HOW TO MAKE EVIDENCE BASED ROOF CHOICE DECISIONS

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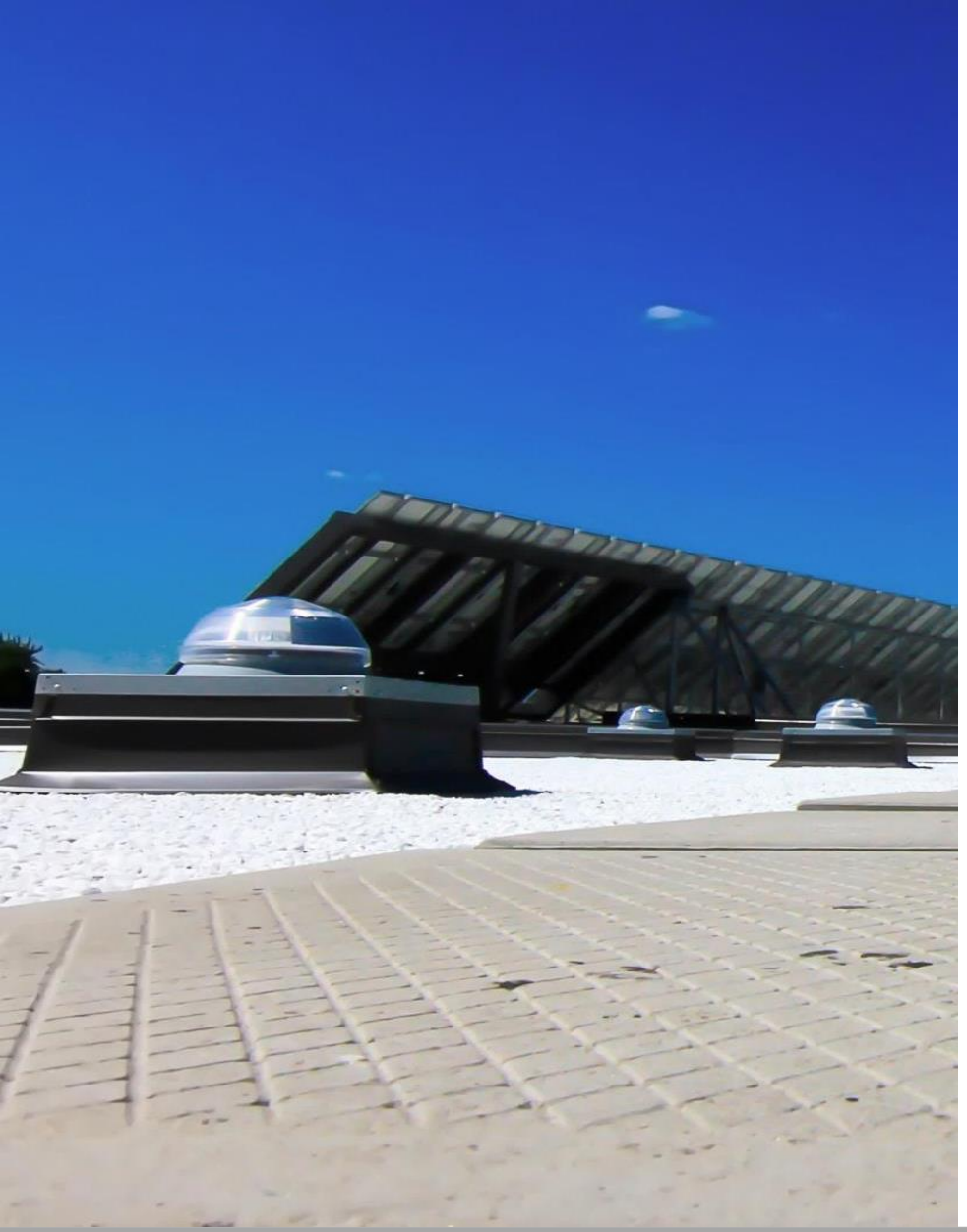
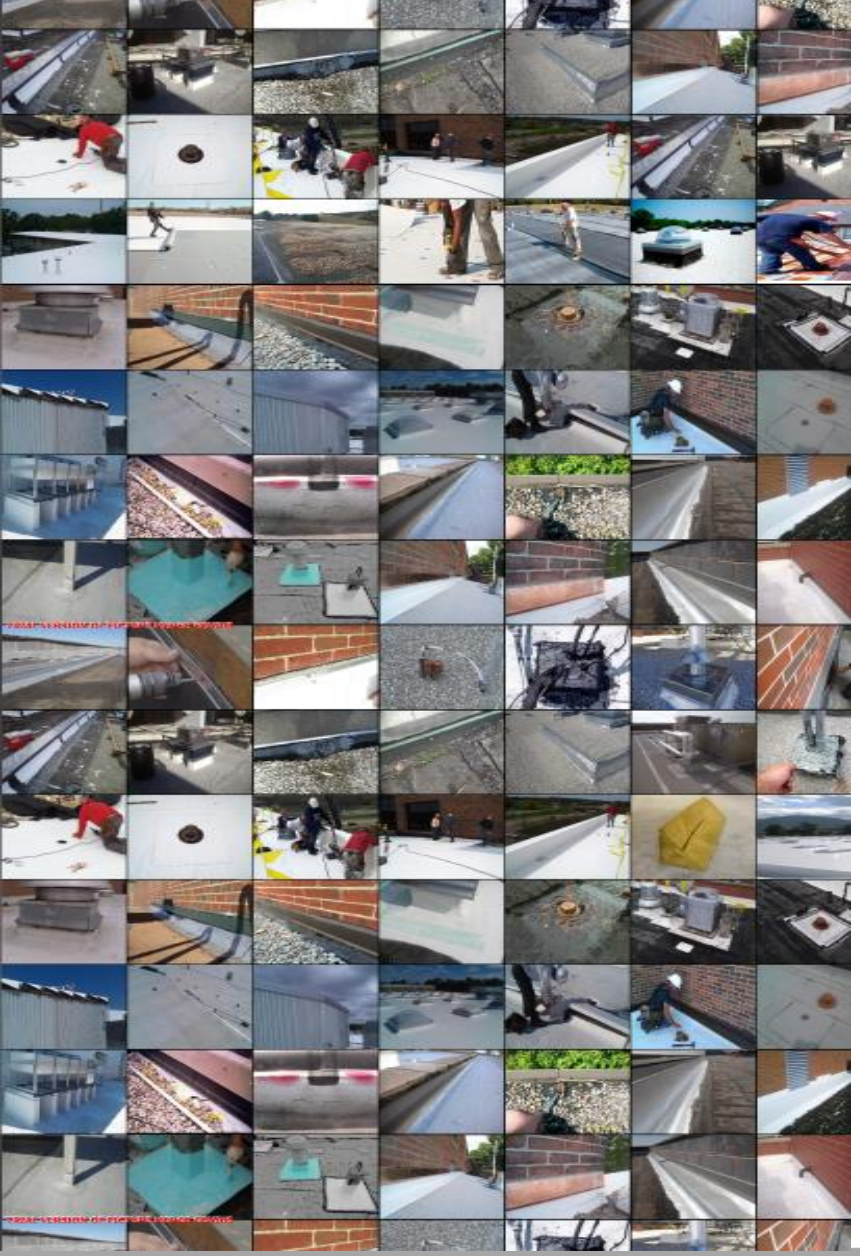
Learning Objectives – Personal ROI
"For The Time You Are Investing Today!"

- Identify the different low slope roof systems
- Have a basic understanding of each system's strengths and weaknesses
- Focus more clearly on the Ownership cost impacts of different options.
- Better understand how to make appropriate roof system choices
- Walk away with a resource you can call with questions



Where to begin?

- Environmental issues
- Building codes
  - *IBC – IECC - IgCC*
- Insurer Regulations or Requirements
- **Budgets**
- **Warranty**
- Accessibility
- Owner / Project Restrictions



The Options (Low Slope)

1. Built-up roofing (BUR)
2. Single- ply membranes
3. Modified membranes
4. Liquid applied membranes
5. Metal roofing
6. Sprayed polyurethane foam

OPTION 1

BUILT-UP ROOFING (BUR)

Traditional layered roofing

150+ year track record

Three membrane components

- Plies
- Bitumen
- Surfacing

Hot or cold applied systems

OPTION 1

BUILT-UP ROOFING (BUR)

PROS

- True waterproofing
- Maintainable
- Ply redundancy
- Abuse tolerant
- **Low Ownership Costs**

CONS

- High labor costs
- Slower installation
- **Higher Initial Costs**

OPTION 1

BUILT-UP ROOFING (BUR)

HOT BUR

- Hot asphalt (375° - 450°F)
- Modified asphalts
- Coal-tar pitch (355°- 375°F)
- Asphalt impregnated sheets
- Asphalt coated sheets
- Limited flood coat and surfacing options

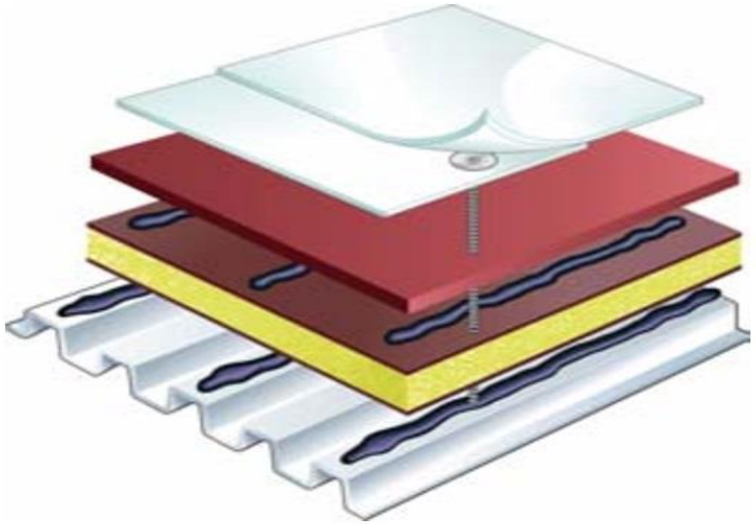
OPTION 1

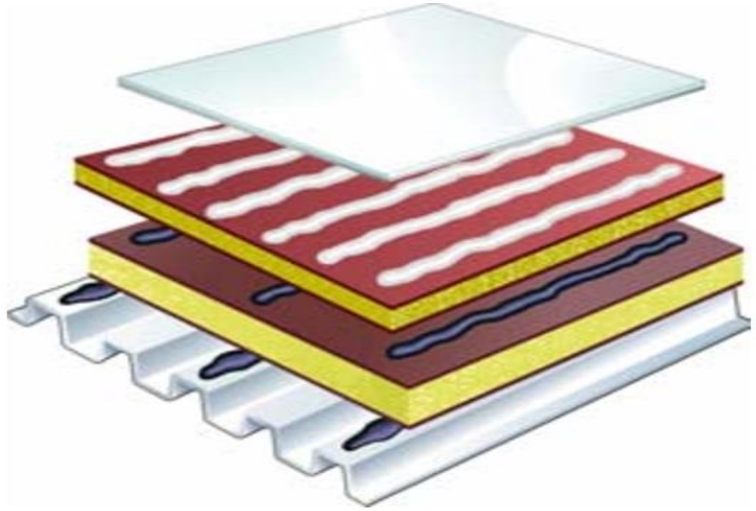
BUILT-UP ROOFING (BUR)

COLD BUR

- Asphalt coated sheets
- Spray applied or squeegee
- Low odor options
- Low VOC options
- Excellent for sensitive environments
- More flood coat and surfacing options available

OPTION 2





SINGLE-PLY MEMBRANES

- Thermosets
- Thermoplastics
- Single layer with seams
- Installation options
  - Ballasted
  - Fastened
  - Fully adhered
- Fleece-backed sheets
- Surface colors: Typically black, gray or white

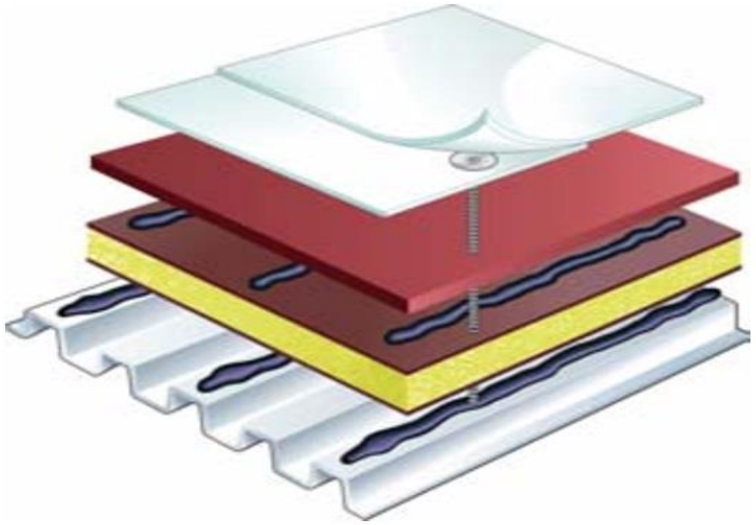
OPTION 2

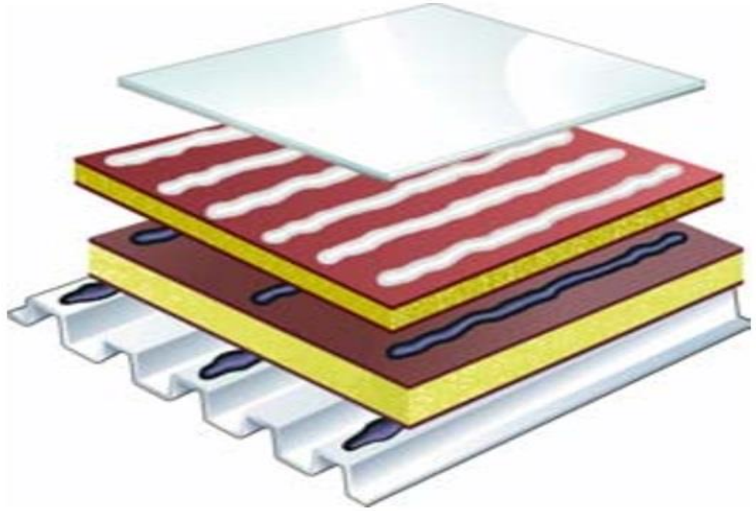
SINGLE-PLY MEMBRANES

MEMBRANE TYPES

- **EPDM** - Ethylene Propylene Diene Monomer
- **CPE** - Chlorinated Polyethylene
- **CSPE** - Chlorosulfonated Polyethylene
- **PIB** - Polyisobutylene
- **PVC** - Polyvinyl Chloride
- **TPO** - Thermoplastic Polyolefins
- **KEE –** Ketone Ethylene Ester
- **TPA** - Tri-polymer Alloy

OPTION 2





SINGLE-PLY MEMBRANES

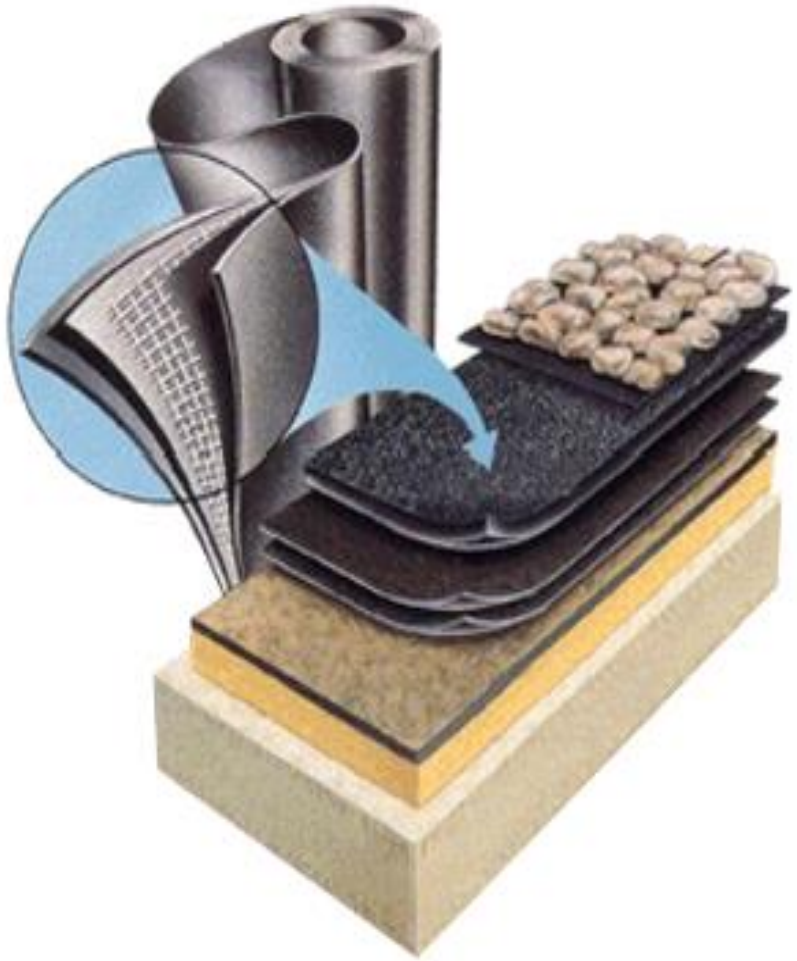
PROS

- **Lower Initial Costs**
- Speed of installation
- Elastomeric
- Reflective surface
- Details are more simple to design/install

CONS

- No ply redundancy
- Shrinkage (thermoset)
- Embrittlement (thermoplastic)
- Seam integrity
- Abuse intolerant
- Rooftop fall risk liabilities
- **High Ownership Costs**

OPTION 3



MODIFIED BITUMEN

First discovered in Europe

U.S. Introduction – 1970's

Two Basic Types
- SBS
- APP

Reinforcement Scrims
- Fiberglass (ASTM D 6163)
- Polyester (ASTM D 6164)
- Combination (ASTM D 6162)

Configuration: 1, 2 or 3 layers

Application
- Hot or Cold Adhesives
- Torch Applied
- Self-Adhered

OPTION 3

MODIFIED BITUMEN

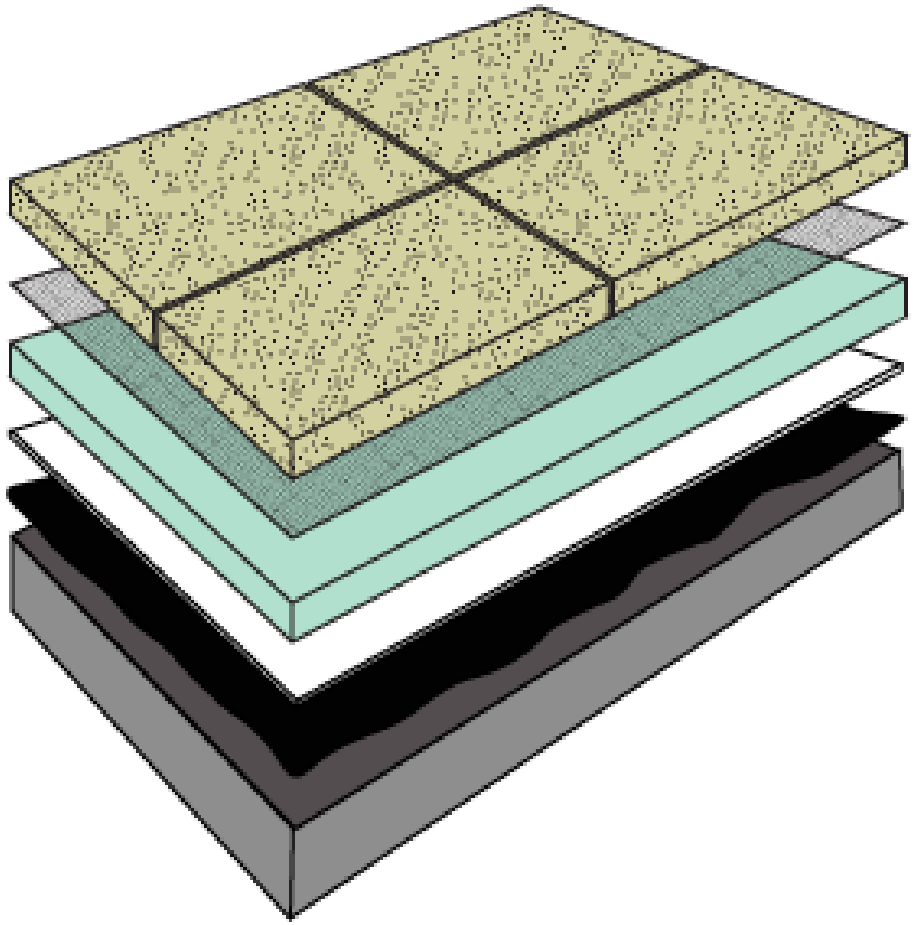
PROS

- Factory surfacing
- Factory controlled thickness
- High abuse tolerance
- Speed of installation
- Color options
- Low/no odor options
- Mid Range initial Costs
- **Low Ownership Costs**

CONS

- Cold temp install precautions
- Open flames with torch installs
- Low temperature flex – +8°F to 32°F

OPTION 4



LIQUID APPLIED ROOFING

- Waterproofing Membrane vs. Coating
- Traditional and PRMA/IRMA.
- Polyurethanes: single and multi-component
  - Moisture cured
  - Moisture triggered
  - Chemical cured
- PMMA
- PUMA
- SBS/SEBS modified asphalt
- Dual layer systems
- Acrylic and silicone coating systems

OPTION 4

LIQUID APPLIED ROOFING

PROS

- Seamless waterproofing
- Cost-effective
- High tensile strength
- Elastomeric
- Excellent for use on high-rise construction and confined spaces
- **Exposed systems, very low maintenance cost.**
- **Phenomenal restoration capabilities**

CONS

- Thickness control
- Weather limitations, some options
- IRMA/PRMA installs are very difficult to inspect, repair and maintain

OPTION 5

METAL ROOFING

- History
- Medieval - lead/copper
- Modern - steel and aluminum
- Life extending developments
  - Panel production
  - Corrosion protection
  - Sealant technology
  - Clip attachment
  - Portable seaming machines
- Hydrokinetic vs. hydrostatic

OPTION 5

METAL ROOFING

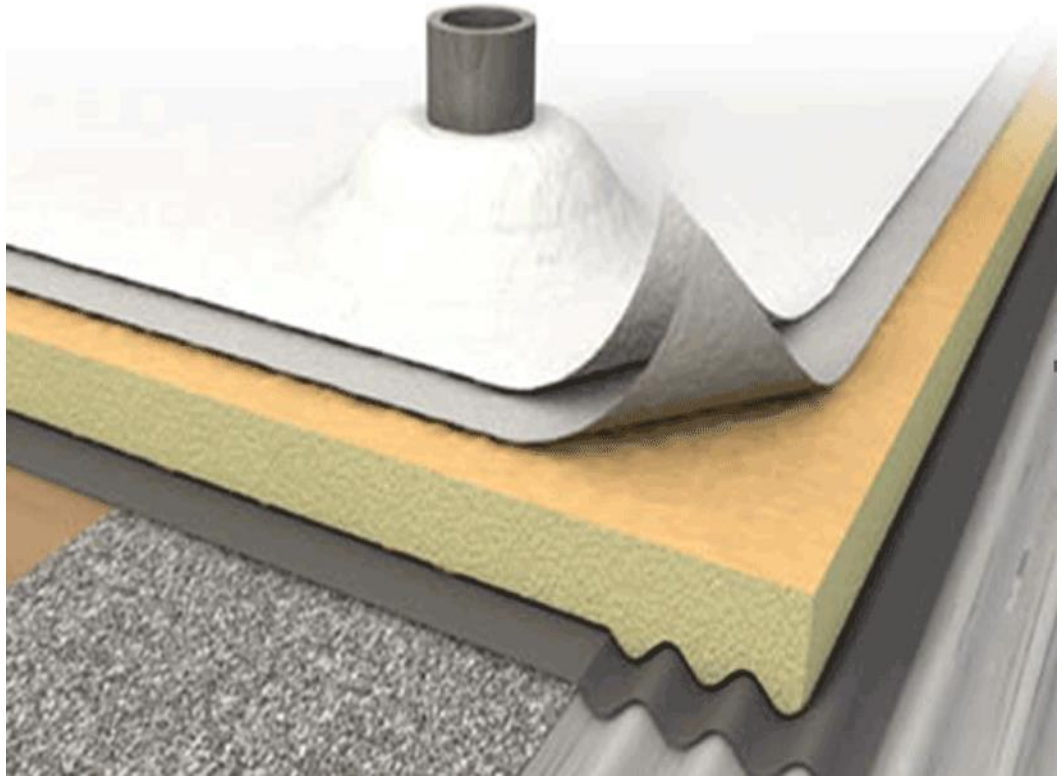
PROS

- Maintainable
- Attractive
- **Low ownership costs**
- Long lasting

CONS

- Flashing difficulties
- **High installed costs**
- Span limitations
- Application limitations.
- Not good with roof mounted equipment

OPTION 6



SPRAY POLYURETHANE FOAM (SPF)

- Introduced in 1960’s
- Spray Applied
- Coating required to be waterproof
- Very poor track record

OPTION 6

SPRAY POLYURETHANE FOAM (SPF)

PROS

- **Low installed cost**
- Inexpensive “R” increase
- Very conforming
- Lightweight
- Monolithic

CONS

- Application sensitivity
- Puncture resistance
- Blistering
- Poor track record
- High maintenance costs
- Not UV stable
- **Very High Ownership Cost**

OWNERSHIP COST - SCENARIO #1

Assumptions - 2025 dollars, 8% annual inflation (historical the last 30 years and expected to continue). 15 years of reliable single ply service life, 30 years of reliable SBS or gravel surfaced built up service life. For both systems, restoration after the initial reliable service life period.

System	Installation cost	Year 15 Maintenance Costs – Single Ply Restoration	Total System Costs After 30 Years Cost/yr Service	Year 30 Maintenance Costs – SBS/BUR Restoration	Year 35 Maintenance Costs – Single Ply Restoration	Total roof costs after 55 years Cost/yr Service
Single Ply	$897,000	$1,313,965	$2,210,965 $73,699/yr	$0	$6,128,383	$8,339,348 $151,625/yr
SBS	$981,000	$0	$981,000 $32,700/yr	$4,169,870	$0	$5,150,870 $93,652/yr

OWNERSHIP COST - SCENARIO #2

Assumptions - 2025 dollars, 8% annual inflation (historical the last 30 years and expected to continue). 20 years of single ply service life with leaks the last 5 years. 30 years of reliable SBS or gravel surfaced built up service life. Replacement cycles for single ply every 20 years. Restoration for the SBS or gravel surfaced built up roof system after initial reliable service life period.

System	Installation cost	Year 20 Maintenance Costs – Single Ply Replacement	Total System Costs After 30 Years Cost/yr Service	Year 30 Maintenance Costs – SBS/BUR Restoration	Year 40 Maintenance Costs – Single Ply Replacement	Total roof costs after 55 years Cost/yr Service
Single Ply	$897,000	$4,180,020	$5,077,020 $169,234/yr	$0	$19,482,840	$24,559,860 $446,543/yr
SBS	$981,000	$0	$981,000 $32,700/yr	$4,169,870	$0	$5,150,870 $93,652/yr

OWNERSHIP COST - SCENARIO #3

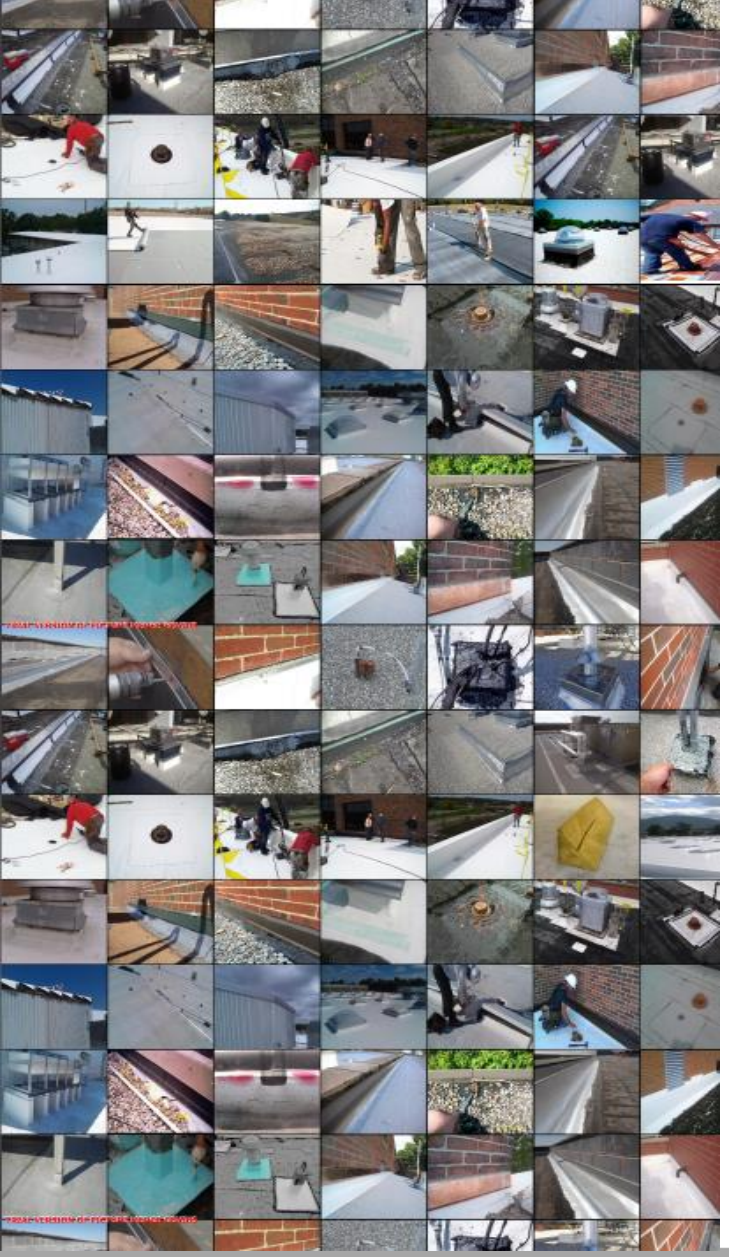
Assumptions - 2025 dollars, 8% annual inflation (historical the last 30 years and expected to continue). 20 years of single ply service life with leaks the last 5 years but restorable instead of replacement. 30 years of reliable SBS or gravel surfaced built up service life. Replacement cycles for single ply every 20 years. Restoration for the SBS or gravel surfaced built up roof system after initial reliable service life period and continued restoration for the single ply after initial restoration at year 20.

System	Installation cost	Year 20 Maintenance Costs – Single Ply Restoration with 20% wet replacement	Total System Costs After 30 Years Cost/yr Service	Year 30 Maintenance Costs – SBS/BUR Restoration	Year 40 Maintenance Costs – Single Ply Restoration	Total roof costs after 55 years Cost/yr Service
Single Ply	$897,000	$2,472,410	$3,369,410 $112,314/yr	$0	$9,002,940	$12,372,350 $224,952/yr
SBS	$981,000	$0	$981,000 $32,700/yr	$4,169,870	$0	$5,150,870 $93,652/yr

OWNERSHIP COST - SCENARIO #4

Assumptions - 2025 dollars, 8% annual inflation (historical the last 30 years and expected to continue). 25 years of single ply service life with abundant leaks the last 5-8 years. 30 years of reliable SBS or gravel surfaced built up service life. Replacement cycles for the single ply roof every 25 years. Restoration for the SBS or gravel surfaced built up roof system after the initial reliable service life period.

System	Installation cost	Year 25 Maintenance Costs – Single Ply Replacement	Year 30 Maintenance Costs – SBS/BUR Restoration	Total Cost After 50 Years Cost/yr Service	Year 50 Maintenance Costs – Single Ply Replacement	Total roof costs after 60 years Cost/yr Service
Single Ply	$897,000	$6,144,450	$0	$7,041,450 $128,026/yr	$42,078,270	$49,119,720 $818,662/yr
SBS	$981,000	$0	$4,169,870	$5,150,870 $93,652/yr	$0	$5,150,870 $93,652/yr



SUMMARY

MAKE AN EDUCATED CHOICE BEYOND INSTALL PRICE & WARRANTY

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QUESTIONS?

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