

**Water Loss Specialist Certification School  
INFRARED MOSTURE DETECTION**

**Infrared Moisture Detection**  
What it can do... what it can't do... and why

**Water Loss Specialist Course**

Restoration Industries Association  
November 2007

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**Infrared Moisture Detection**  
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**The 4 most important facts about infrared  
moisture detection**

- 1. Infrared cameras only show surface temperature patterns**
- 2. Helps you see "The Big Picture" of water damage**
- 3. Investigating interior water damage is much simpler than exterior or forensic investigations**
- 4. Meaningful reports take longer than the inspection itself**



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(603) 431-0635    [www.MasonGrant.com](http://www.MasonGrant.com)**

## Water Loss Specialist Certification School INFRARED MOSTURE DETECTION

### Examples

- Interior water damage
  - Gypsum wall board
  - Wood gym floor
- Exterior forensic investigations
  - Roof moisture
  - Stone building
  - EIFS building



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### Flood damage - Gypsum wall board



- Office condo in New Jersey
- Corroded connection to 5 gal hot water heater, flooded the floor over a weekend



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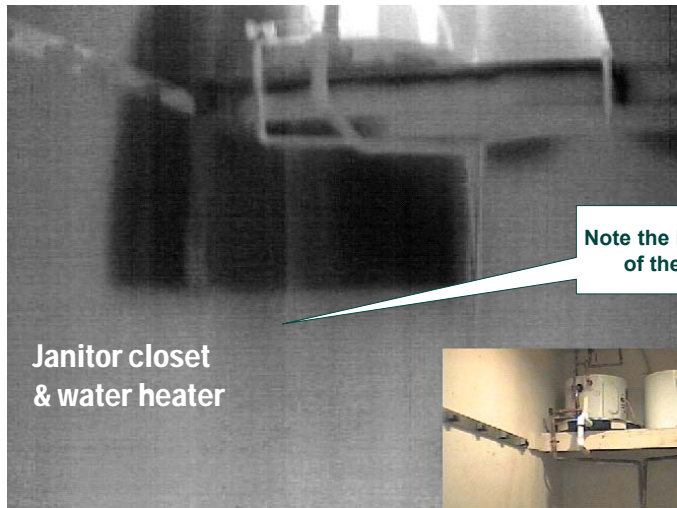
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Extract from video report



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Note the insulating effect  
of the ceramic tile

Janitor closet  
& water heater

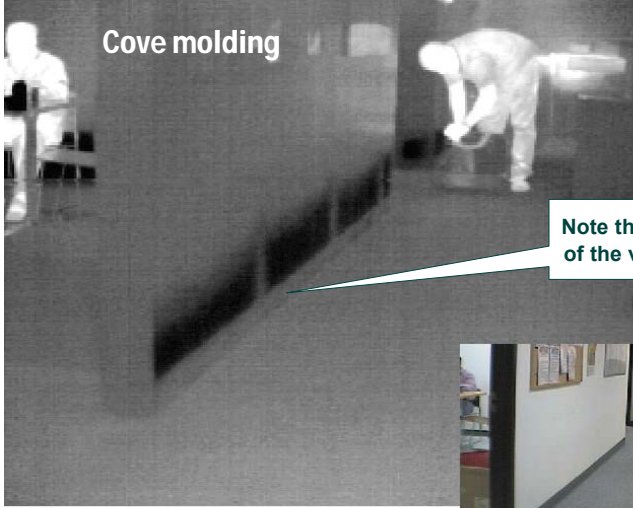


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Cove molding

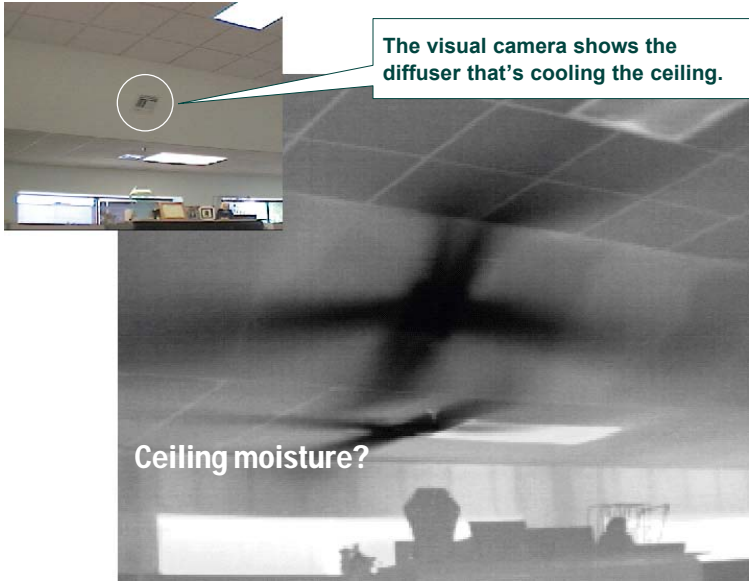
Note the insulating effect of the vinyl base molding



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The visual camera shows the diffuser that's cooling the ceiling.

Ceiling moisture?

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**Observations on the gypsum wallboard project**

- **Very simple situation. Using IR, moisture is obvious**
  - Known, interior water source and location
  - Single-story is affected, interior issues only
  - Simple wall construction - Single layer is wet, and it's exposed to view
  - No vinyl wall covering to inhibit evaporation & thermal pattern
- **Note the effect of vinyl cove molding and tile in janitor closet**
  - Insulates the surface from evaporative cooling of drying wall board



**Gymnasium floor moisture mapping**



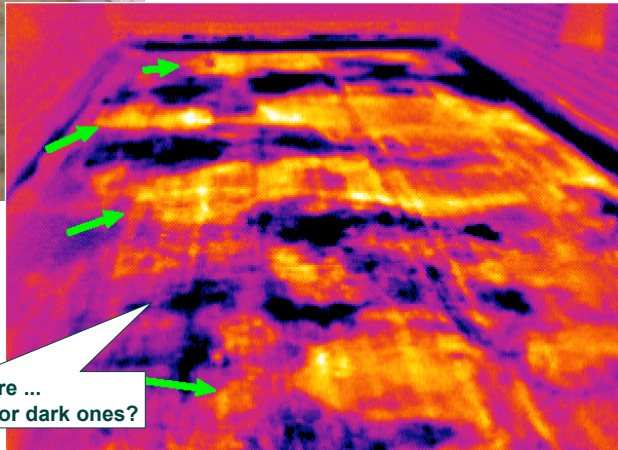
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Observations on gym floor moisture mapping

- **For the floor, the camera is useless**
  - Reflections generate strong (and false) patterns
  - Thick wood flooring insulates surface from evap cooling underneath
- **For the wall, camera is quite helpful**
  - Non-insulated block responds VERY differently in wet areas



Exterior Moisture - Roof  
Definitely moisture damage...



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### Observations on exterior moisture

- On the exterior of buildings, the direction of heat flow becomes especially important information.
- Need to keep track of air temperatures on both sides of the wall or roof, where the sun is, and if there are any clouds.
- Outdoor investigations tend to be MUCH more complex
  - More sources of heating and cooling effects
  - Many layers in the wall or roof
  - Time of day becomes very important to success



### Rain intrusion - Stone building

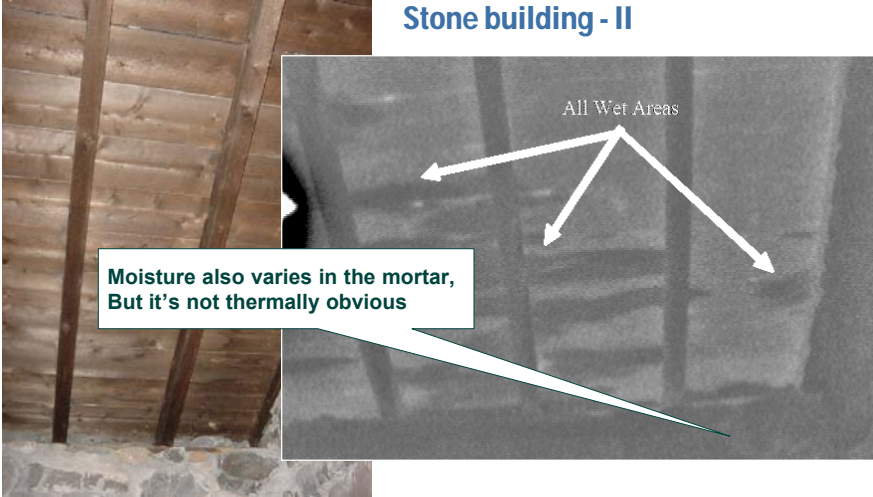


- 100-year-old unheated stone church, at the water's edge, in Maine
- Concerns about possible long-term moisture damage



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**Stone building - II**



All Wet Areas

Moisture also varies in the mortar,  
But it's not thermally obvious

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### Observations on stone church

- **Thick stone walls are not affected thermally by small amounts of moisture**
  - Thermal mass is very large
  - Thermal conductivity of stone and mortar is very high - heat moves quickly, flattening-out patterns
- **Thick stone does not respond quickly to sunlight - heats and cools evenly, and slowly**
- **Thermal camera helpful - but limited**
  - Can see suspect areas indoors - wood members
  - Fewer clues about path of moisture intrusion through stonework

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### Exterior EIFS

- 5-story condominium building - On the beach, in Maine
- Identify moist insulation and locate moisture intrusion path



East side, facing the ocean and the rising sun on a very cold winter day



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### Exterior EIFS - Fast-changing temperatures with large $\Delta T$ make surface patterns obvious



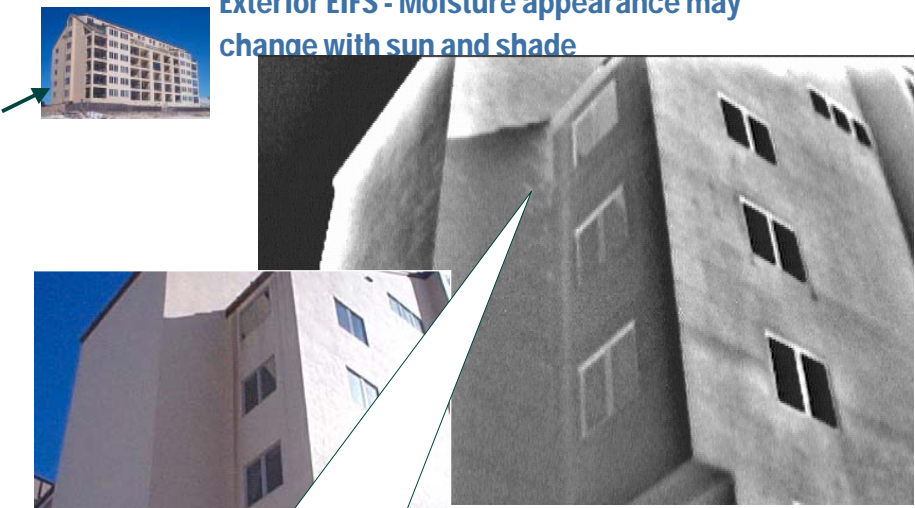
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**Exterior EIFS - Moisture appearance may change with sun and shade**



On the shady side of the building on this cold day, moisture appears warmer.

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**Exterior EIFS - The visual image helps interpret the infrared image**



Sun shadow

Water leak

Water leak

Drip-splash pattern

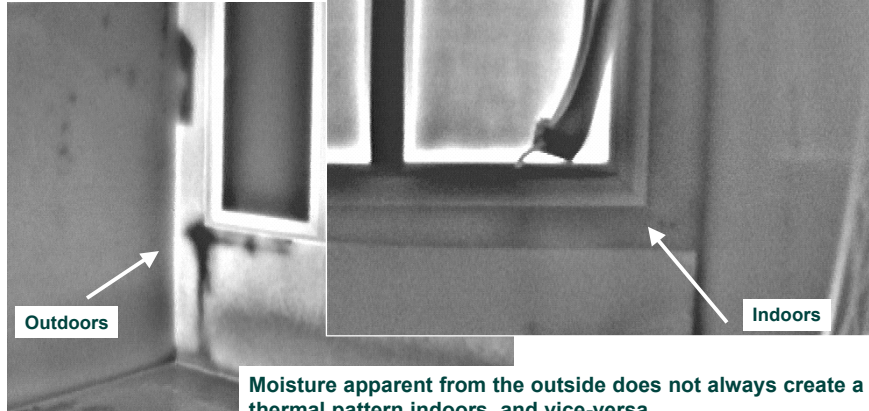
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Exterior EIFS - Thermal patterns do not always penetrate all layers of the exterior wall



Observations on exterior EIFS  
inspection

- **Ideal conditions for seeing moisture-related thermal patterns**
  - Bright sunlight, after very cold night (10°F)
  - Insulation keeps sun's heat on the surface (50 to 90°F!)
- **Thermal camera is very helpful**
  - Confirms moisture leakage path, visually
  - Locates the problem
  - Helps quantify the extent of the problems
- **The same problem looks different on each side of the building**
  - On cold side, moisture looks warm
  - On warmer side, moisture looks cool



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**The 4 most important facts about infrared  
moisture detection**

- 1. Infrared cameras only show surface temperature patterns**
  - They CANNOT see inside walls
  - Not all temperature patterns are moisture patterns – meters remain mandatory
- 2. Helps you see “The Big Picture” of the damage**
  - Faster, more accurate damage assessment
  - Faster drying through accurate re-direction of dry air
- 3. Interior water damage is much simpler than exterior or forensic investigation**
  - Water source is known
  - Moisture nearly always appears cooler
  - Very little weather or solar influence
  - Fewer layers
- 4. Meaningful written reports take longer than the inspection**
  - Locations and thermal circumstances must be explained for each photo



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