



Roof Maintenance and the Building Envelope

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SCHOOL DISTRICT

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Welcome to Roofing School!

Surprise Quiz !!

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Where are we?

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Miller Park (aka American Family Field)



And Now ?



Concordia University





And Now?





Whitefish Bay School District

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And Now?





Kettle Moraine School District

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And Now?





Elkhart Lake High School

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Topics of Discussion



- **Types of Roofs on Your Buildings**
 - What can you expect from your roof ??
- **Basic Roofing Terminology**
- **Building Enclosure Maintenance Tips**
- **Proven Approach to Take When a Leak Occurs and How to Resolve Recurring Leaks**
- **Roof Management**
- **Lessons Learned: Case Studies**
- **Question & Answer**



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Types of Roofs on Buildings

What can you expect from your roof ??



Snow Loads



Ice Dams



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Ponding Water



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Rainfalls



Built-Up Roof Systems



Construction–Built up BUR (BUR)

- Multiple layers of insulation
- Mechanically attached or adhered
- Hot asphalt applied
- Multiple plies, typically four (4)
- Gravel surfaced
- Smooth asphalt coating
- Aluminum coating



BUILT-UP (BUR)

Pros: Long Term Performance

Cons: Odor at installation and cost



Adhered EPDM TYPES

- Nailable or non-nailable decks
- Multiple layers of insulation
- Adhered or mechanically attached
- Entire sheet is adhered in bonding adhesive.
- Mechanically attached at edges, walls and penetrations



ADHERED EPDM

Pros: Light weight and clean

Cons: Punctures



Ballasted EPDM



Ballasted EPDM TYPES

- Multiple layers of insulation
- Loose laid insulation
- Large sheets, up to 50' x 100'
- Held in place with stone ballast
- 10-12 pounds per 1 sq. ft. or paver
- Mechanically attached at edges, walls and penetrations



Ballasted EPDM

Pros: Cost effective

Cons: Leak finding, weight, punctures



Thermoplastic (PVC, TPO) System Construction



- Multiple layers of insulation
- Mechanically attached, fewer fasteners
- Sheets are fastened at the seams, 12" on center or aligned (Rhinobond)
- Fully adhered systems
- Mechanically attached at edge, walls and penetrations
- Heat welded seams



Thermoplastic (Typ. White)

- Pros: White, Reflectivity, Cost Effective
- Cons: Slippery, Performance Variables, Repairs

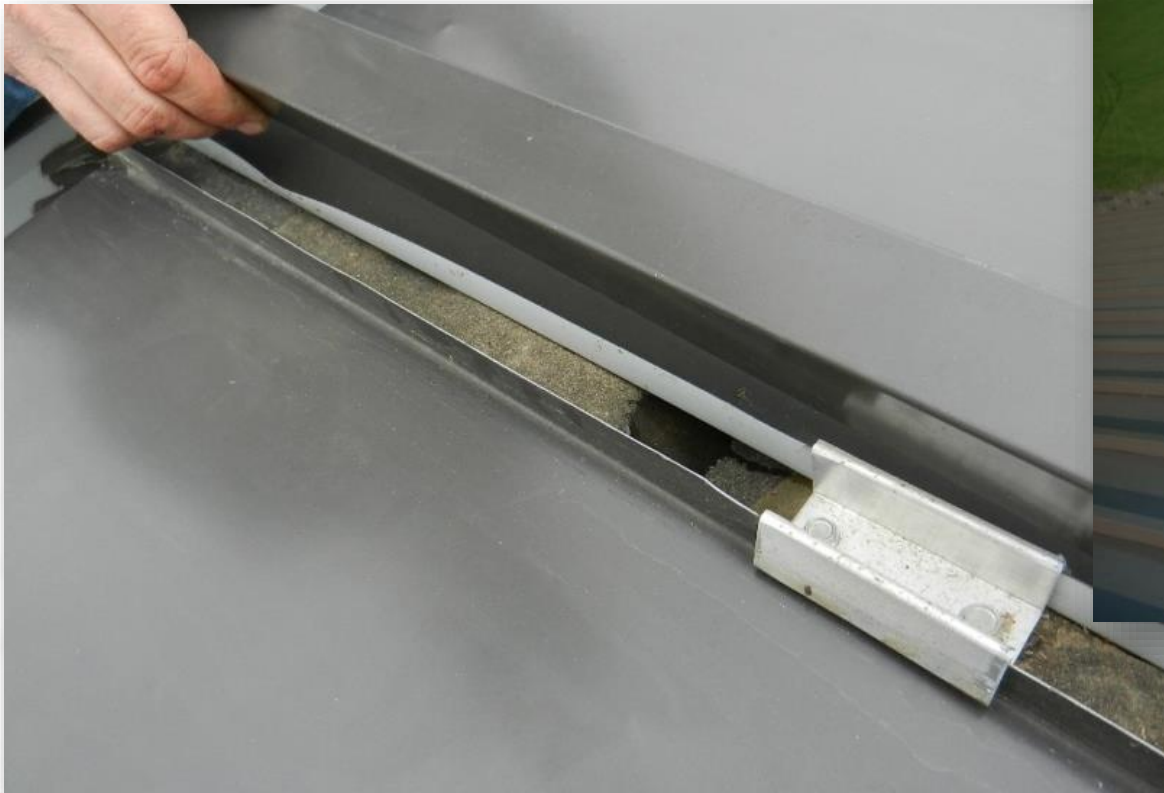


Metal Roof Systems



Metal Roof Systems

- Standing Seam
- Batten Seam
- Flat Seam
- The Key: A waterproofed, solid, substrate



Green Roof Systems



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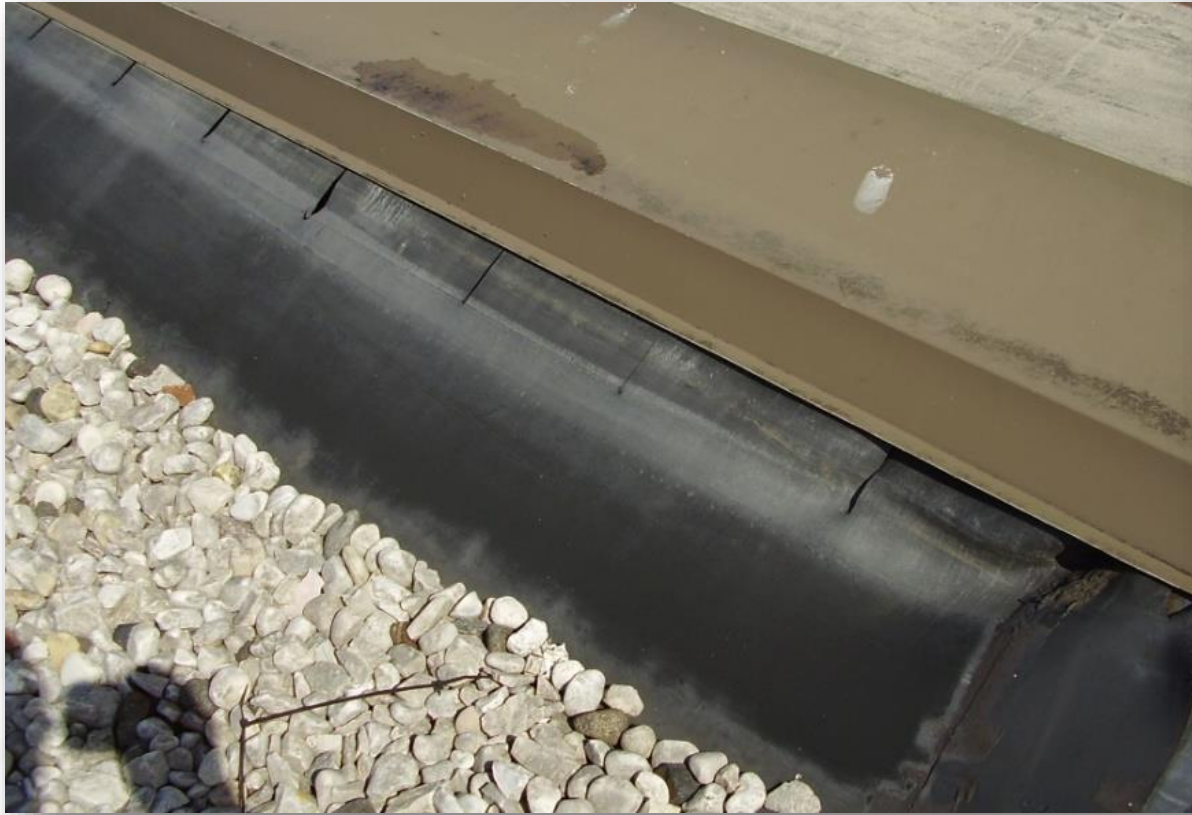


Basic Roofing Terminology

- Flashing
- Counter Flashing
- Coping
- Ballast

FLASHING:

Roof membrane transitions to a wall, edge or curb



COUNTERFLASHING: Cover/Termination over the flashing



COPING: Top of the exterior wall, metal or stone



BALLAST: Stones or pavers used to keep the membrane in place



A photograph showing a close-up of a roof drainage system. A metal gutter runs across the top of the frame. Below it, a circular metal grate is partially submerged in a pool of dark, stagnant water. A clump of tall, thin grasses is growing out of the water, partially obscuring the grate. The surrounding roof surface is made of concrete or a similar material, showing some signs of wear and discoloration.

Building Enclosure Maintenance Tips

*“Not exactly a
Green Roof”*

MAINTENANCE ISSUES



- Perimeter Flashings
- Roof Equipment Flashings
- Clean Drains and Debris
- Roof Splits and Open Seams
- Pipe, Gas Lines, and Electrical Penetrations
- Metal Edge Inspections
- Heat Loss
- HVAC Leaks
- System Deterioration

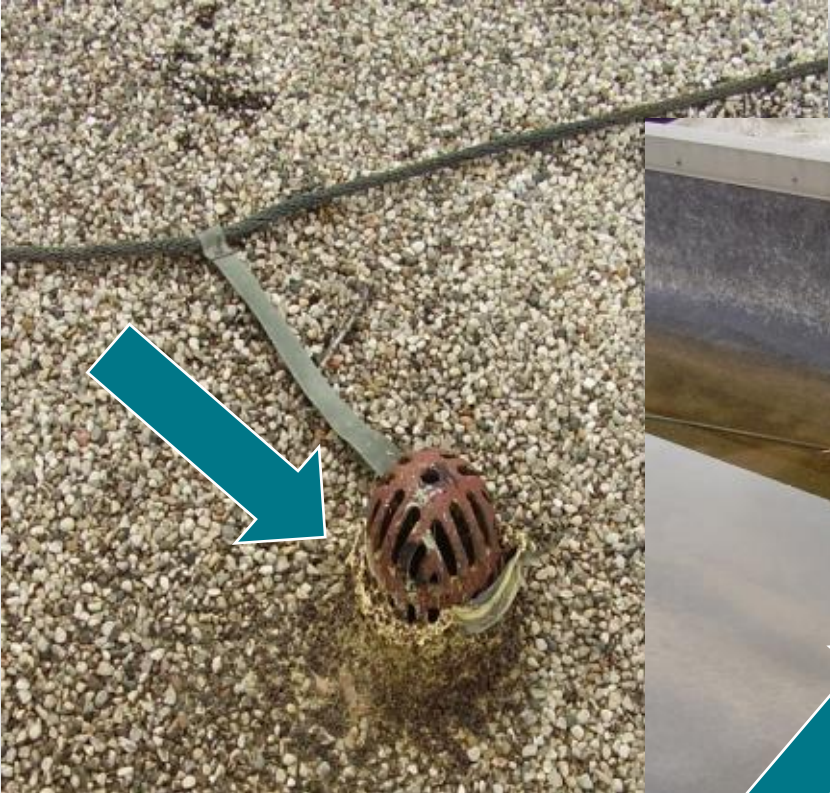
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PERIMETER FLASHINGS

- EPDM and most single ply membranes shrink
- Can be replaced to extend the life of roof membrane

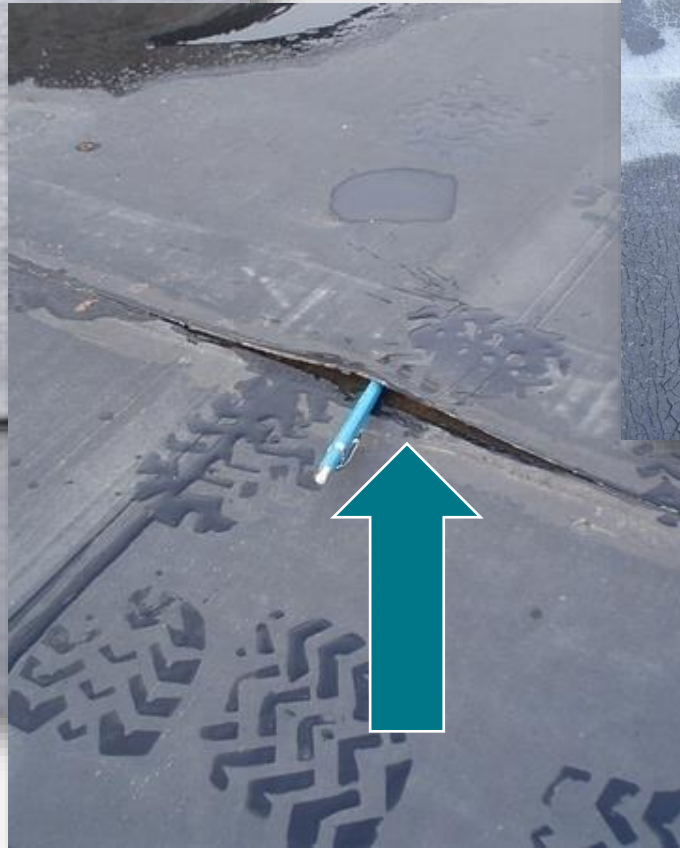


CLEAN DRAINS AND DEBRIS



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ROOF SPLITS AND OPEN SEAMS



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PIPE, GAS LINES, AND ELECTRICAL PENETRATIONS



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METAL EDGE INSPECTIONS



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HEAT LOSS

- Inspect early morning in the frost or heavy dew
- Signs of wet insulation



HVAC LEAKS



- Location of HVAC unit in comparison to leak
- Where is water dripping?
 - Off duct work
 - Off metal deck
- What type of rain?
 - Duration
 - Direction
 - Hard wind driven



Proven Approach to Take When a Leak Occurs and How to Resolve Recurring Leaks



Leak Check List

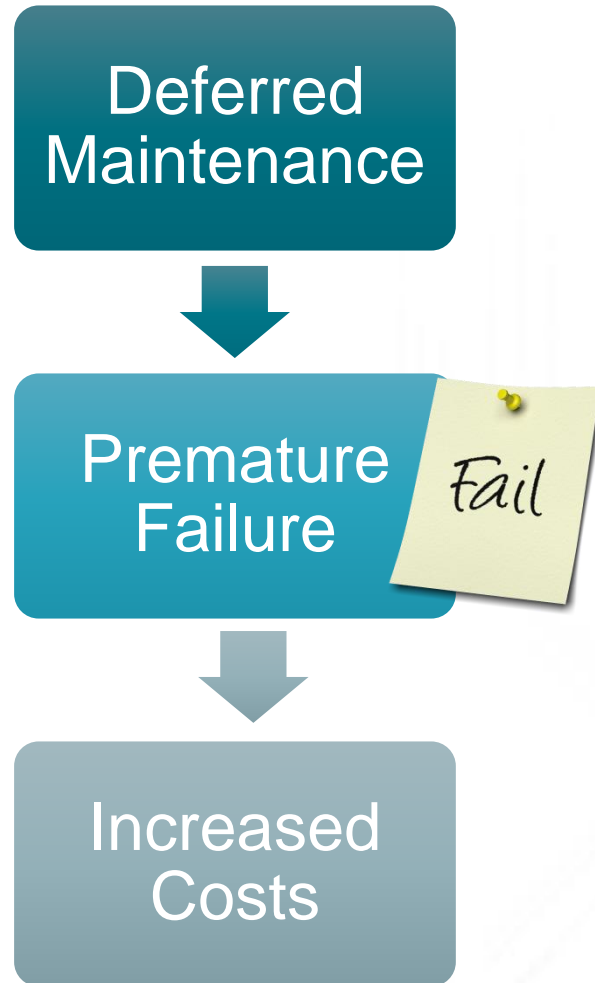
1. Check the weather and look above the ceiling tile
2. Is the leak from a pipe or mechanical equipment
3. Control the water and damage to the interior contents
4. Access the roof (if safe) and check to see if there is anything unusual (plugged drain, storm damage, etc.)
5. Repair to the best of your ability if you are able to see a defect in the roof (hole, open seam, etc.)
6. Contact your District roofing professional



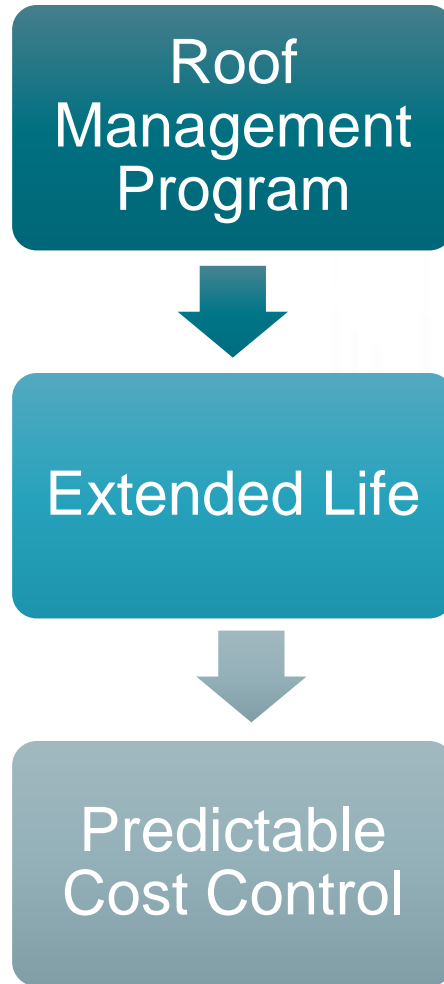
Why Roof Maintenance?

REACTIVE
VS.
PROACTIVE

Reactive Roof Management



Proactive Roof Management





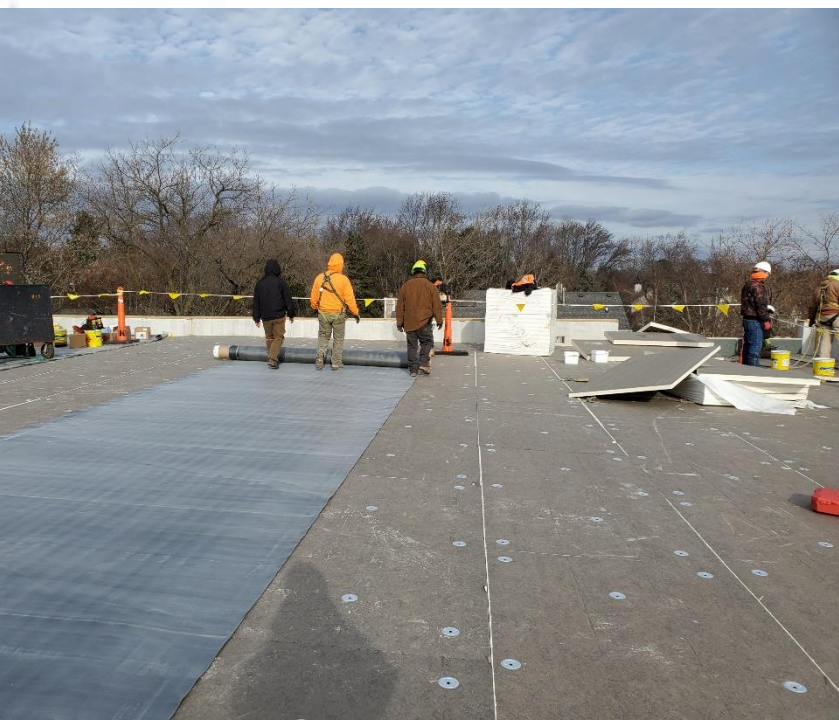
Design Trends and Case Studies

Roof Design Trends



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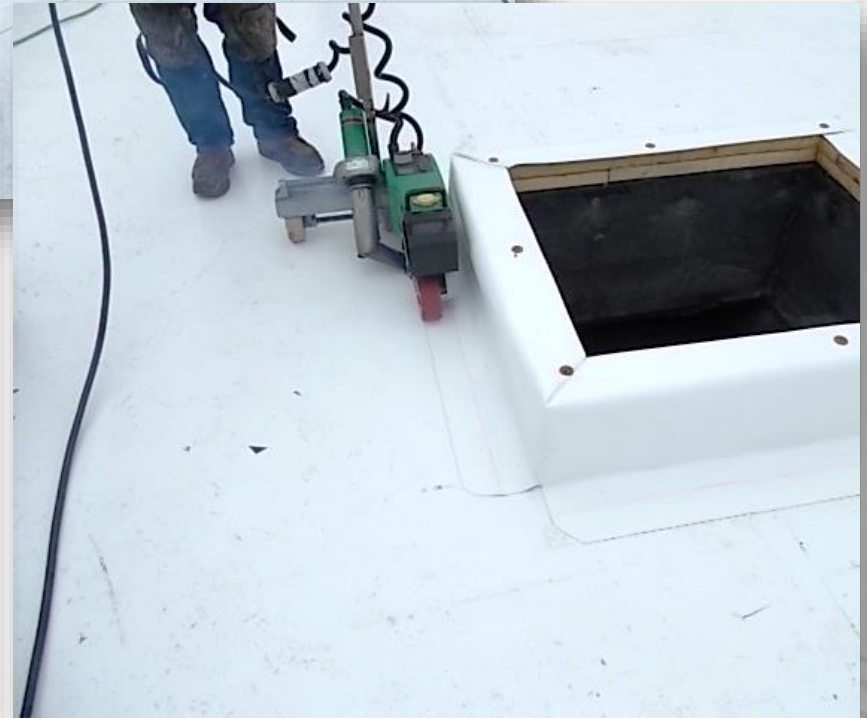
- Tendency to underestimate limitations of roof systems
 - Design and installation vs. timing
- Fully-adhered systems & low-rise adhesive foam
 - Cold weather issues (> 40 degrees)
 - Freeze before flash off
- New Technology
 - Peel & stick products
 - Adhesives (solvent-based vs. water-based)
 - Low VOC's (good and bad)



Roof Design Trends



- Mechanically attached systems
 - In-seam vs. rhinobond field attachment
- Quality-compliance observation (site visits)
 - Basic questions to ask
- Probing field seams
 - Issues
 - Field application

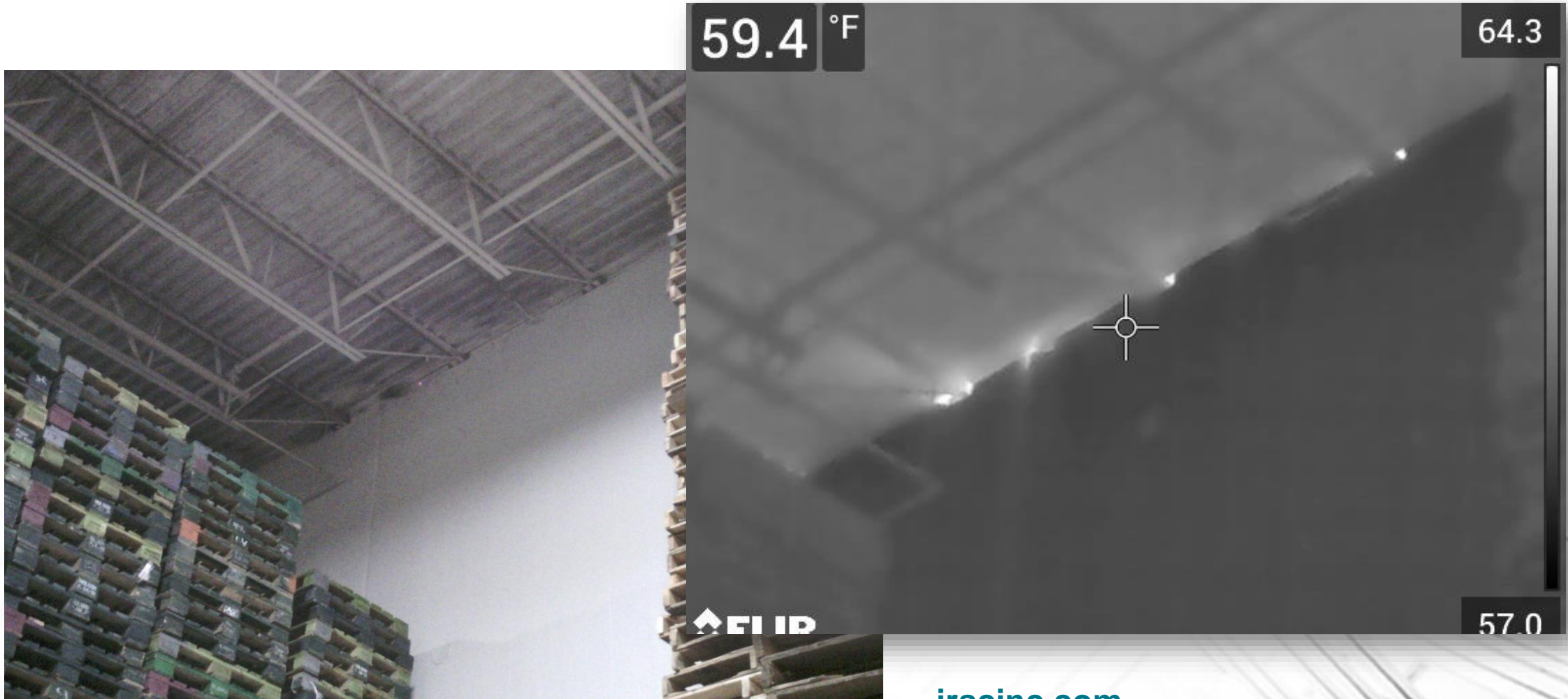


Envelope Design Trends

- Perimeter edge details
 - Sealing perimeter edge
 - Wood nailer
 - Membrane and flashing termination
- Air and water infiltration
- Steep slope attic venting
 - 150 vs. 300 calcs
 - Obstructed vs. non-obstructed attic spaces
- Fire walls (balancing venting)



Infrared Technology – Example 1



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Example 1 Continued



Whitefish Bay School District Case Study



Case Study: Weep

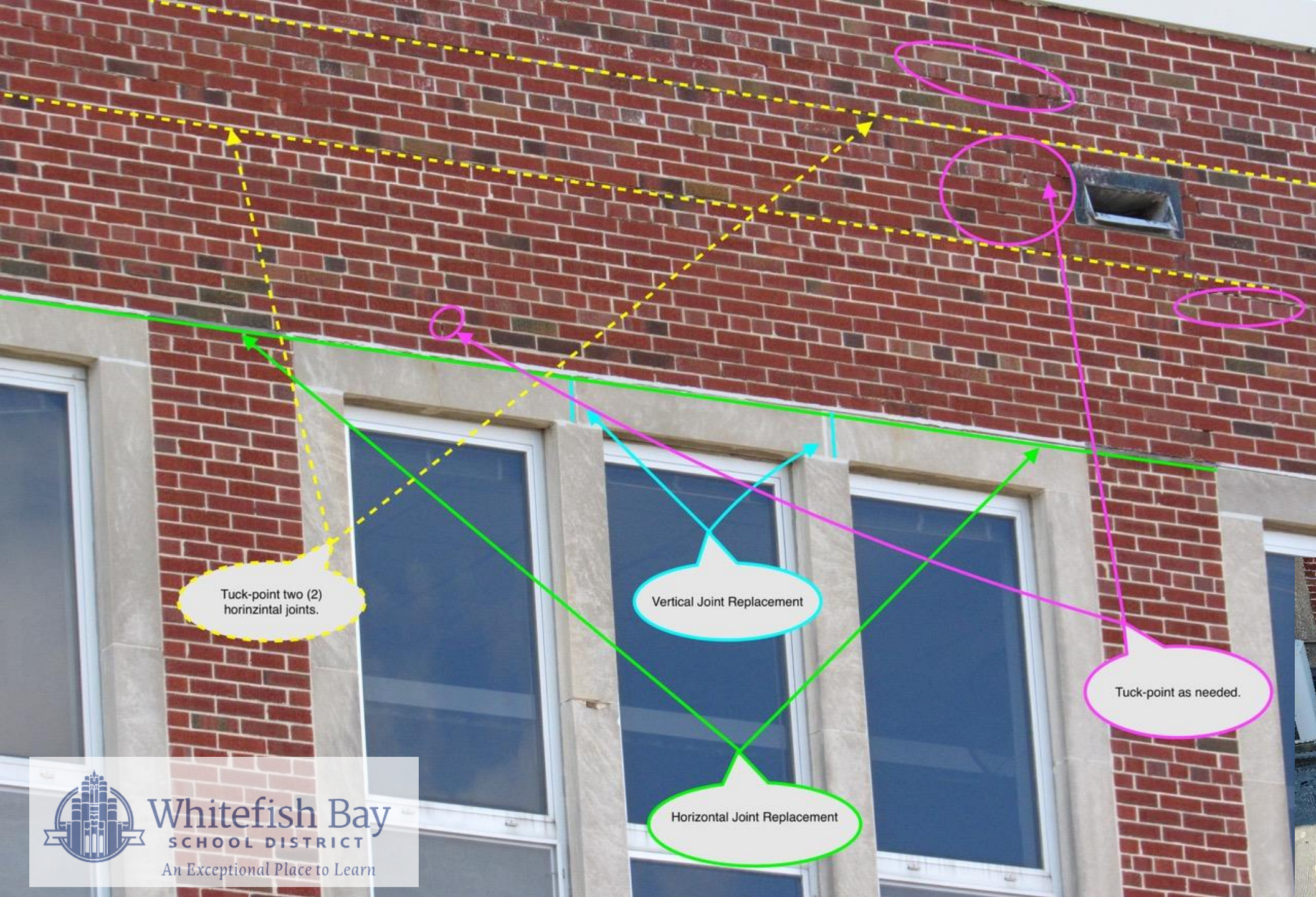


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Case Study: Window Leak





Tuck-point two (2) horizontal joints.

Vertical Joint Replacement

Tuck-point as needed.

Horizontal Joint Replacement





Thank you for attending!



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