surfaced cap sheets
- Sprayed granules in bitumen (hot or cold)
- Ballast or pavers
- Walk pads

Surfacing Function

- Protect against ultraviolet degradation
- Resist wind damage and foot traffic damage
- Improve fire resistance
- Provide resistance to hail damage
- Reduce heat flow during cooling season
- Provide aesthetically pleasing product
- Meet code requirements for reflectivity

Flood Coat & Gravel



Gravel Surfacing



Observer Items Flood Coat and Gravel

- Check membrane for unadhered laps and fish mouths prior to flood coat application
- Dry membrane/felts
- Full flood coat – 60#/sq asphalt, 70#/sq coal tar pitch
- Ensure all orifices are open on application cart
- Clean, dry pea gravel
- Keep gravel close to flood coat application to get good embedment and adhesion

Granular Cap Sheet



Coatings



Modified Bitumen Membranes

- Modifying compounds
- Reinforcing materials
- Surfacing materials



Compounds

- APP – Atactic Polypropylene
- SBS – Styrene Butadiene Styrene
- Asphalt or Coal tar

Application Techniques

- APP Modified Bitumen (Atactic Polypropylene)
 - Torch
 - Cold applied
 - Self adhering
- SBS Modified Bitumen (Styrene Butadiene Styrene)
 - Above plus hot bitumen
 - Sometimes called “rubberized asphalt”
- SEBS (Styrene-Ethylene Butadiene Styrene)
 - Above plus hot bitumen

Application Precautions

Torch applied

- Handheld L shaped pattern
- Multiple head torch – APP
- SBS sheets are more technique sensitive
- Should be uniform bleed-out - APP
- Observe torch safety
- Don't over torch and damage sheet
- At end laps, prepare granular surface prior to torching
- Fire watch at end of day

Torch Applied SBS



Torch Applied APP



Application Precautions

Hot asphalt application

- Use correct type of asphalt – may require type IV
- Keep roll close to hot application
- Keep bitumen at manufacturer's recommended temperature at point of application
- EVT doesn't apply to modified installation

Mop Applied SBS



Cold Applied System Application Precautions

- Use correct adhesive
- Check application rate
- Uniform coverage
- Steel broom out air bubbles
- Laps can be adhesive, torch, or hot air
- Roof is susceptible to damage while adhesive is soft

Self Adhered Sheet Application Precautions

- Some manufacturers limit slope to 1"/ft
- Age and adhesion quality of SA sheet
- Check ambient temperature for suitability for SA sheet application
- Substrate cleared of debris and clean
- Special primers or adhesion aids for SA sheet in special conditions
- Follow Manufacturer's requirements for proper treatment of side and end laps, as well as "T" joints and terminations

General Mod Bit Application Precautions

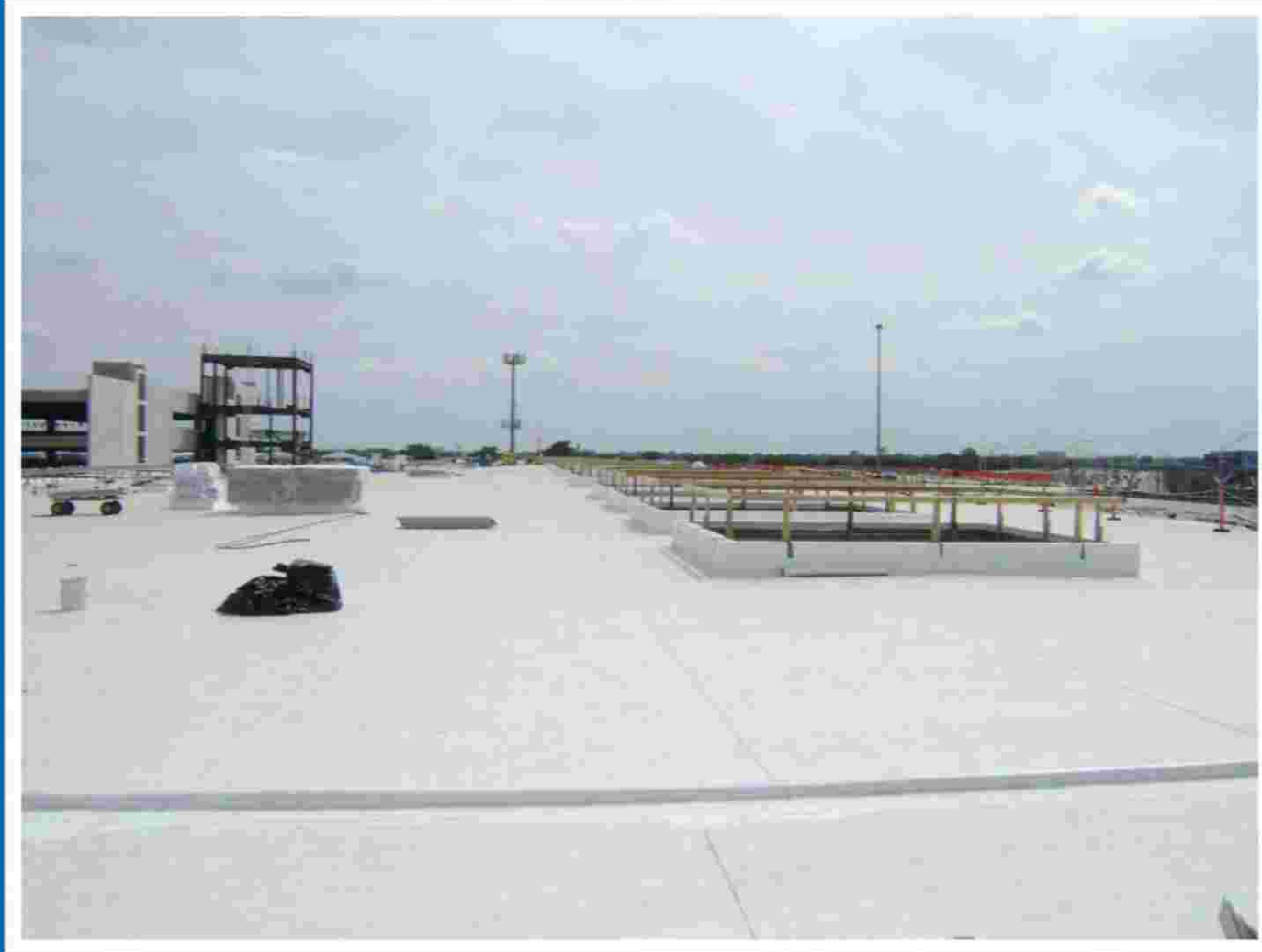
- Use correct sheet for application
- Store rolls in heated location
- Relax sheets prior to installation
- Use short lengths on flashings



Modified Bitumen Roof



Single Ply Membranes



Single-Ply Roofing

- Vulcanized elastomers/thermosets
- Non-Vulcanized elastomers/uncured
- Thermoplastic Materials

Single Ply Roofing Attachment

- Loose laid/ballasted
- Fully adhered
- Mechanically fastened

Elastomers

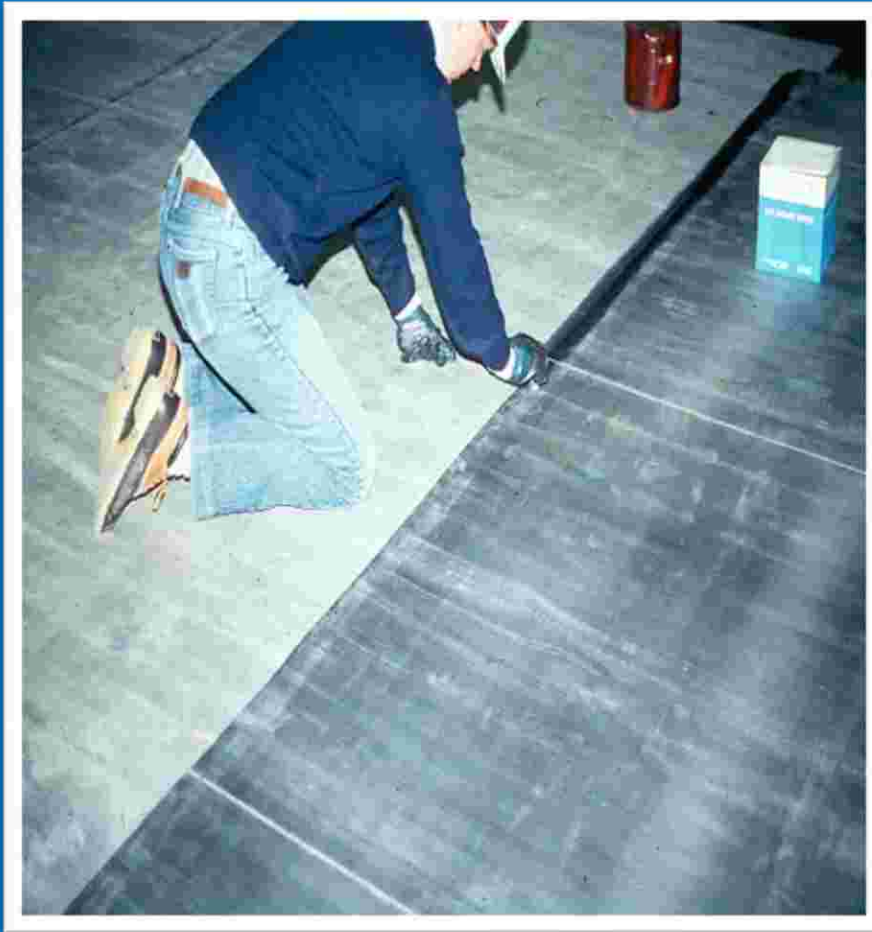
Vulcanized Thermosets

- EPDM
- Epichlorohydrin
- Neoprene

Non-vulcanized Uncured

- CSPE
- PIB
- EPDM and Neoprene

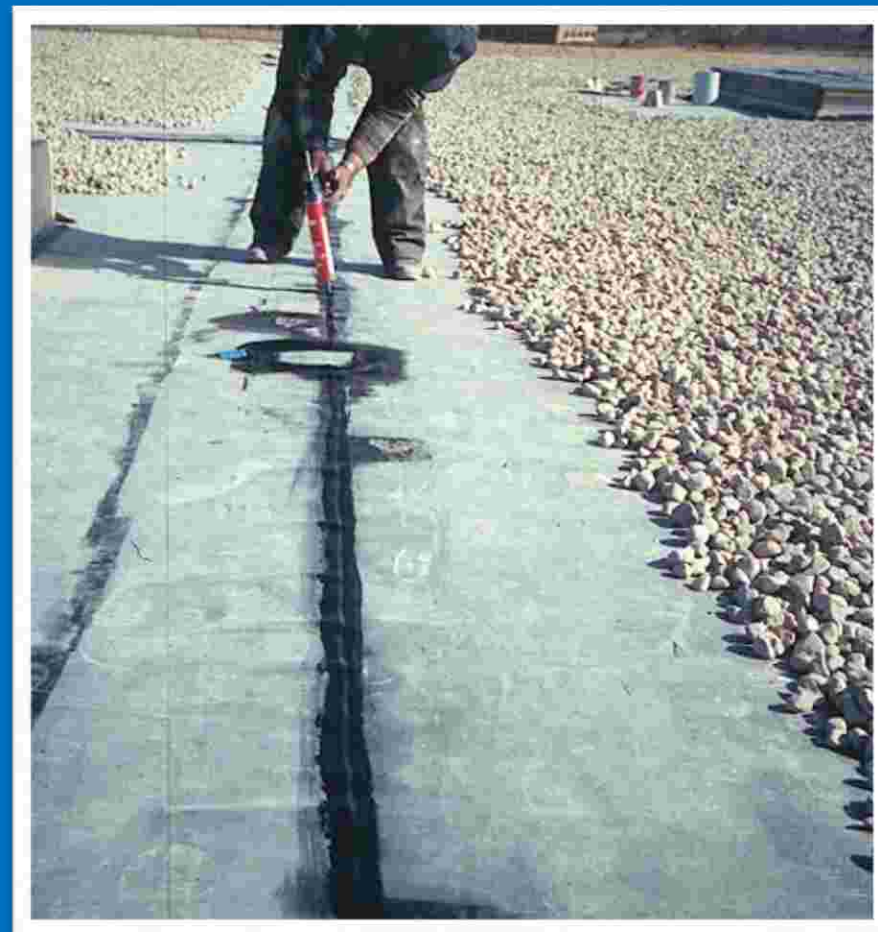
EPDM Lap Installation Adhered Seams



EPDM Lap Installation Adhered Seams



EPDM Lap Installation Adhered Seams



Observer Items Adhered Seams

- Use correct adhesive
- Clean lap area
- In-seam sealant if specified
- Target patch “T” junctures
- Caulk all seams
- Use manufacturer specific application techniques
- Make sure the minimum seam width is achieved to meet warranty requirements



Observer Items

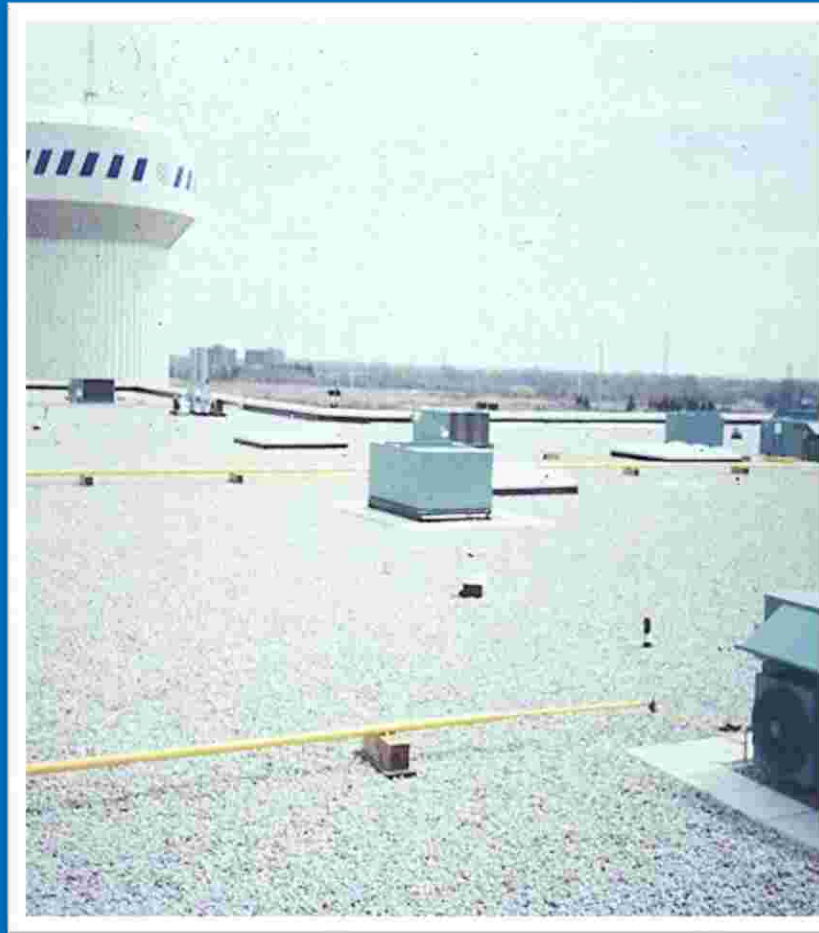
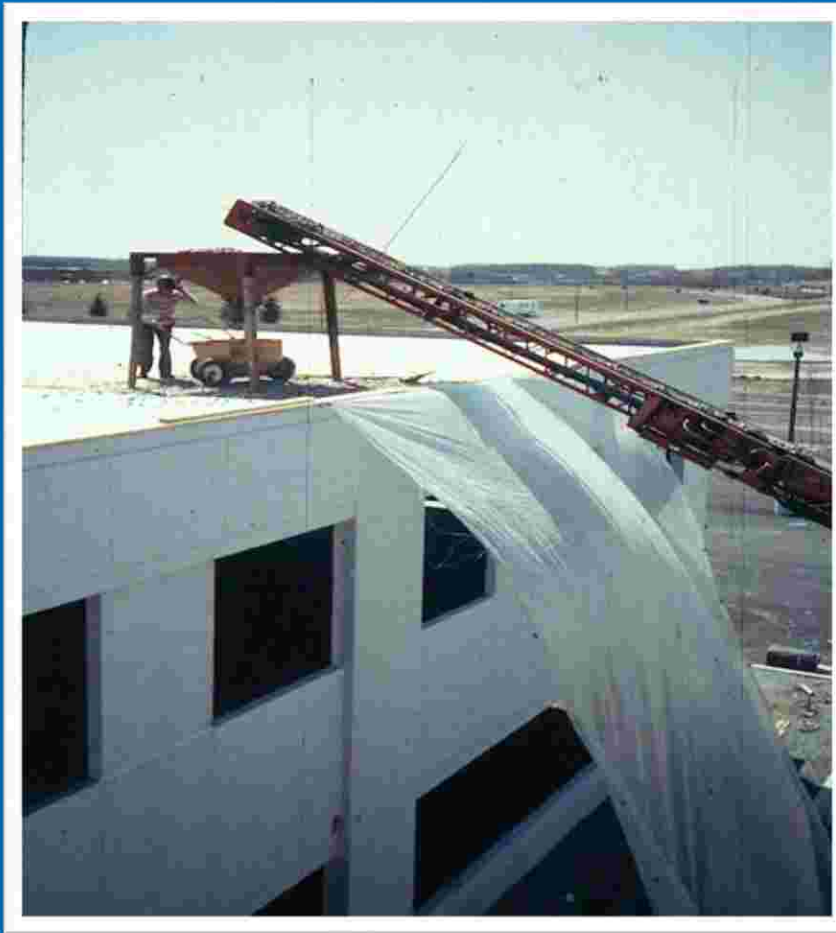
Adhered Seams



Observer Items Taped Seams

- Clean the laps
- Proper use of primer/sealer
- Use proper seam tape width and overlap for warranty requirements
- Tape extends beyond laps
- Target patch “T” joints
- Tightly rolled laps
- Pre-taped seams will not have exposure past the edge of the membrane

Ballasted EPDM



Observer Items Ballasted EPDM Systems

- Use correct stone - ASTM #3 or #4
- Check coverage weights with frame and scale
- #2 stone at perimeter?
- Double ballast perimeter?
- Pavers at perimeter?
- Protect membrane near gravel hopper
- Do not fasten insulation
- Anchor membrane at perimeter and penetrations at membrane level to prevent pulling at flashings

EPDM Fully Adhered



EPDM Fully Adhered



Observer Items Fully Adhered EPDM

- Keep bonding cement off lap area
- Broom, Squeegee, or roll surface
- Mate surfaces when dry to knuckle test with contact adhesive
- Mate surfaces when adhesive is still wet with single sided adhesive
- Apply adhesive using manufacturers instructions

Mechanically Attached EPDM



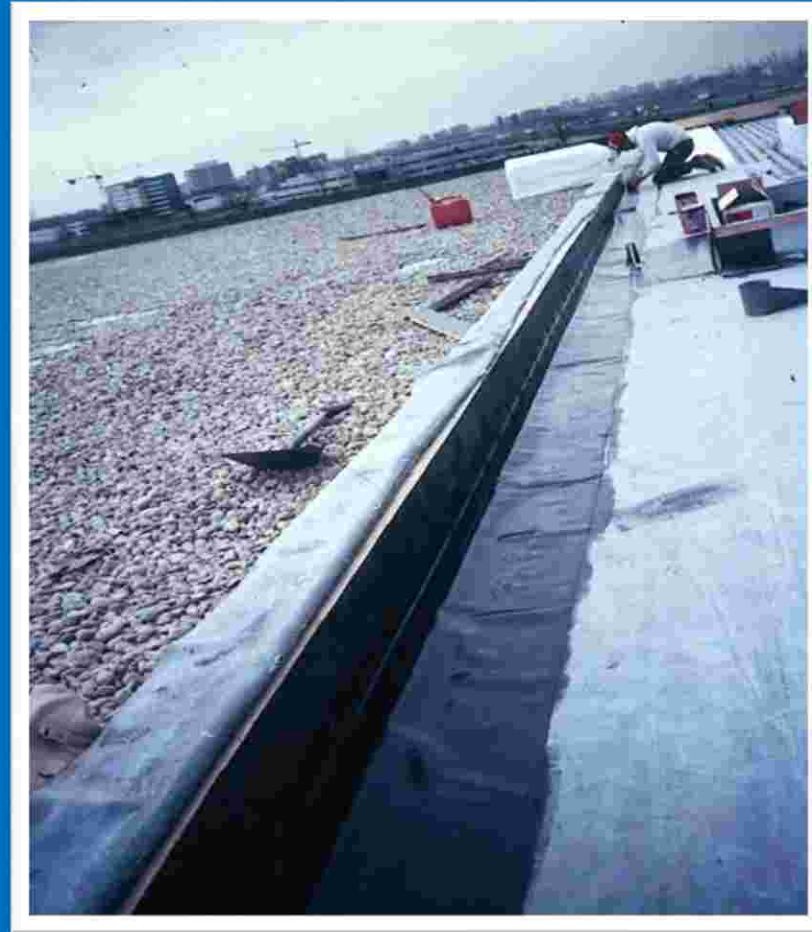
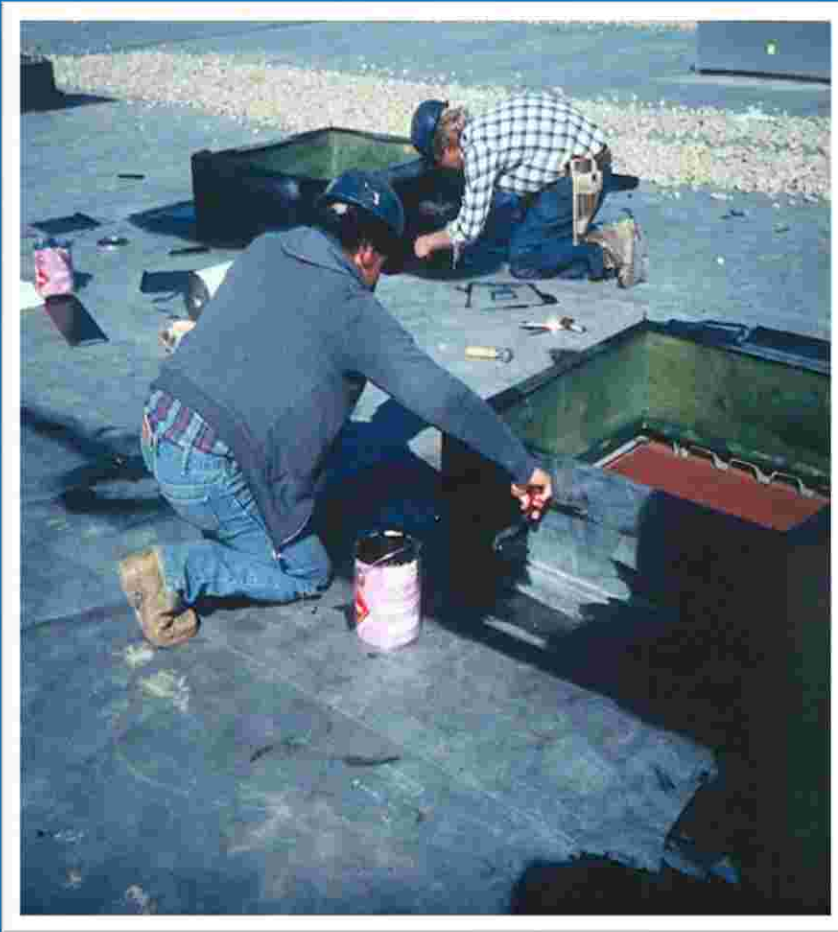
Mechanically Attached EPDM



Observer Items, Mechanically Attached EPDM

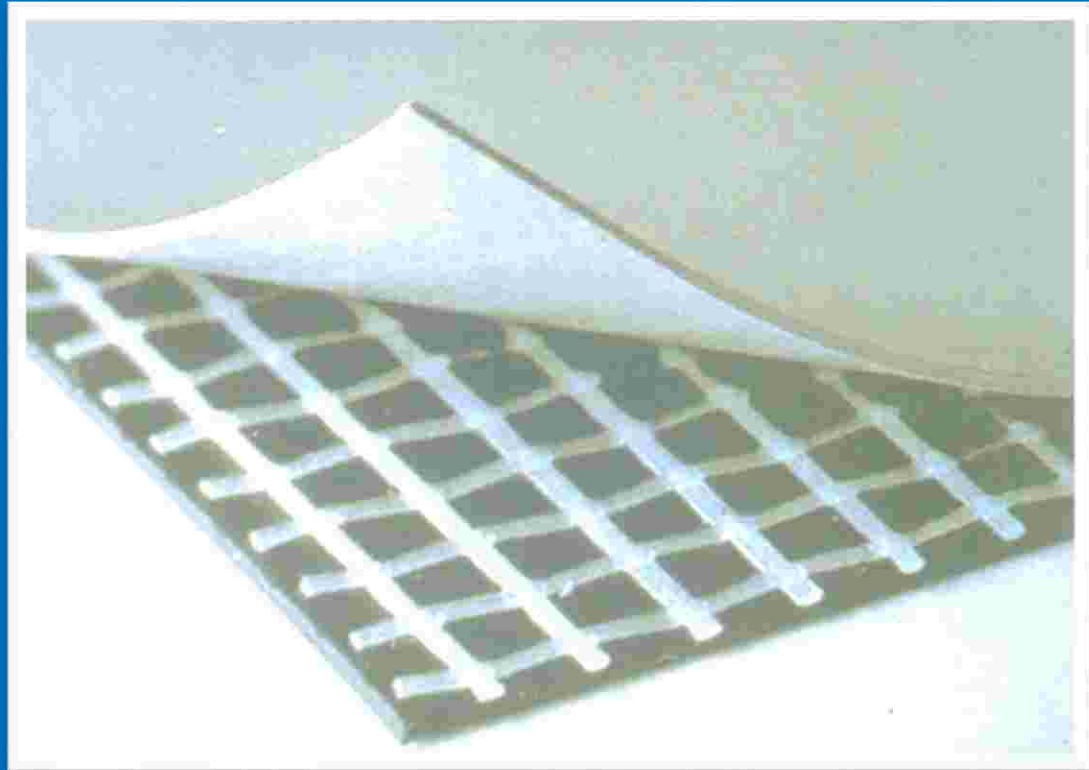
- Should be shop drawing for attachment locations in field of roof and perimeters
- Understand manufacturer's detailed instructions for items such as rounding term bars, silicone sealant over screw heads, cover tape dimensions, etc.

EPDM Flashing



Thermoplastic Materials

- PVC
- PVC Blends
- EP
- TPO
- KEE



Thermoplastic

Polymers which soften when heated and harden when cooled.

This process is reversible provided the material is not heated above the point at which decomposition occurs.

Seam Strength

PVC	Welded	> 50 lbs > 220 N
EPDM	Tape	< 12 lbs < 54 N
	Adhesive	< 5 lbs < 22 N

Mechanically Secured Heat Weldable Systems



Fastening Requirements

- Perimeter width - $0.4 \times \text{bldg height}$ or $0.1 \times \text{smallest bldg. dimension}$, whichever is less. Sheets are picture framed or reinforced adhesive strips below the membrane can be used.
- Know specific design to meet wind design
- Parapet $< 3'$ - corner fastening required
- Parapet $> 3'$ - corner fastened like perimeter

Fasteners – Recent Improvements

- Corrosion resistant coatings
- Longer fasteners
- More corrosion resistant metal plates
- Minimum standards for plastic plates
- Drill points for easier penetration

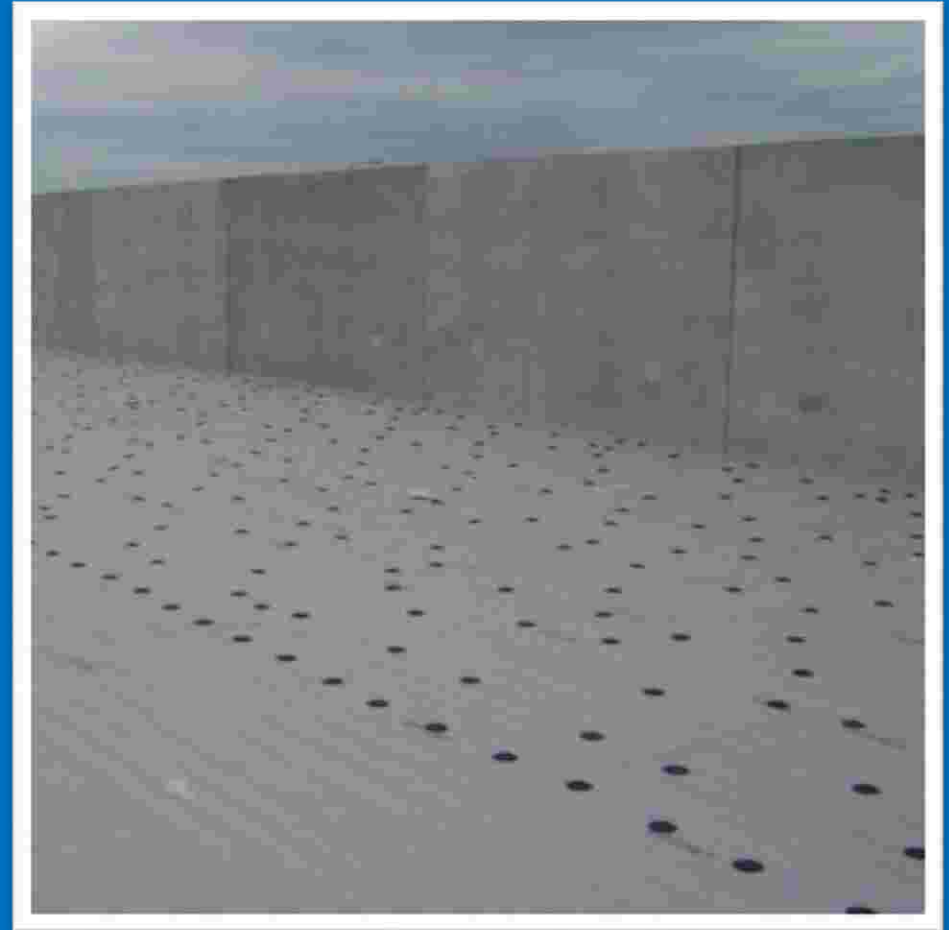
Fastener Improvements

- Stiffer shanks to resist bending
- Head with greater driving stability
- Locking plates/collars
- Extending clips/barbs
- Plastic fasteners/expanding shanks

Fastener Improvements (Induction Welding)

Can use the same fastener and plate to secure both the insulation and the membrane to the deck without penetrating the membrane.

Can also be done in a linear method for metal retrofit projects.



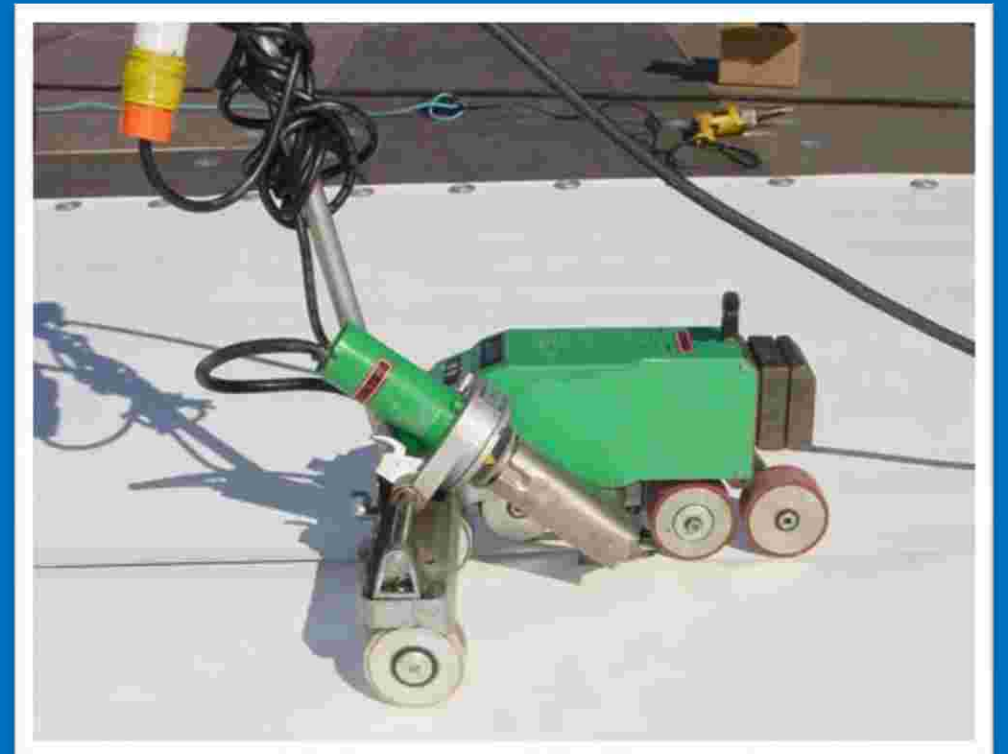
Fastener Improvements (Induction Welding)



Mechanically Secured with Bars and Covers



Robot Welder



Observer Items Welded Seams

- Roofer probes all seams
- Trial welds at least twice per day (Every time the robot welder is started up)
- Reject burned or damaged joints
- Manufacturer may require sealing cut edges
- Use non-reinforced sheet where conformability is required
- Ensure minimum weld width as per manufacturer requirements

Mechanically fastened PVC

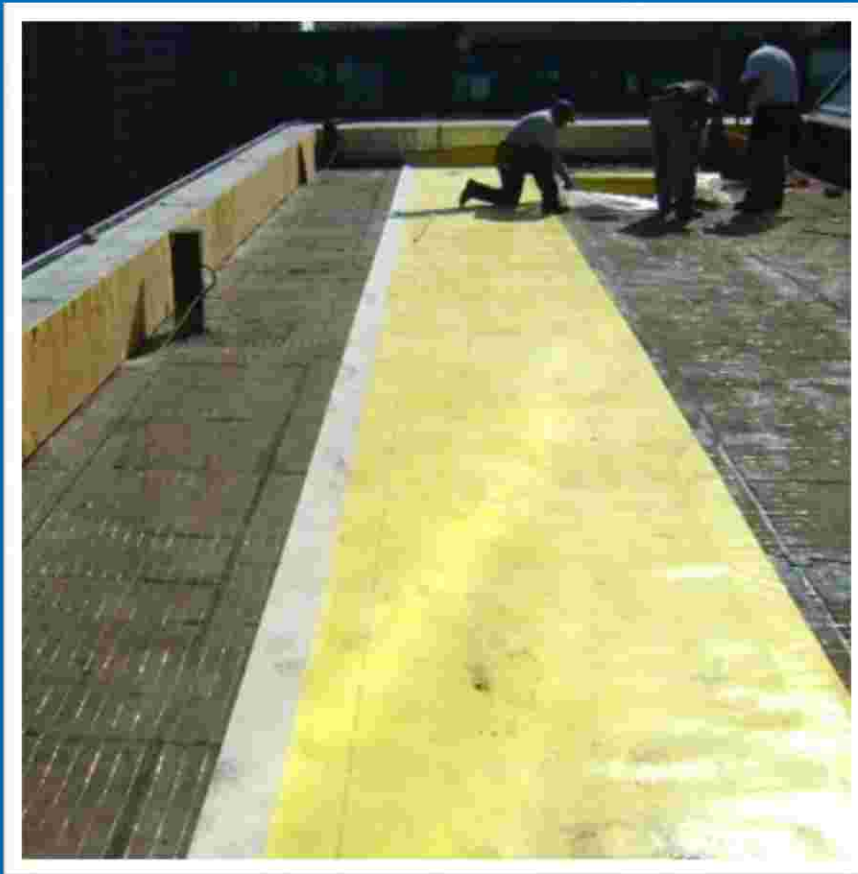


Protected Membrane Assembly

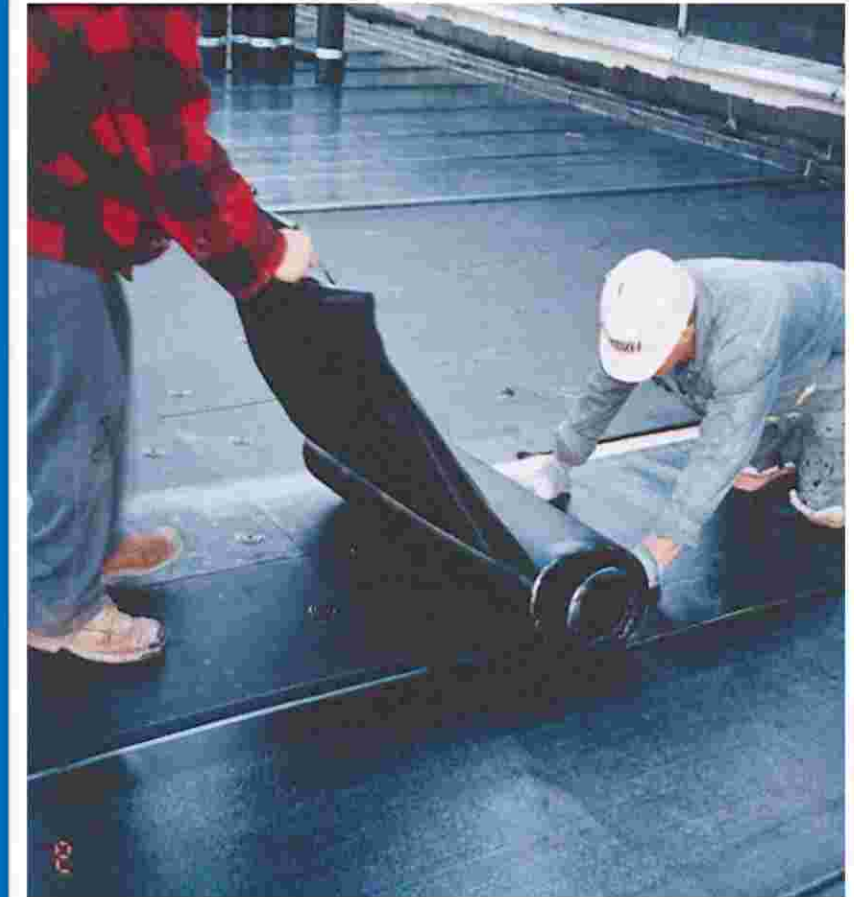
- Construction
- Materials

- Types of PMRs
- Plaza Decks
- Garden Roofs
- IRMA roofs

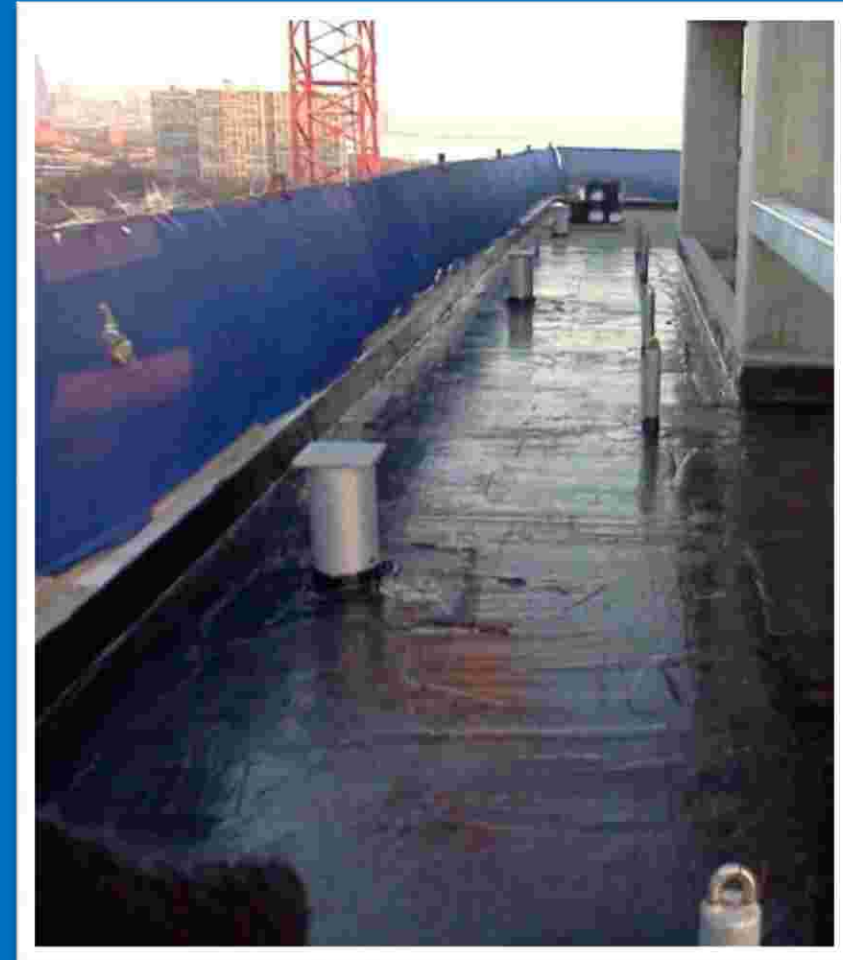
Protected Membrane



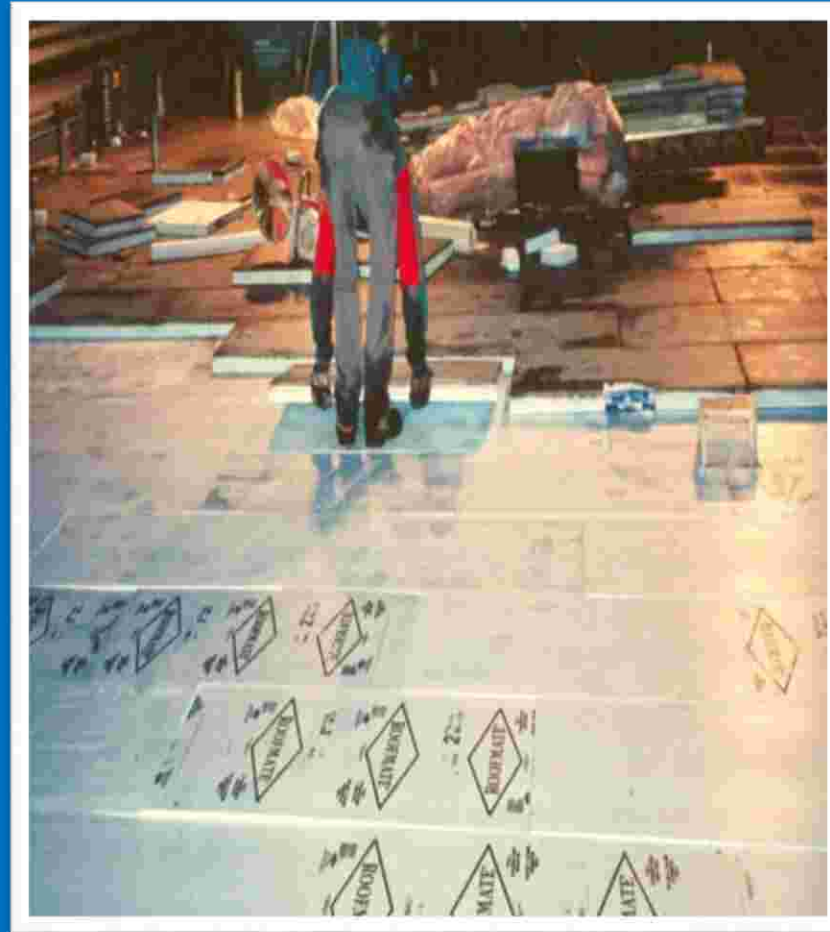
Protected Membrane



Protected Membrane



Protected Membrane Assembly



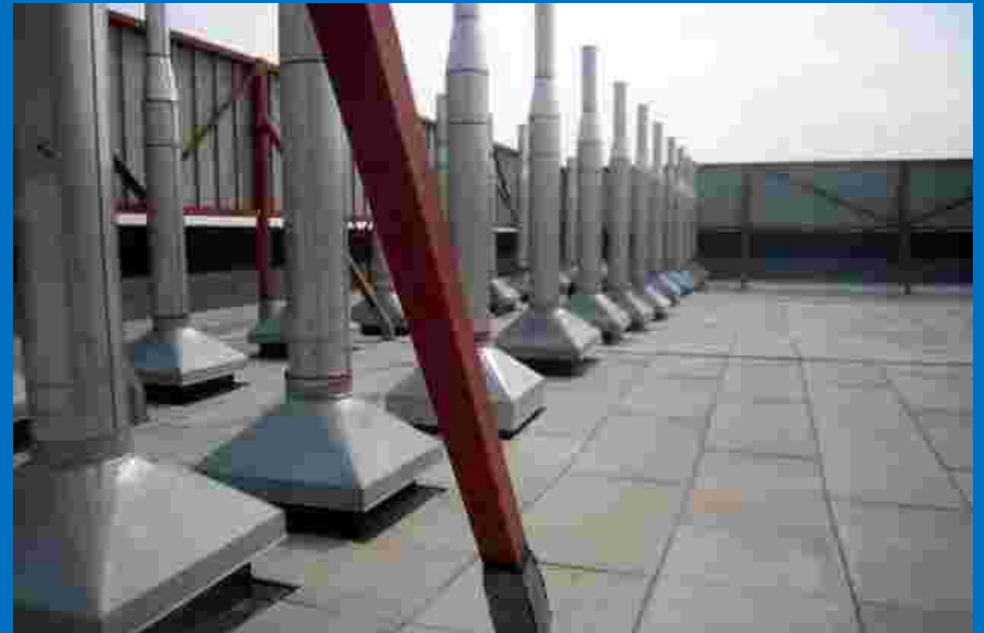
Observer Items Concrete Surfaced Boards

- Observe securement plan – perimeters, penetrations, break in T&G
- Use correct concrete thickness board
- Chamfered edges required?



Observer Items Concrete Paver Surfaced PMR

- Know wind design requirements
- Interlocking pavers have specific pattern and perimeter restraint system



Protected Membrane Assembly



Observer Items

Stone Surfaced PMRs

- Assure specified stone is used
- Filter fabric must be designed for PMR use
- Overlap fabric minimum 300 mm



Observer Items Stone / Paver PMRs

- Assure specified stone / paver is used
- Filter fabric must be designed for PMR use
- Overlap fabric minimum 1 ft
- Extend fabric above stone / paver
- Double ballast (stone) at perimeters and penetrations
- Use correct type of extruded foam (psi, etc.)



Spray-Applied Polyurethane Foam (PUF)

Foam

- Isocyanurate
- Polyol

Protective coating

- Acrylic
- Butyl
- Hypalon
- Neoprene
- Silicone
- Urethane
- Vinyl

Non-Performance of Low Slope Roofs

- The extraordinary requirements
- Proliferation of new materials
- Complexity of roof system design
- Field application problems
- Trend toward more flexible buildings

Recommended Reads

National Roofing Contractors Association (NRCA)

- Quality Control Guidelines for the Application of Built-Up Roofing
- Quality Control Guidelines for the Application of Polymer-Modified Bitumen Roofing
- Quality Control Guidelines for the Application of Thermoset Single-Ply Roof Membranes



Questions and Discussion

