Maintaining Building Envelope Integrity

Is Your Leak *REALLY* a Roof Leak?
Learning Objectives:

- Recognize what is, and what is not, a roof leak.
- Identify water leak sources at masonry walls and counterflashings.
- Identify water leak sources at HVAC and ducting.
- Identify the two main types of failures on exterior sealant joints.
What would be your next step?

- Call building engineer/maintenance?
- Call a roofing contractor for repair?
- Live with it (more buckets)?
- Try and find your warranty?
You took one or more of those steps… what if the leak was not fixed?

- You paid for something that was not fixed!?  
- Call a roofing contractor for repair, again?  
- Damaged internal finishes?  
- Damaged equipment?  
- Complaining employees?  
- Safety?  
- Maybe mold?
• Call contractor again
• Review warranty again
• Contact manufacturer again
• Contact attorney or legal dept?

Definition of Insanity:

Doing the same thing over and over again and expecting different results

Albert Einstein
Where could the leak be coming from?
Experience has repeatedly shown that there are more potential water entry areas than just through the roof:
Where do you start to look?

It will not always be this obvious…
Coping
New roof is not leaking...but...coping is leaking
Porous Masonry
Split-faced block is particularly sensitive
What causes efflorescence?
Cracked & Spalling Masonry
Counterflashing & Thru-wall

Problems are NOT always immediately identifiable
COUNTER FLASHING

“Formed metal or elastomeric sheeting secured on or into a wall, curb, pipe, rooftop unit or other surface, to cover and protect the upper edge of a base flashing and its associated fasteners.”

DETAILS

COUNTER FLASHING

Surface Mount

8" MIN
DETAILS

COUNTER FLASHING

Surface Mount

GOOD
DETAILS

COUNTER FLASHING

Reglet
DETAILS

COUNTER FLASHING

Reglet

BETTER
DETAILS

COUNTER FLASHING

Through-Wall
DETAILS

COUNTER FLASHING

Through-Wall

BEST
Louvers, Windows & Doors
HVAC Issues
SPF contractor’s idea of how to handle a nuisance roof leak…

“mummification”
Duct work
30 SECONDS OF WORK TO CLEAR DRAIN & REMOVE 18,000 LBS OF WATER
Old cast iron pipe is prone to splitting.
Drifted & Blowing Snow
“Loss of Adhesion” is failure of the sealant to adhere along the bond line of the surface to which it is attached, causing it to break away. Possible causes are joint movement exceeding the sealant capability, improper surface preparation, or improper bead configuration.
Sealant Failures

“Cohesive Failure” occurs when the sealant fails to hold together. Cohesive failure can take the form of splits and tears in both transverse and longitudinal directions. Usual causes include improper sealant selection, poor mixing of multi-component sealants, possible air entrapment in the sealant from mixing, or improper bead configuration.
Looks minor from the outside...
Daylight visible from the inside = water & air leakage
How Can You Determine the Impact of a Leak?

- Thermal Comfort
- Air Quality (egress and ingress of contaminants)

### HOLE AREA “A” BASED UPON:

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<tr>
<th>Description</th>
<th>Value</th>
<th>Unit</th>
<th>Notes</th>
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<td>35 doors x 20 ft. perimeter x 1/16” crack</td>
<td>3.65</td>
<td>FT.</td>
<td>²</td>
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<td>24’ overhead door w/s x 1/8” crack</td>
<td>0.25</td>
<td>FT.</td>
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<td>16,204 ft. of window sealing x 1/64” crack</td>
<td>21.09</td>
<td>FT.</td>
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<td>0.40</td>
<td>FT.</td>
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<td><strong>TOTAL:</strong></td>
<td><strong>34.785</strong></td>
<td><strong>FT.</strong></td>
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Roofing, albeit a major concern, is only one piece of a building’s waterproofing protection:
CANDIDATES
PRESERVATION CANDIDATES

BUR

Hot & Cold applied built-up roofing?

Yes
PRESERVATION CANDIDATES

MOD BITS

SBS or APP Cold Adhesive, Hot or Torch Applied Modified Bitumen Systems?

yes
PRESERVATION CANDIDATES

SINGLE PLY

EPDM, PVC, TPO, Hypalon, etc. single ply Systems?

no
PRESERVATION CANDIDATES

SINGLE PLY

EPDM, PVC, TPO, Hypalon, etc. single ply Systems?

Yes
PRESERVATION CANDIDATES

Metal roofing systems

Any?

yes
- No Cover Board
- No Restoration
WHAT IS FLUID APPLIED ROOFING?

Fluid applied roofing is:
• A monolithic and fully bonded roof coating
• Liquid based
• Cures to form a waterproof membrane.
• Capable of stretching and returning to its original shape without damage
WHAT IS FLUID APPLIED ROOFING?

Fluid applied roofing is almost always a combination of:

• Primer (primer type depends on substrate)
• Base coat
• Reinforcing Membrane: fiberglass or polyester
• Top Coat
WHAT IS FLUID APPLIED ROOFING?

Material is applied by:
- Trowel
- Squeegee
- Roller
- Brush
- Spray apparatus
- Or other method recommended by membrane manufacturer.
REPAIR
(on most roof types)
RESTORATION
For existing roofing systems:
• Mod Bit
• Single ply
• Smooth BUR
• Metal
• Sprayed Polyurethane
• Previously coated surfaces
OTHER COURSES IN THE SERIES

TR1  Roofing Options: Alternative Roofing Systems
TR2  Cold Process Roofing
TR3  Modified Bitumen Roofing
TR4  Single Ply Roofing
TR7  Metal Roofing Systems
TRM003  Codes and Approvals
TRM011  Roof Warranties
TRM031  Safe Solutions
Traditional Approach
Guarantees Premature Failure

- Replace
- Repair
- Repeat
- “20-Year” designs fail in 10 - 12 years.
Managing the Building Envelope
Financial Assets for Return on Investment

- Manufacturing facilities are composed of long term institutional buildings that represent significant asset value.
- Facilities represent 25-40% of corporate wealth. *
- Less than 10% are managed as financial assets for a return on investment.

*Harvard Study
Managing the Building Envelope
Financial Assets for Return on Investment

Life Expectancy with Maintenance and Restoration

- Through preventive maintenance the service life of a roof is increased anywhere from 30% to 100% according to NRCA* and AIPE**

- With restoration, roof life can be extended even further. We have local building owners with roofs that have lasted well over 50 years with preventive maintenance and restoration.

*NRCA – National Roofing Contractors Association

**AIPE – American Institute of Plant Engineers (Now AFE)
Cost of Neglect
Case Study - 1996 Infrared Results

1,155 sf wet
$15.00 / sf
$17,000 cost
Cost of Neglect
Case Study - 1999 Infrared Results

6,160 sf wet
$15.00 / sf
$92,000 cost
Cost of Neglect
Case Study - 2001 Infrared Results

27,201 sf wet
$15.00 / sf
$408,000 cost
Cost of Neglect
Roof Replacement 2005

65,000 sf wet
$15.00 / sf
$975,000 cost
Cost of Neglect

- Phase 1 Failure $17,000
- Phase 2 Failure $92,000
- Phase 3 Failure $408,000
- Phase 4 Failure $975,000

- Asset Management Program Priceless
The Asset Management Solution

Methodology to Extend Asset Life

- Know what you have
Client: Centennial High School
Address: 3505 SE 182nd Ave
Gresham, OR 97030

Drawn By: KS
Date: 3-15-18

Roof A: 4,513 sq.ft.
Roof B: 15,165 sq.ft.
Roof C: 4,560 sq.ft.
Roof D: 6,933 sq.ft.
Roof E: 5,345 sq.ft.
Roof F: 10,748 sq.ft.
Roof G: 1,950 sq.ft.
Roof H: 5,261 sq.ft.
Roof I: 4,789 sq.ft.
Roof J: 1,960 sq.ft.
Roof K: 7,685 sq.ft.
Roof L: 1,604 sq.ft.
Roof M: 2,663 sq.ft.
Roof N: 3,619 sq.ft.
Roof O: 4,787 sq.ft.
Roof P: 873 sq.ft.
Roof Q: 12,496 sq.ft.
Roof R: 14,374 sq.ft.
Roof S: 1,568 sq.ft.

Total Low Slope: 329,922 sq.ft.
Maintain/Restore Delay 7-10

Green

Restore 2-3

Yellow

Replace 1-2

Red

Core Information:

x1: Wood Deck
2 Layers 2" ISO
1/2" Gypsum
Multi Ply + Cap

x2: Wood Deck
Rosin Paper
1/2" Wood Fiber
Multi Ply + Cap

x3: Wood Deck
2 layers Tapered ISO
Multi Ply + Cap

x4: Wood Deck
1" Yellow Fiberglass
Multi Ply + Cap

x5: Wood Deck
2 Layers 2" ISO
2 Layers 1/4" Gypsum
Multi Ply + Cap

x6: Tectum Deck
1" Yellow Fiberglass
Multi Ply + Cap

x7: Wood Deck
Multi Ply + Cap

Category Drawing
Maintain: 6,743 sq.ft. (6%)
Restore: 111,374 sq.ft. (86%)
Replace: 10,806 sq.ft. (8%)
GENERAL INFORMATION:

ROOF AREA: Centennial High School
SQUARE FOOTAGE: 129,222 sq. ft.
DATE INSTALLED: Unknown

ROOF COMPOSITION:

MAJORITY SURFACEING: MB Cap Sheet (sq. ft.)
MEMBRANE: MB Cap Sheet
INSULATION: Yellow Fiber Glass
INSULATION: Polyisocyanurate
COVERBOARD: Perlite
COVERBOARD: Gypsum
DECK: Wood

DEFEICIENCIES NOTED:
• Clean all membrane surfaces of organic build up.
• Foil Flashing face is failing
• Clean drains of all debris and organics.
• Defective Membrane fishmouths
• Clean all gutters free of organic debris.
• Deteriorated rubber expansion joint.
• Replace walkway on stadium
• Poor termination of foil to masonry
• Poorly installed cap repair
• Exposed lead flashings
• Fill all pitch pockets
• Replace missing wall clad metal
• Failing flashing at Scuppers
• Racked membrane by drain

INSPECTOR COMMENTS:

Centennial High School MB Cap sheet is in fair condition and should be budgeted for restoration in 3-5 years. Fix all deficiencies and maintain twice a year to extend the life of the system.

Roof A was more recent and should be maintained and budgeted for delayed restoration in 5-7 years. Moderate areas of Granule loss will continue to expand.

RECOMMENDATIONS:

Good
AlphaGuard NR Clean the existing roof system clean of all dirt and debris. Apply reinforcing at all seams in AlphaGuard Base Coat. AlphaGuard Top Coat. Provide a 12-year Tremco QA Warranty with inspection and maintenance on years 2, 5, 10.

Best
AlphaGuard Fully Reinforced System Clean the existing roof system clean of all dirt and debris. Fully reinforce Base Coat and all flashings with Polyester fabric in Base Coat. Install Top Coat at 2 Gallons/sq. Provide a 20-year Tremco QA Warranty with inspection and maintenance on years 2, 5, 10 & 15.

Note: At the end of year 20, the system can be cleaned, primed, and 2 gallons per 100 sq. ft. of AlphaGuard Top Coat can be installed to extend the system life cycle by providing an additional 10-year warranty with inspection and maintenance again, on years 2 & 5. The system can be restored indefinitely for the life of the building.

ROOF CATEGORY: Restore

RESTORATION BUDGET: Range: $1,162,998-$1,421,442

REPLACEMENT BUDGET: $1,809,108

Kachwaring@tremcoinc.com • www.tremcoroofing.com
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Total Asset 6,736,901 Sq. Ft.
Total Asset Value $202,107,030

- REPLACE 2,572,974 sq. ft. $54,032,454 (38%)
- MAINTAIN 1,712,811 sq. ft. $274,049 (26%)
- RESTORE 2,451,166 sq. ft. $26,962,276 (36%)

TREMCO®
ROOFING & BUILDING MAINTENANCE