Building. Life. Managed.

You May Already Own The Last Roofing & Building Envelope System You Need

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Definition of the High Performance Building

The term "high performance building" means a building that integrates and optimizes all major high-performance building attributes, including *energy efficiency, durability, life-cycle performance, and occupant productivity.**

4 Elements of a High Performance Building

- *Heat Flow*
- *Air Flow and Pressure*
- *Moisture*
- *Air Quality*

National Institute of BUILDING SCIENCES
An Authoritative Source of Innovative Solutions for the Built Environment

*High Performance Building Council
a council of the National Institute of Building Sciences

High Performance Capital ROI????

What Does A Healthy Building Look Like

Three Ways Conditioned Buildings are Impacted by Air Leakage

Air – Moisture – Heat

Building Science translates:

- Air = Comfort / Productivity / IAQ Health
- Moisture = Building Durability / IEQ Heath
- Heat = Energy Efficiency / Equipment Sustainability

Building Air Leakage Consequences

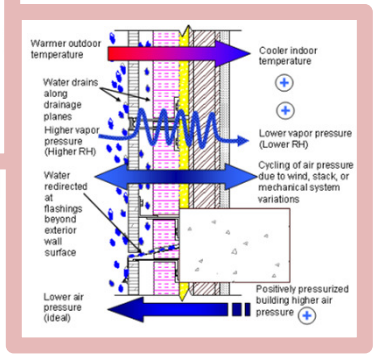
The Air and Moisture Connection

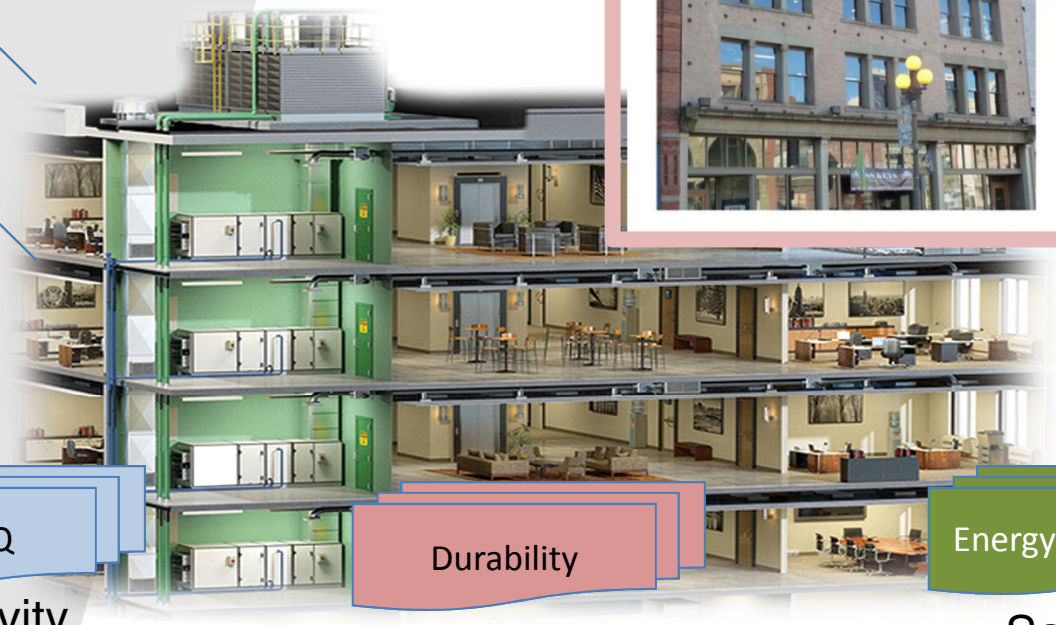
HVAC Sizing

Occupant Comfort

Indoor Air Quality

Wind Effect/ Weather





IAQ / IEQ

Durability

Energy Efficiency

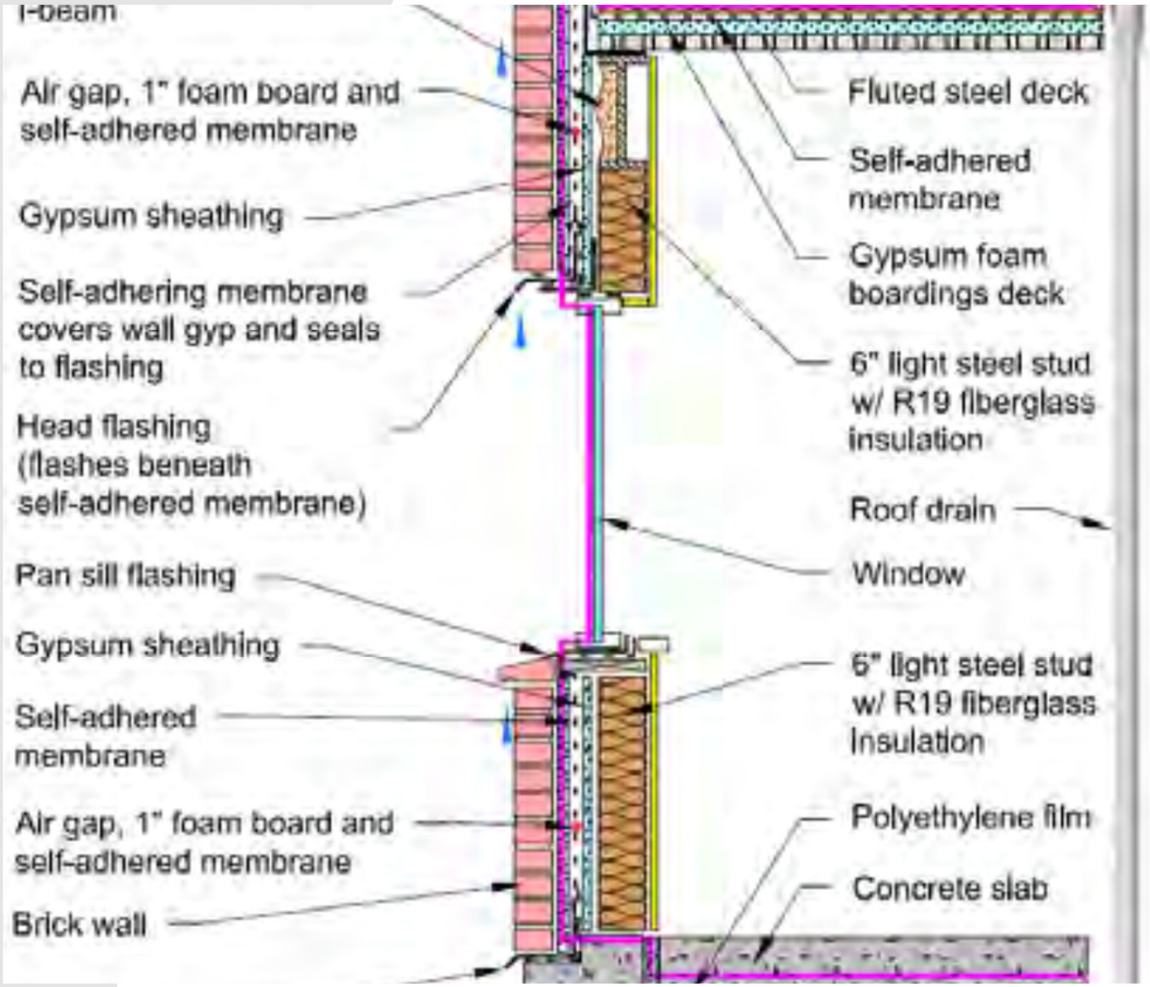
= Productivity

= Sustainability

= Savings

The Connection of Continuity

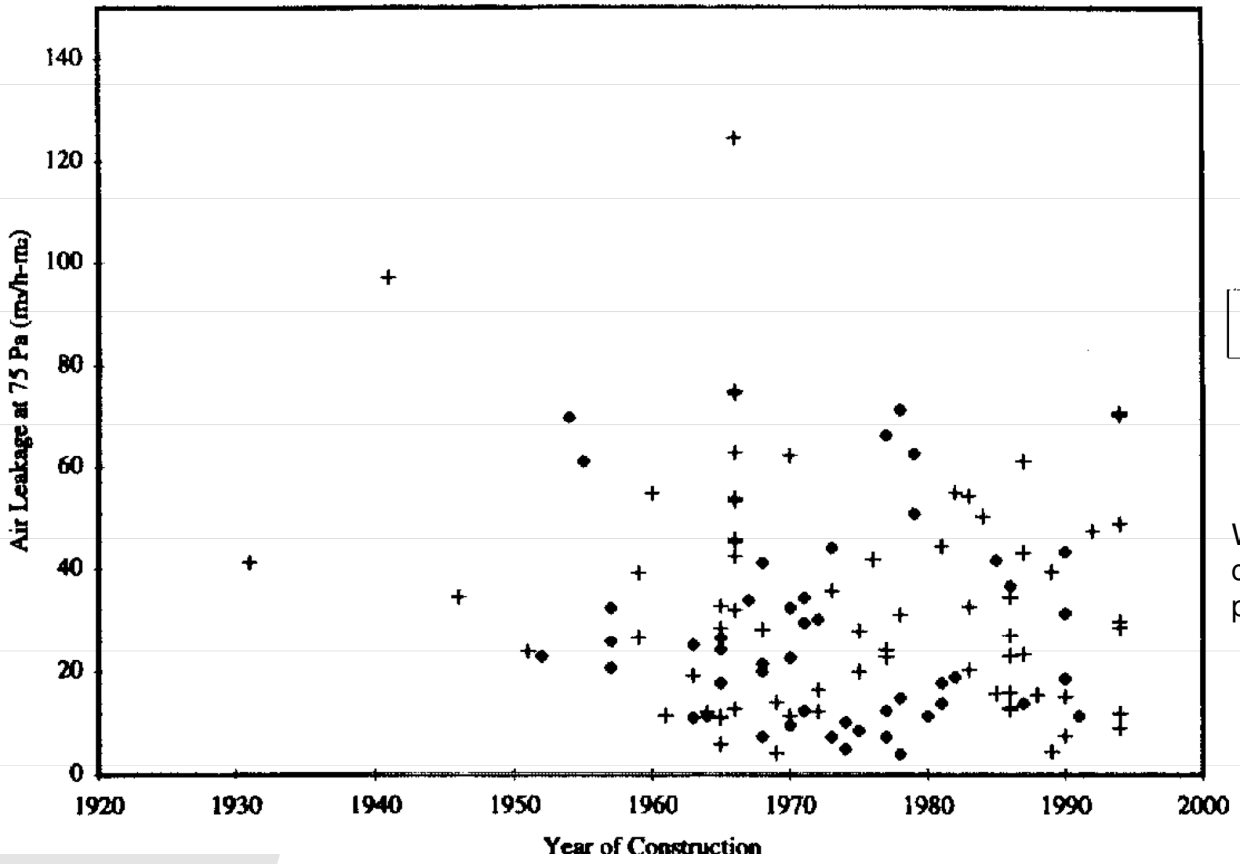
Advanced Building Design Complicate the Connections



NIST / Emmerich 40 year Study…

Building Design Evolves……..maybe

Air Leakage on Commercial Buildings By Year



* Newer building design doesn't mean enhanced RESULTS!

We assess 300+ commercial buildings per year…similar results

Air Barrier Continuity

Failure of air barrier systems

Breaches in the air barrier and it's connections / continuity will make buildings:

- Less healthy
- Unsafe
- Less durable
- Uncomfortable
- Energy inefficient

Air Barrier Continuity

Failure of air barrier systems

Leads to:

- Uncontrolled and uncontrollable air leakage..
- Infiltration / Exfiltration

Caused by:

- Stack effect
- Wind effect
- Mechanical effect

What to look for

Building Connections and Conditioned Spaces

Change in Plane

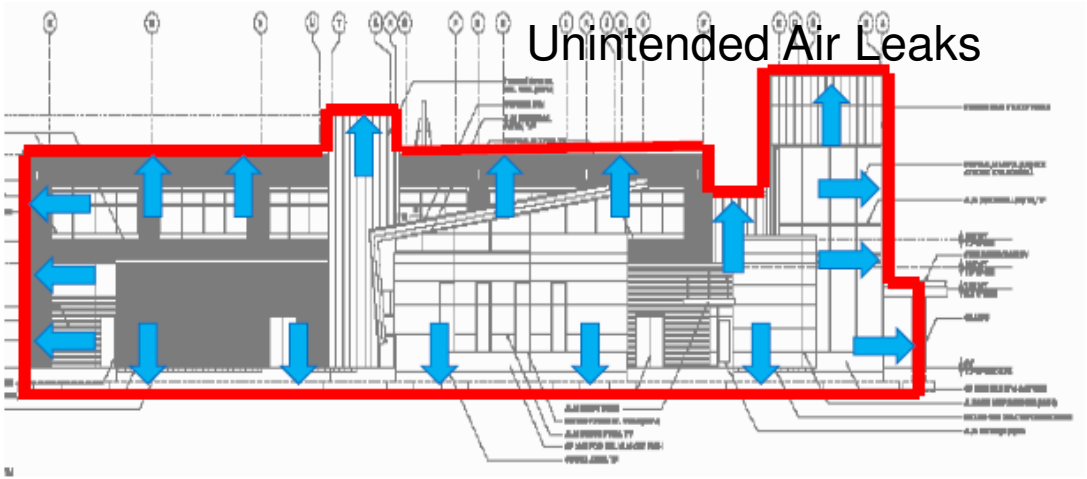
- Wall to Roof Connection
- Transitions on Elevation (bump outs)
- Overhangs / Soffits

Interior Conditioned Spaces

- Lab Spaces
- Operating Rooms / Specialty spaces
- Natatoriums

Locations where two or more materials intersect

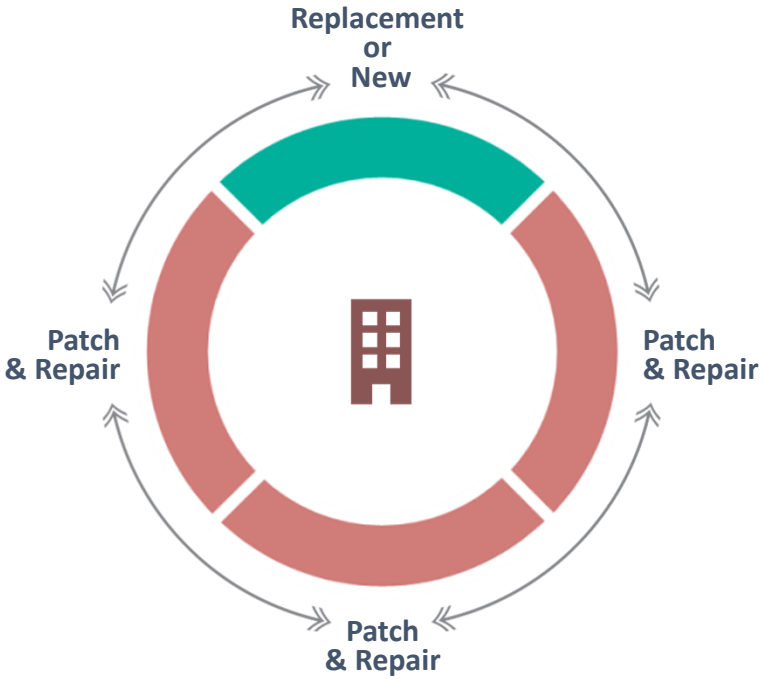
- #1 concern: CONTINUITY OF AIR BARRIER



Inward = Infiltration
Outward= Exfiltration

Roof Asset Management vs. Traditional Roofing Practices

Traditional Approach



- Replace, repair, repeat
- "20-Year" designs last about 15 years and get replaced about year 20
- Resource inefficient—capital & materials

What I don't typically see…..

An approach that prioritizes the best ROI and utilization of funds

- One that recognizes a true understanding of roof life cycles
- Demonstrates the required roof expertise to analyze restoration potential and the financial incentive to restore roofs, not just repair and then ultimately replace them
- *Program reducing cost of roof ownership!!!*

Traditional Program Economics

Six Building Inventory

- Total district roof square footage: 275,000 sf
- Avg 2018 roof replacement cost: $15/sf
- Replacement asset value (today's $$): $4,125,000
- 20 yr replacement cycle = replace 13,750 sf/yr
- 6% annual inflation
- Total 20 yr replacement program costs: $7,587,028

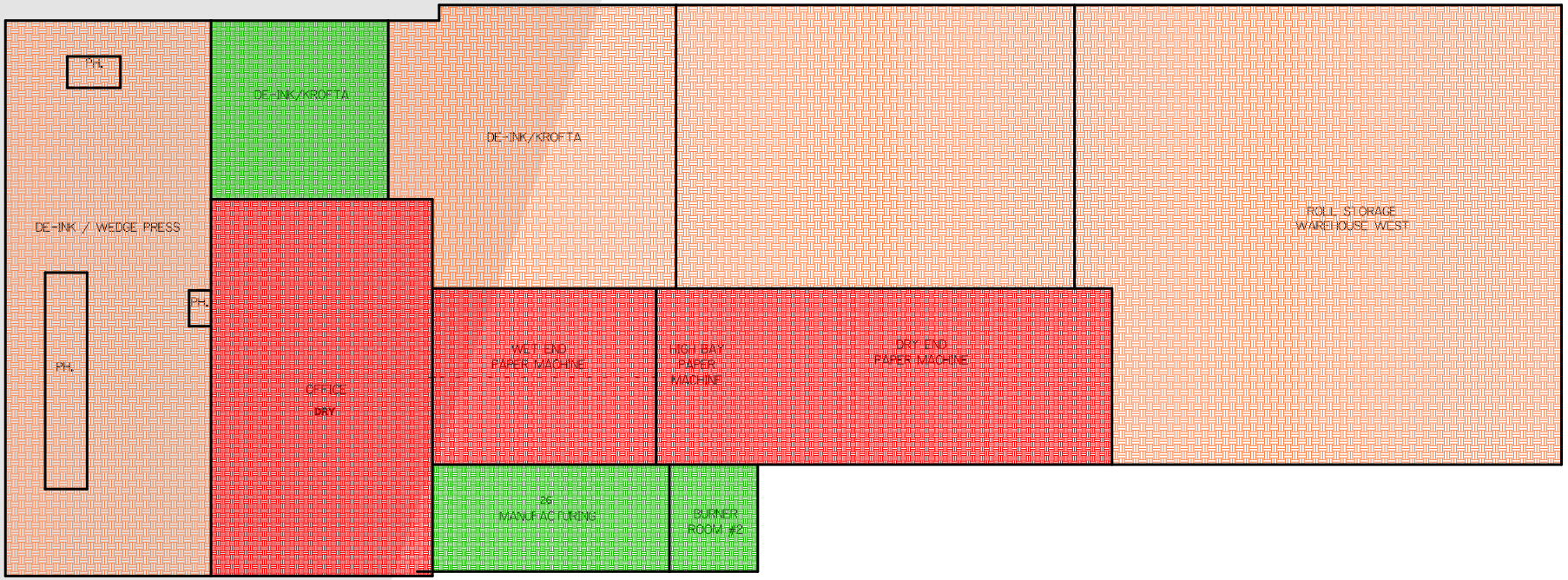
The alternative

- Assess entire existing inventory to determine life cycle stage of **ALL** roof assets—implement a true asset management approach!
- Maintainable roof systems at year 15-20 **WILL YIELD** another 20-30 years of additional service life at 45% the cost of roof replacement!
- "**HUGE**" cost saving potential!!!

Why is this important…

- Roof replacement cost 2x / 8-10 years
- Avg roof life expectancy about 15 years
- Every $1 spent today with a run to fail asset approach will cost $4.66 to replace in 20 years!! $9.16 in 30 years!!!
- Choices have **MAJOR** downstream organizational financial impacts…your decision matters
- Roof funding difficult & getting tougher

Asset management model



Repair

GREEN

Asset is performing, preventive maintenance or corrective repairs needed

Restore

AMBER

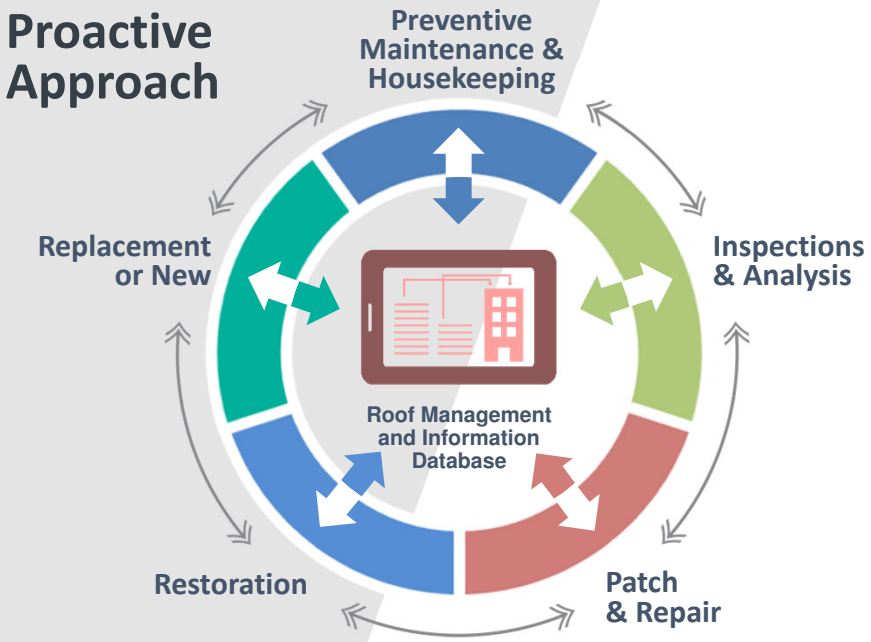
Major repairs & restoration is needed soon to significantly extend service life

Replace

RED

Asset cannot be restored and major repairs will not add significant service life

Why is this important…



PROCESS

- Inspections, Analysis, Inventory
  - **Green – maintain/repair**
  - **Amber – restore FIRST PRIORITY**
  - **Red – replace LAST PRIORITY**
- Preventive Maintenance
- Housekeeping
- "Living" Management Database

RESULT

"20-year" designs lasting as much as 75 years

Asset management approach economics

Six Building Inventory

- Total district roof square footage: 275,000 sf
- Avg 2018 roof replacement cost: $15/sf
- Average 2016 Roof Restoration Cost: $7/sf
- 20 Year program cycle = address 13,750 sf/yr
- 1/3 Inventory **Red**, 2/3rd Inventory **Amber**/**Green**
- 6% annual inflation
- 15 years restoration, last 5 years replacement
- Total program costs now $5,401,948 (71% - $7.6M)

The bottom line

Best in Class Roof Programs…..

- Implement a proactive **ASSET** management approach updated annually
- More than a roof repair and scheduled replacement program
- Prioritizes capital based on ROI not roof leaks
- Requires someone with significant roofing experience and expertise with a track record, not just years in the roofing business
- Frees up capital for other initiatives

CASE STUDIES

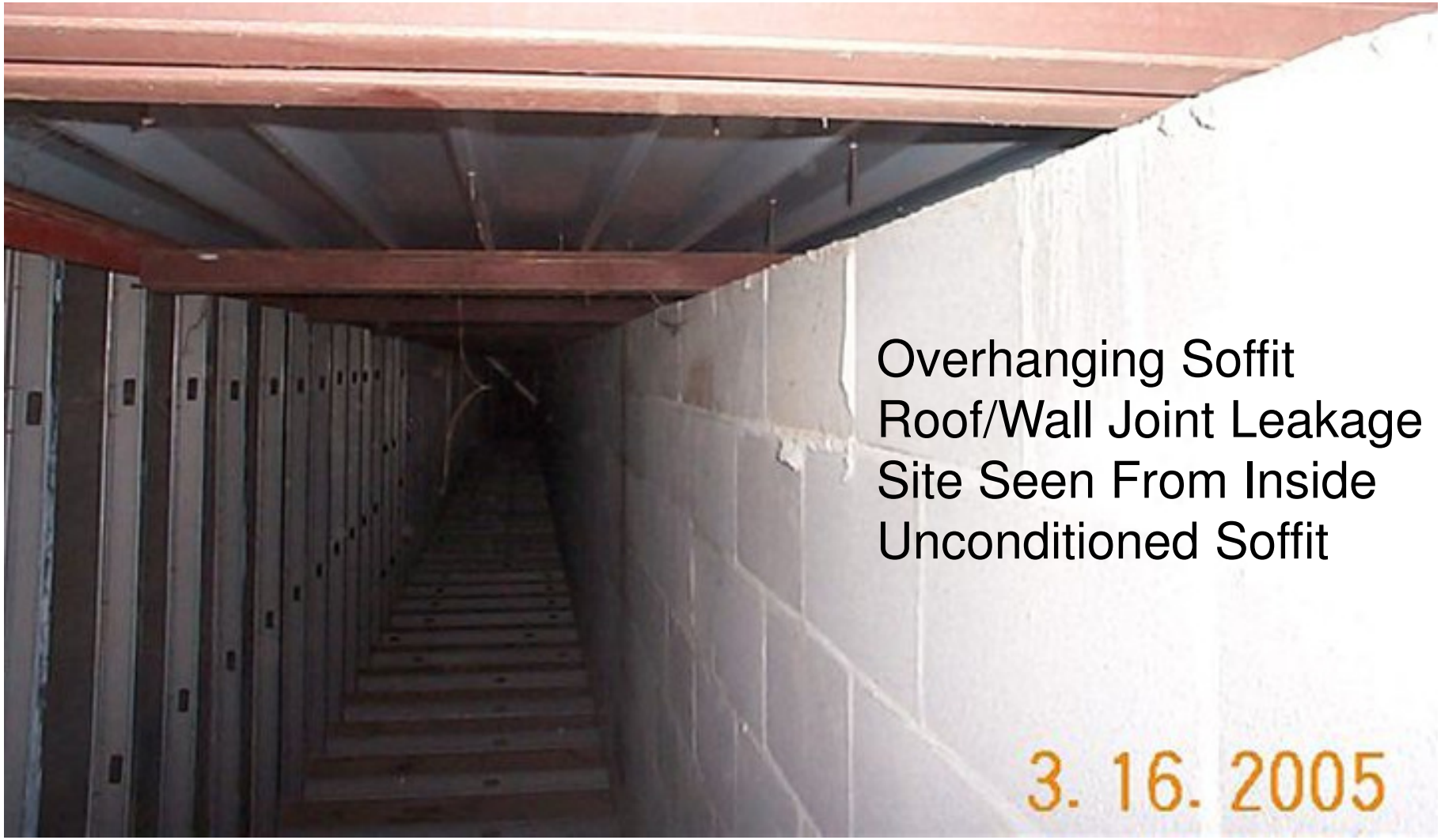
Case Study

Hospital Air Sealing Project: History of Mold Problems, High Humidity and Condensation, Negative Air Pressure, High Bills

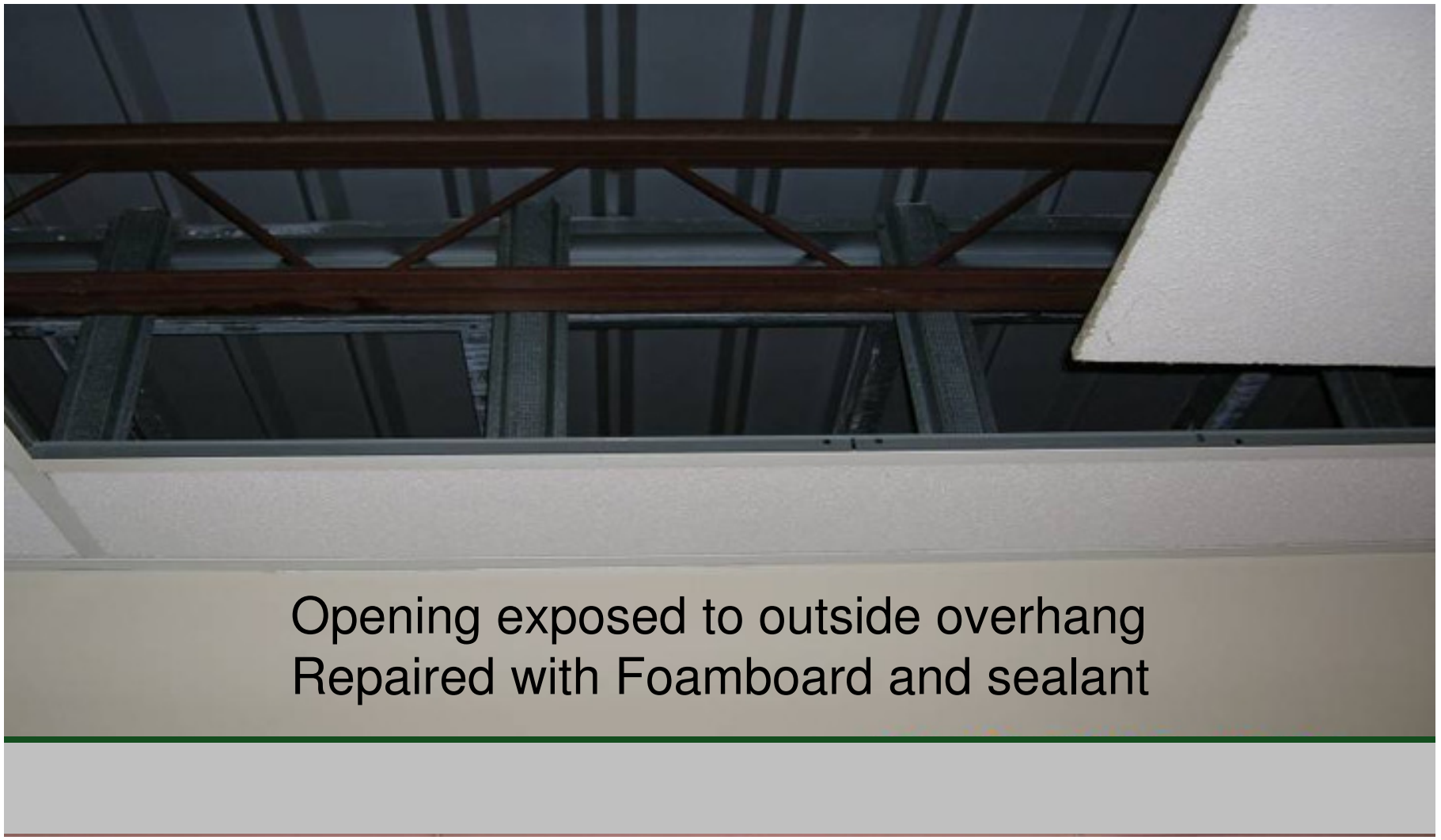
Results: Controlled Humidity, Twice Expected Savings on Utility Bills, 3 year payback on $52,000 job

Case Study

Case Study

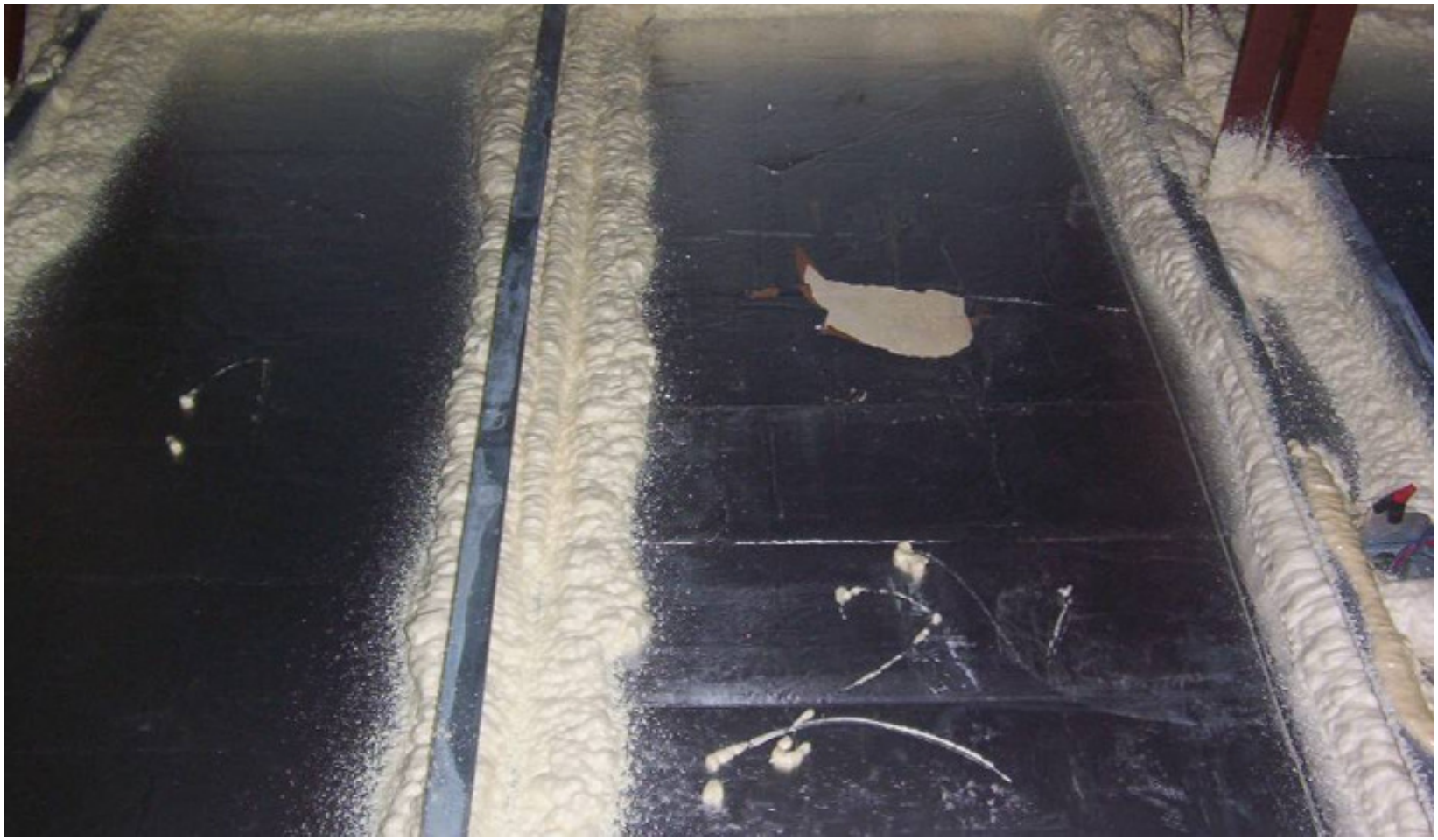

Overhanging Soffit
Roof/Wall Joint Leakage
Site Seen From Inside
Unconditioned Soffit
3. 16. 2005

Case Study



Opening exposed to outside overhang
Repaired with Foamboard and sealant

Case Study



Metal soffit panel board and foam sealant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Roofing & Building Maintenance Division

QUESTIONS?