



Building Life. Managed.

**Is Building Envelope  
Performance CRUCIAL for  
a Healthy Building?  
Is Your Building on Life  
Support?**

Presented by:

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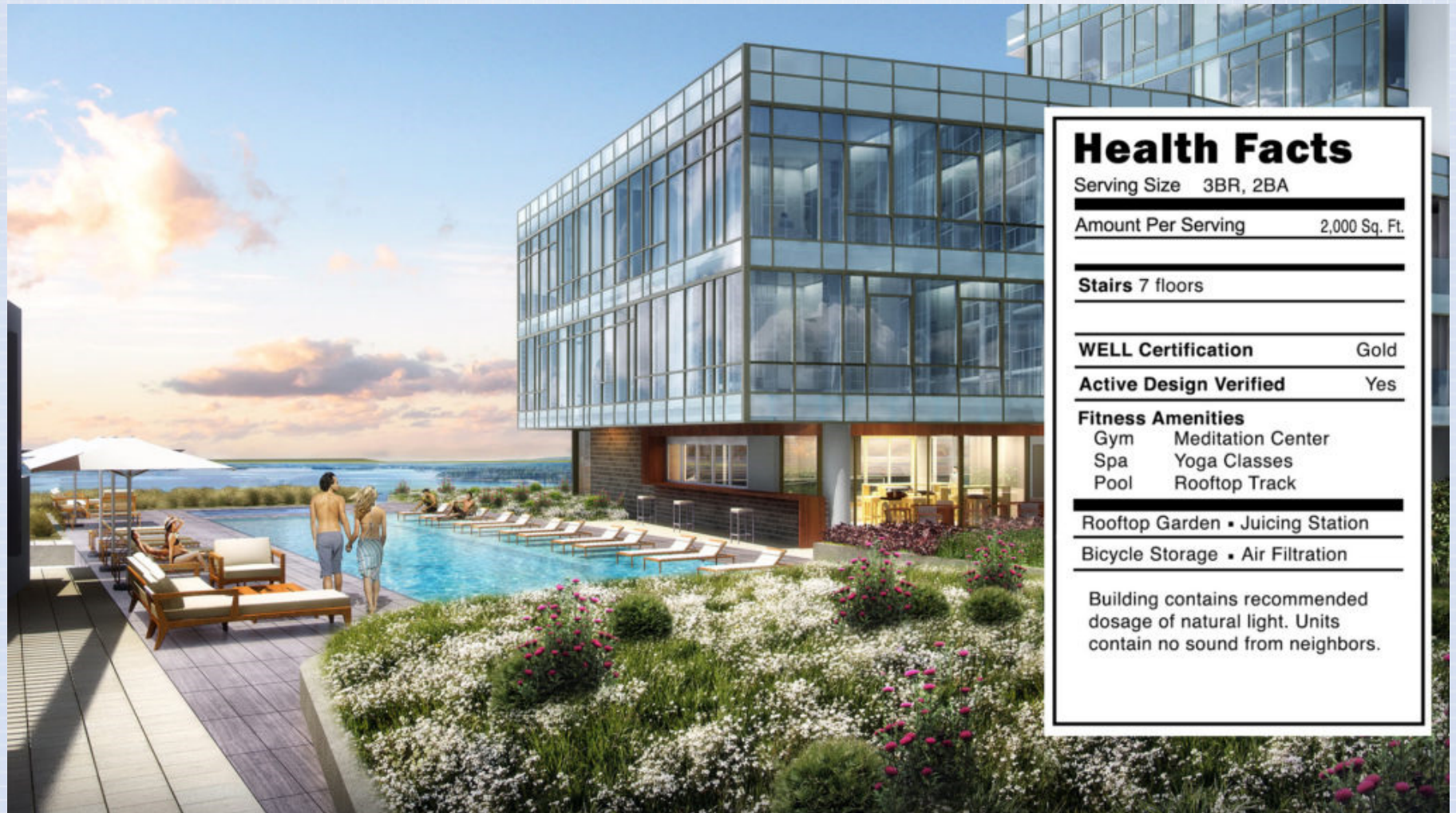
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# Learning Objectives:

- Identify what building envelope components and systems are CRUCIAL to support a healthy building environment initiative and why.
- Understand building envelope system interdependence relationships.
- Identify common building envelope system maintenance mistakes.
- Design proactive programs to improve overall building health and reduce operating costs.

# What Does a Healthy Building Look Like?



## Health Facts

Serving Size 3BR, 2BA

Amount Per Serving 2,000 Sq. Ft.

Stairs 7 floors

WELL Certification Gold

Active Design Verified Yes

### Fitness Amenities

Gym Meditation Center  
Spa Yoga Classes  
Pool Rooftop Track

Rooftop Garden • Juicing Station

Bicycle Storage • Air Filtration

Building contains recommended dosage of natural light. Units contain no sound from neighbors.

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# What Does a Healthy Building Look Like?

- Natural Light Exposure/Better Indoor Lighting
- Accessibility to Nature and Outdoor Views
- Construction w/Non-Toxic Building Materials
- Design & Construction Strategies that Encourage Physical Activity
- Source The Healthy Building Revolution is Here: A Look into the 'Drive Towards Healthier Buildings' Report

# What Building Envelope Components Create A Healthy Building Environment?

- Air Barrier Continuity
- Exterior Façade Integrity
- Watertight Roof System
- HVAC System.....
- Health Performance Indicators (ventilation, air quality, thermal, moisture, noise, dust/pests, lighting. **Why is this an important topic?**)

# Why Is This Important?

- In a recent event at Realcomm/IBCON, Joseph Allen, Asst. Prof at Harvard and Ken Sinclair of Automated Buildings spoke of Healthy Buildings. Joseph spoke of research at Harvard on factors that impact health and well-being of the occupants and hence their productivity. Joseph spoke of the time we spend indoors and how the indoor environment impacts health. He also spoke of the **real cost of operating buildings is the health of the employee, and not waste, water and energy.**
- The 3/30/300 formula states that the cost of a building is \$3 towards energy, \$30 towards infrastructure and \$300 towards the people...per square foot per year. But the Intelligent Building industry currently focuses only on the \$3 energy and \$30 building infrastructure as the main cost factors. Ken spoke of focusing on the \$300 equation and the difficulty in quantifying productivity to justify the investment in the \$300 equation.

# Why Is This Important?

- Another way to look at it is \$3 for utilities, \$30 for rent/real estate costs and \$300 for the Human Asset. While actual figures will vary across locations and organizations, 3-30-300 is a solid rule of thumb. For example, where a 10% increase in energy efficiency would yield \$0.30 savings per square foot and a 10% decrease in rent would save \$3.00, a 10% gain in productivity is worth \$30.
- Using this tool, input a company's values to determine the actual 3-30-300 and total cost of occupancy (TCO). From there, you can play around with attributes to calculate cost savings.

# Why Is This Important?

- Using the 3-30-300 calculator, a company with a Total Cost of Occupancy of just over \$60 million per year and a human capital cost of \$54 million can:
  - Save \$1.50 p.s.f./year with a reduced absenteeism rate of 10%
  - Save \$11p.s.f./year with 10% improvement in employee retention
  - GAIN \$54 p.s.f./year with a 10% improvement in productivity



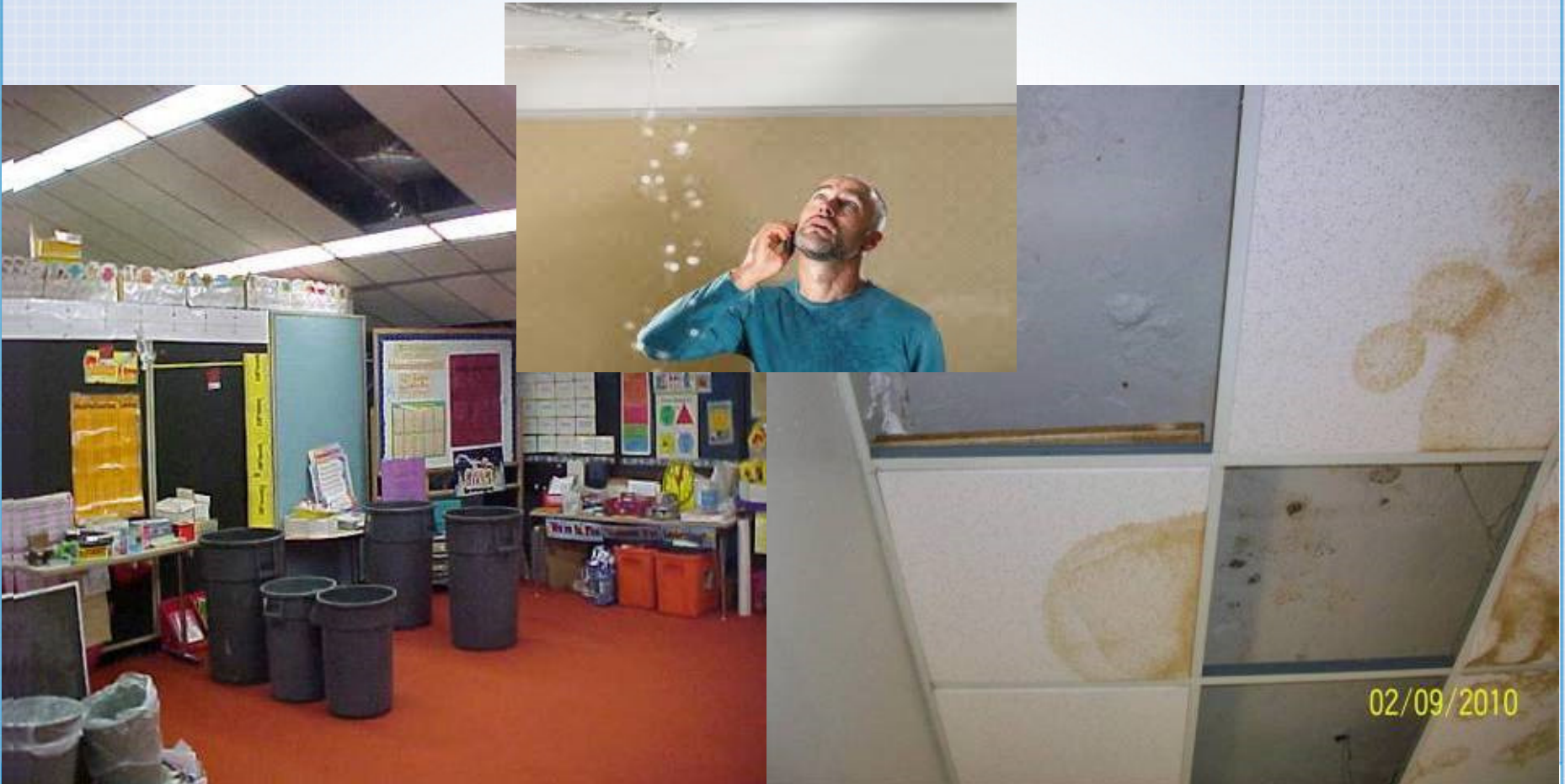
# Managing the Building Envelope

- Organization facilities include building assets that represent significant asset value.
- Facilities represent 25-40% of organization wealth. \*
- Less than 10% are managed as financial assets for a return on investment.
- WATER COMPROMISES THE BUILDING ENVELOPE.
- WATER COMPROMISES INDOOR AIR QUALITY.

\*Harvard Study

# Maintaining Building Envelope Integrity

Is Your Leak *REALLY* a Roof Leak?



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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





***Newer roof is not leaking....coping is leaking...  
no thru-wall installed beneath coping stones***





# Porous Masonry – requires inspection/protection



# Split-faced block is *particularly* sensitive



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**SEALED**

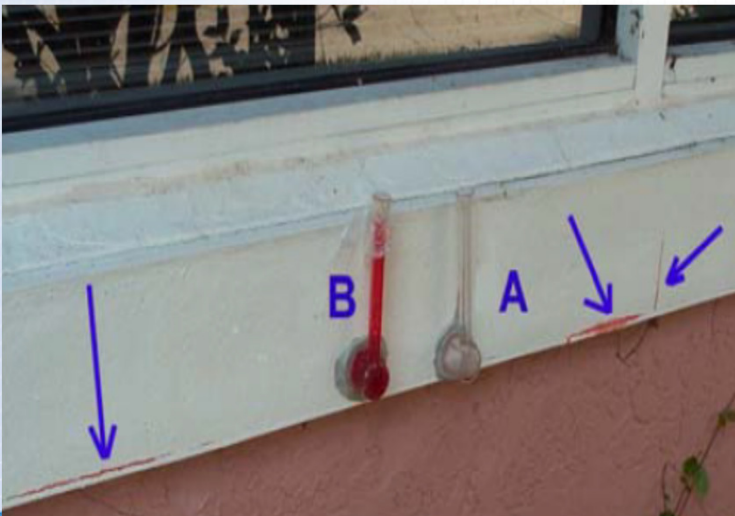


**UNSEALED**





Above: Water-filled RILEM tube at start of test    Above: Water 20% absorbed after 5 minutes



Left photo:

Red-dyed water-filled RILEM tube over a hairline crack in stucco.

Note red dye lines show water movement in wall several inches from test location.

# EFFLORESCENCE?



# CRACKED AND SPALLED MASONRY



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# Louvers, Counterflashing & Thru-wall

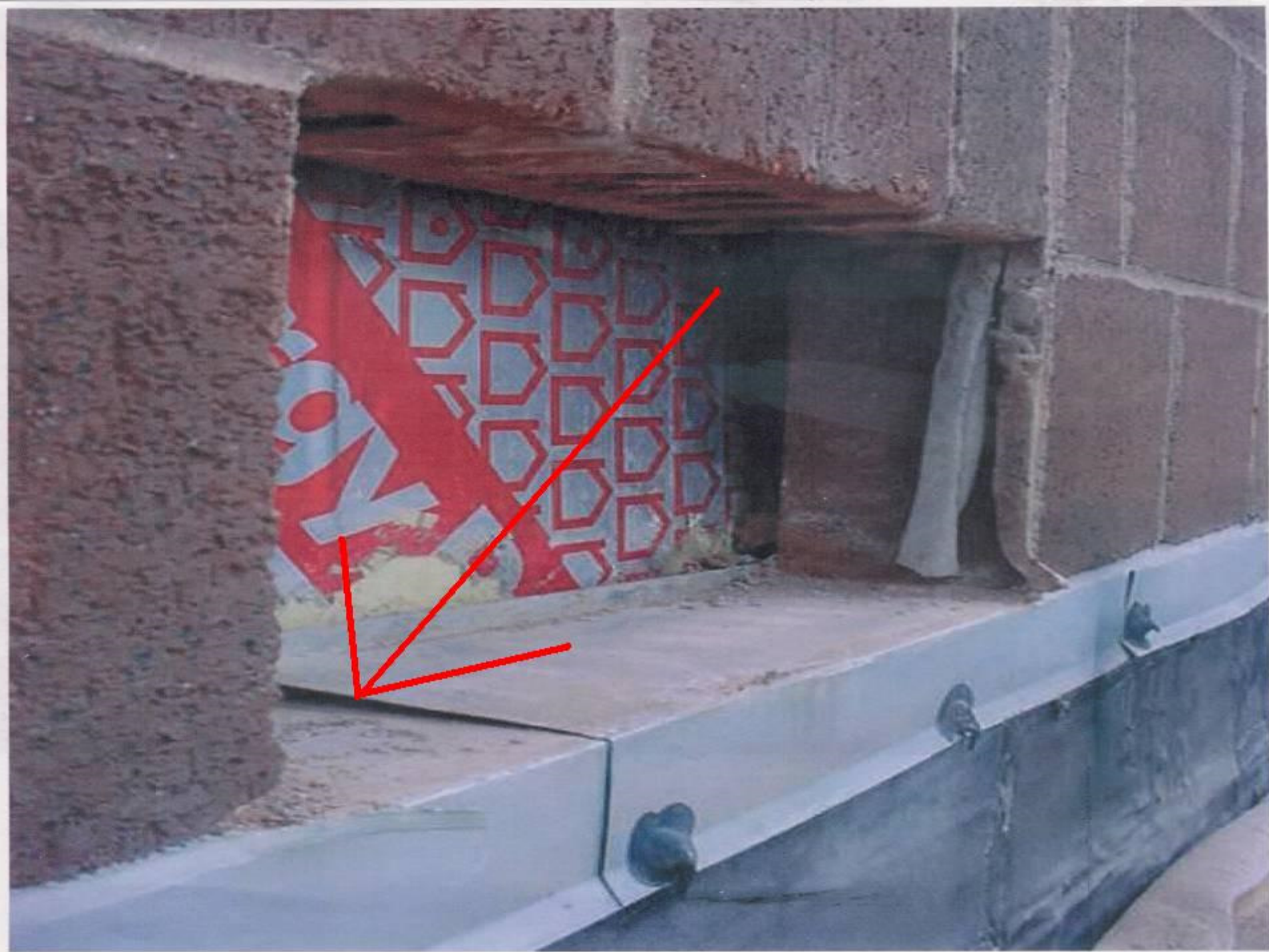
Problems are NOT always immediately identifiable



# Louvers, Counterflashing & Thru-wall

Problems are NOT always immediately identifiable





What is very wrong in this photo?





03/07/2012











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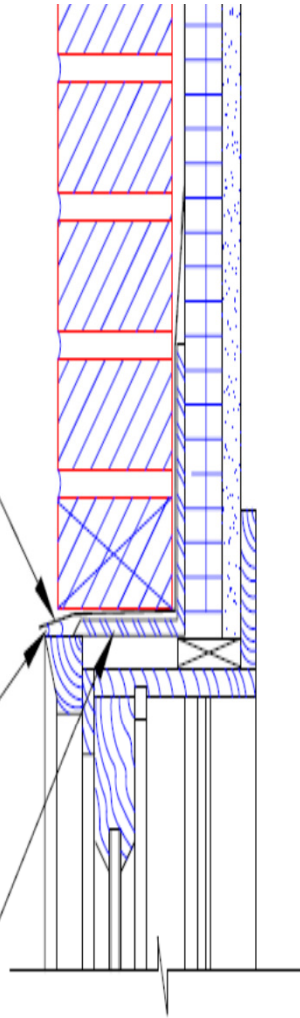
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THRU-WALL FLASHING  
EXTENDED PAST LINTEL

SEALANT  
STEEL LINTEL

CORRECT  
WATERPROOF LINTEL



# Do your weeps weep?



# Doors, Louvers & Windows





# HVAC Issues



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SPF contractor's idea of how to handle a nuisance roof leak...



# Ductwork









# Plumbing & Drainage



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30 SECONDS OF WORK TO CLEAR DRAIN & REMOVE 18,000 LBS OF WATER







Old cast iron pipe  
can be prone to  
splitting



# Drifted & Blowing Snow



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# Sealant Failures



Adhesive



“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



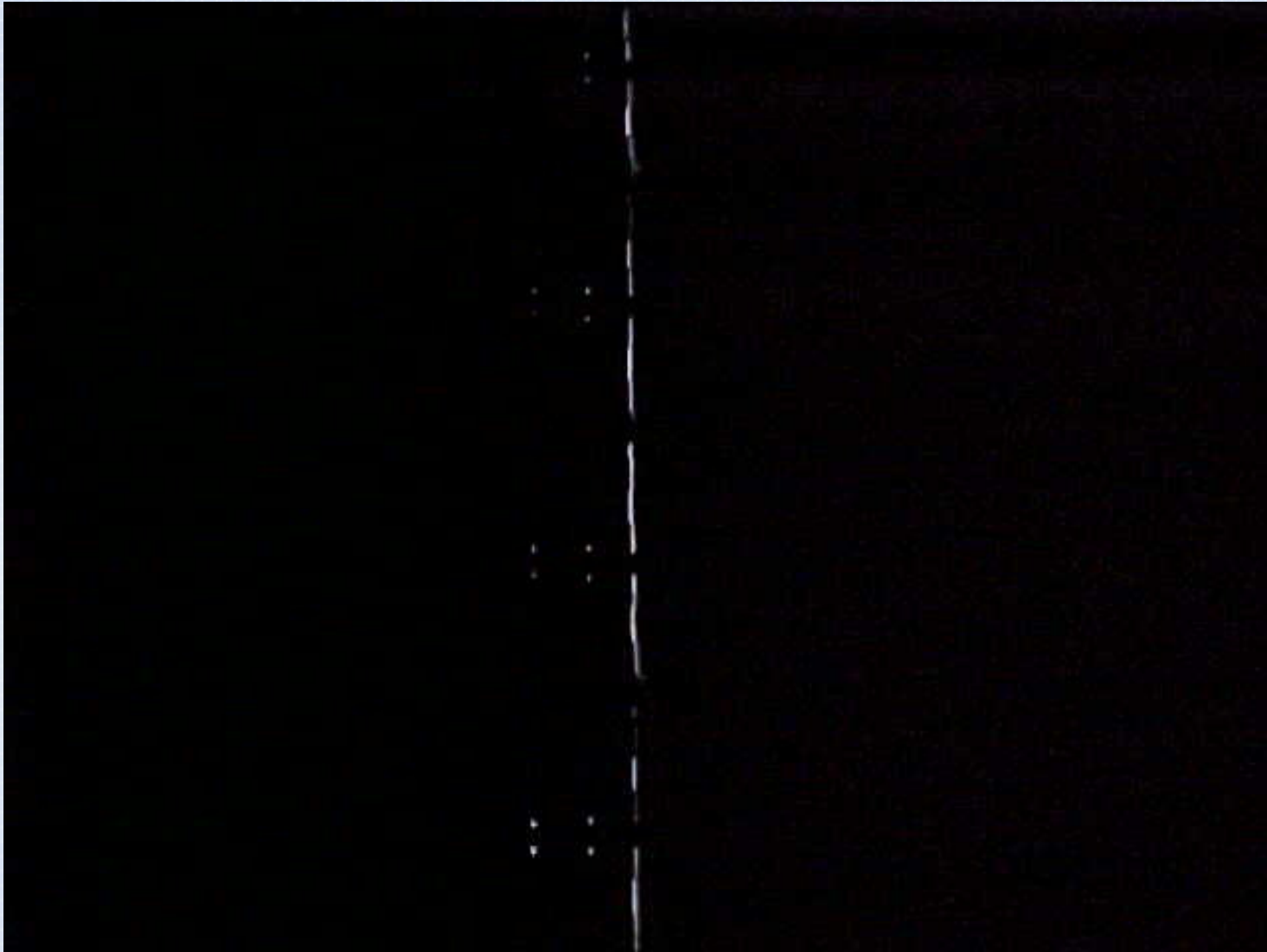
Cohesive



“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.



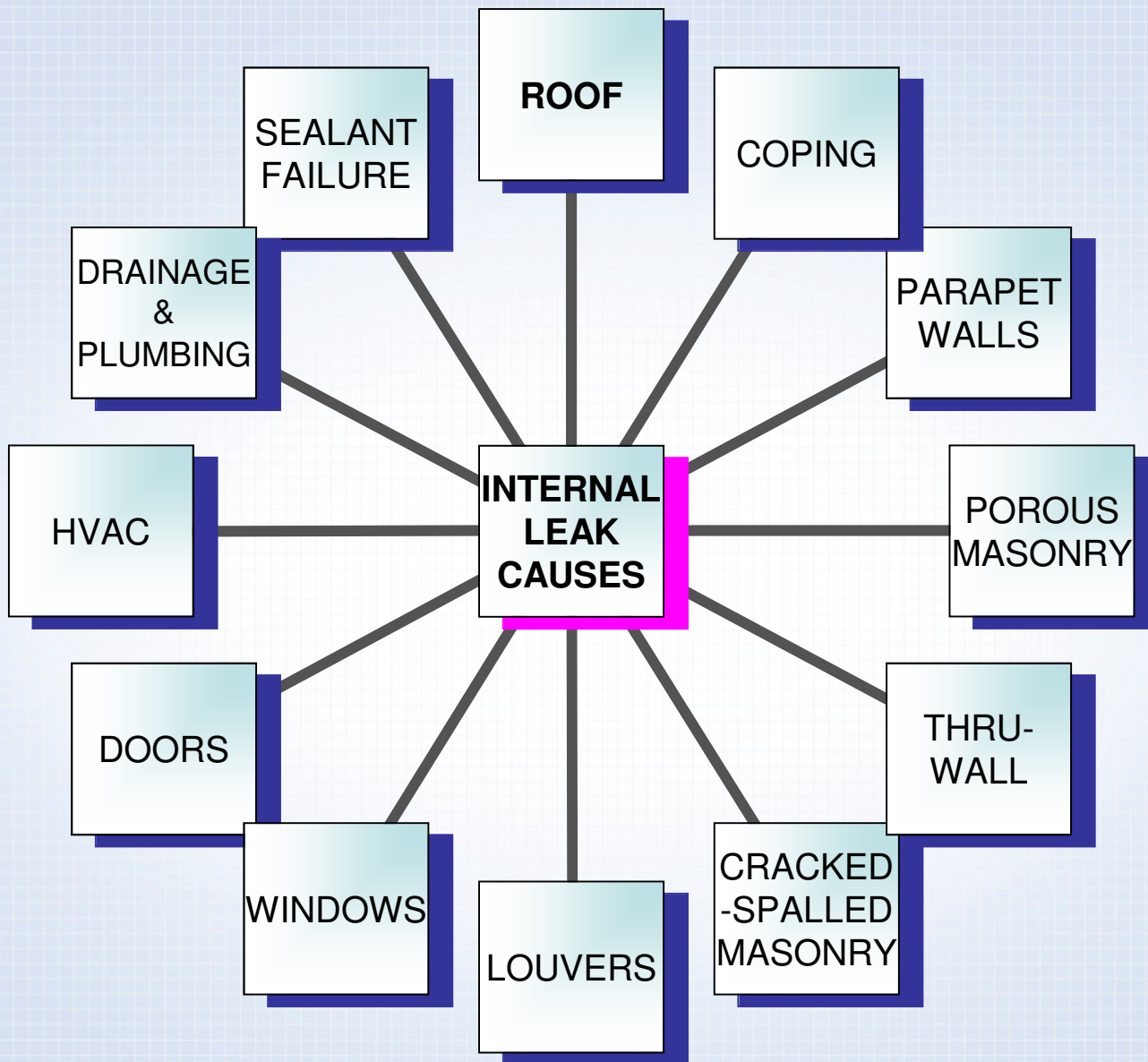
Looks minor from the outside...



Daylight visible from the inside = water & air leakage

# What Does a Healthy Building Look Like?

- What is your sensitivity to leaks?
- Do you have a regular inspection program to document the entire building envelope condition?
- Do you need some help?



# ***THANKS – QUESTIONS?***

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