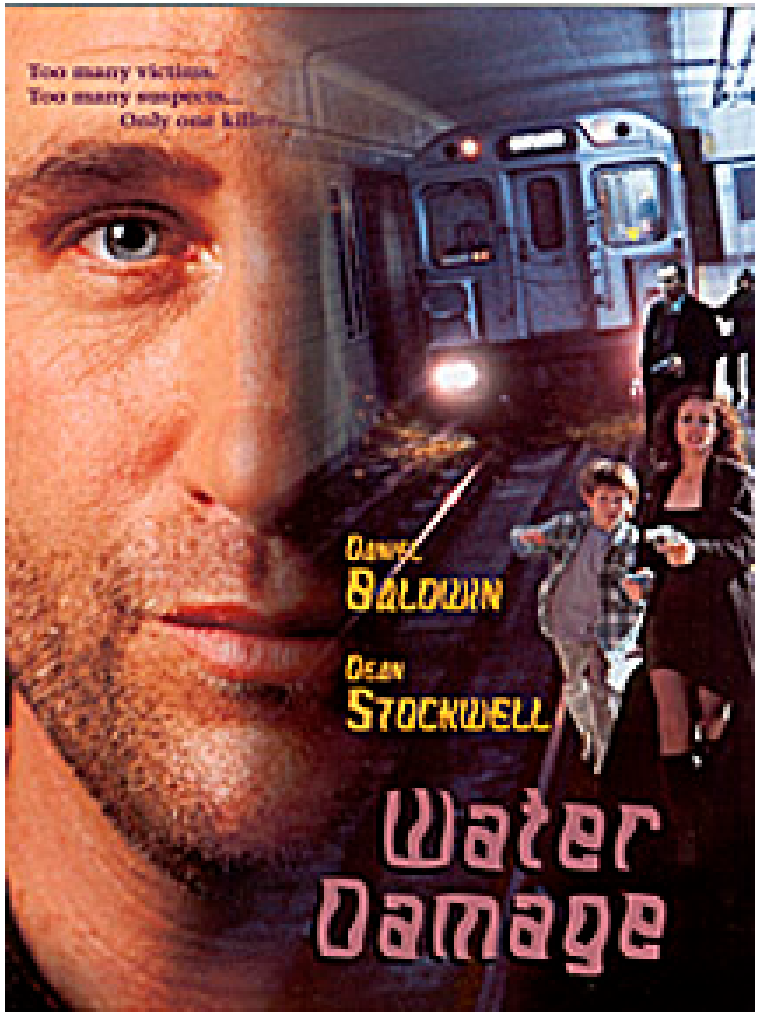
Lecture # 4: Looking for Trouble… Water is Your Enemy



Controlling Unwanted Moisture in Historic Buildings

Preservation Brief No. 39, Sharon C. Park, FAIA

Uncontrolled moisture is the most prevalent cause of deterioration in older and historic buildings.

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"Looking for Trouble"

Identifying the visible signs of moisture damage.

Discovering the source or sources of unwanted moisture - usually involves the human senses of sight, smell, hearing, touch, and taste, combined with intuition.

Controlling the unwanted moisture – Levels of Treatment

Developing Project Goals and an Approach to Treatment

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Ten common signs of visible as well as hidden **moisture damage**:

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Ten common signs of visible as well as hidden **moisture damage**:

1. Presence of standing water, mold, fungus, or mildew

Pere Marquette Depot
Bay City, Michigan
Basement/Crawl Space

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Ten common signs of visible as well as hidden **moisture damage**:

2. Wet stains, eroding surfaces, or efflorescence (salt deposits) on interior and exterior surfaces

Milwaukee City Hall
Milwaukee, Wisconsin
8th floor, exterior masonry

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Ten common signs of visible as well as hidden **moisture damage**:

3. Flaking paint and plaster, peeling wallpaper, or moisture blisters on finished surfaces

Bethlehem United Church
Ann Arbor, Michigan
Narthex/Tower Entrance

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Ten common signs of visible as well as hidden **moisture damage**:

4. Dank, musty smells in areas of high humidity or poorly ventilated spaces

Gardner Museum of Architecture & Design
Quincy, Illinois
Basement under Entrance

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Ten common signs of visible as well as hidden **moisture damage**:

5. Rust and corrosion stains on metal elements, such as anchorage systems and protruding roof nails in the attic

Pere Marquette Depot
Bay City, Michigan
Attic Structure

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Ten common signs of visible as well as hidden **moisture damage**:

6. Cupped, warped, cracked, or rotted wood

Fayette State Park
Upper Peninsula, Michigan
Building No. 3

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Ten common signs of visible as well as hidden **moisture damage**:

7. Spalled, cracked masonry or eroded mortar joints

Pere Marquette Depot
Bay City, Michigan
Exterior Masonry

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Ten common signs of visible as well as hidden **moisture damage**:

8. Faulty roofs and gutters including missing roofing slates, tiles, or shingles and poor condition of flashing or gutters

St. Andrew's Episcopal Church
Ann Arbor, Michigan
Patterned Slate Roof

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Ten common signs of visible as well as hidden **moisture damage**:

9. Condensation on window and wall surfaces

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Ten common signs of visible as well as hidden **moisture damage**:

10. Ice dams in gutters, on roofs, or moisture in attics

Bethlehem United Church of Christ
Ann Arbor, Michigan
Ice dammed exterior eave

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Common sources of unwanted moisture include:

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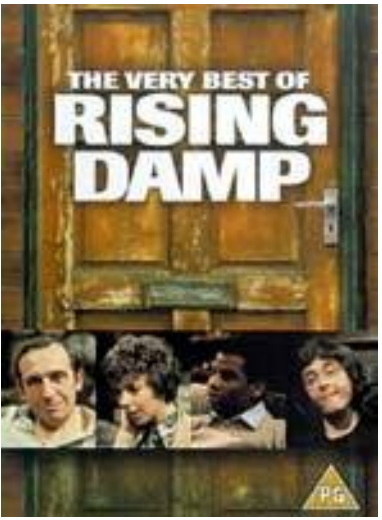
Common sources of unwanted moisture include:

1. Above grade exterior moisture entering the building



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Common sources of unwanted moisture include:

2. Below grade ground moisture entering the building

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Common sources of unwanted moisture include:

3. Leaking plumbing pipes and mechanical equipment

…associated with mold and health risks

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Common sources of unwanted moisture include:

4. Interior moisture from household use and climate control systems

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Common sources of unwanted moisture include:

5. Water used for maintenance and construction work, or irrigation

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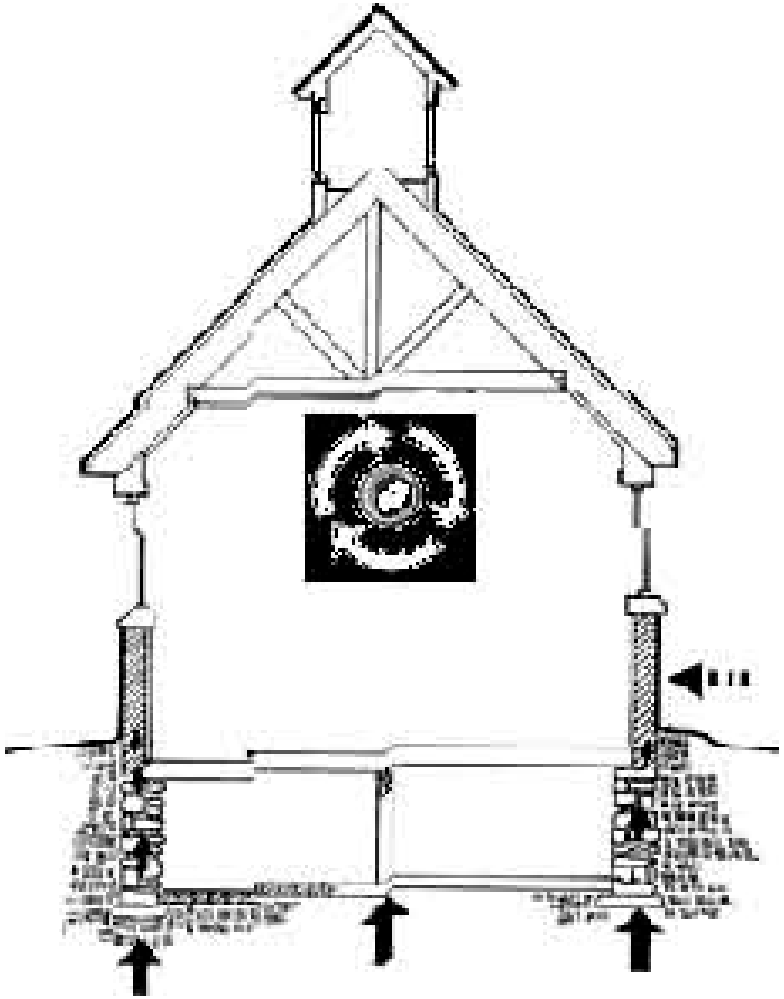

NPS diagram illustrates moisture pressure points

Reduce and prevent damage to building materials by:

- ***draining*** *bulk moisture,*
- ***ventilating*** *vapor moisture, and*
- ***avoid setting up new barriers*** *with impermeable coatings or over-pressurized new climate control systems.*

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Level I Preservation Maintenance

Apply cyclical maintenance procedures to eliminate rain and moisture infiltration.

For example, a simple chore is to

- *clean gutters twice a year*

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Level II Repair and Corrective Action

Repair features that have been damaged. Replace an extensively deteriorated feature with a new feature that matches in design, color, texture, and where possible, materials.

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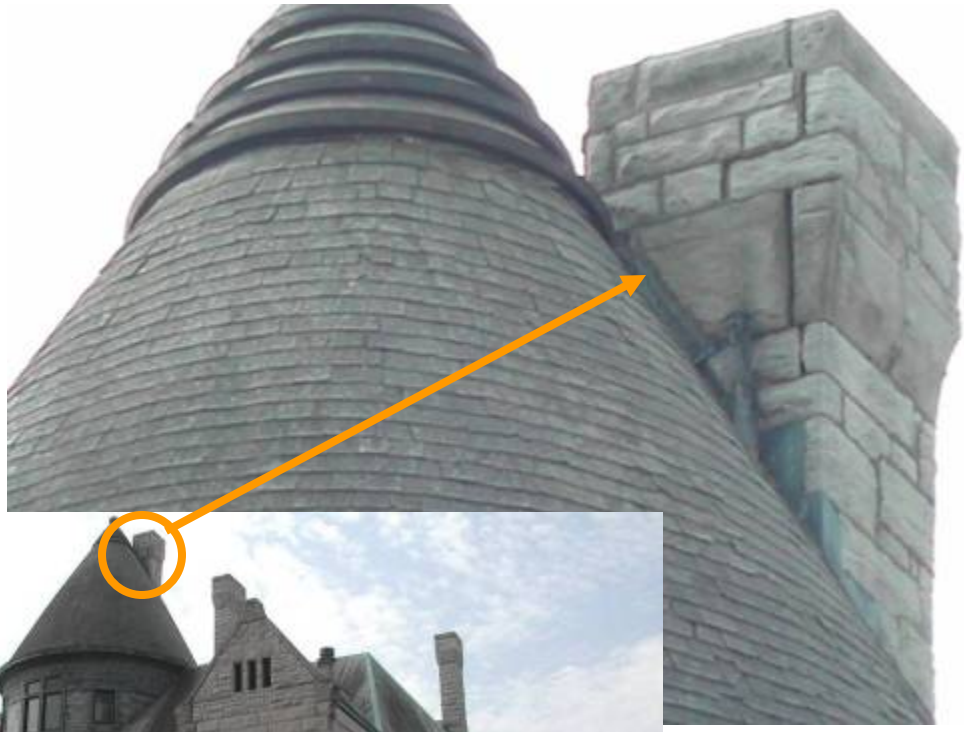
Level III Replacement / Alterations For Chronically Damp Conditions

Undertake exterior rehabilitation work that follows professional repair practices.

For example, to improve performance of ***foundation walls*** *install –*

- *damp-proof treatments to stop water infiltration or*
- *damp course layers to stop rising damp.*

Four Basic Recommendations:
#1 Maintain Structural Integrity



Assess the Building Envelope:

- Roof Materials, Flashing, and Eaves
- Windows and Doors - Trim, Drip, Sills and Thresholds, Perimeter Sealant, Glazing, Weatherstripping, Hardware
- Mortar Joints, Siding Joints, Anchors, and Fasteners
- Foundation Materials, Grade Conditions, and Site Drainage

Gardner Museum of Architecture & Design
Quincy, Illinois
Basement under Entrance

Four Basic Recommendations: #2 Prevent Water Infiltration

Wilson - Tyler House
Ann Arbor, Michigan

Correct Failures:

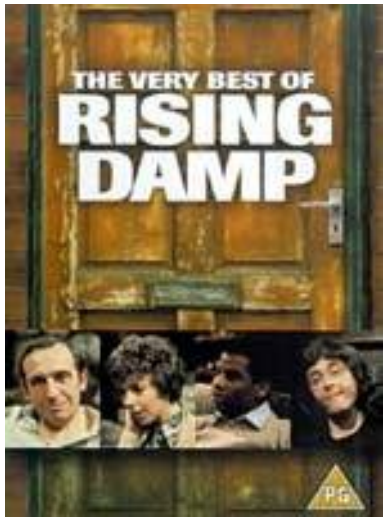
- Roof Leaks
- Window and Door Infiltration
- Open Mortar Joints
- Building Cracks and Settlement

Four Basic Recommendations:
#3 Keep the Foundation Walls Dry

Moody Mansion
Galveston, Texas

Understand Ground Water & Site Drainage:

- Rainwater Conductors
- Soil Erosion and Grade Problems
- Rising Damp



Four Basic Recommendations:
#4 Perform Regular Inspection and Maintenance

- Water is particularly damaging to building materials.
- Your building envelope needs inspection regularly for signs of water infiltration…

Milwaukee City Hall
Milwaukee, Wisconsin
North Elevation, exterior survey

Four Basic Recommendations:
#4 Perform Regular Inspection and Maintenance

TOOLS TO HAVE ON HAND:
Ladder, binoculars, knife or probe, and powerful flashlights; also a clipboard, graph paper for sketching or prepared base drawings, and multi-colored pens.

WHAT NEEDS INSPECTION? Places where water could infiltrate, such as:
- Roofs, gutters, downspouts, subsurface drainage systems
- Exterior materials: Brick, stone, mortars, wood sheathing and siding
- Functional building elements: Doors, windows, fireplace flues
- Interior materials: Wood framing, flooring, wood trim, plaster
- Plumbing, heating, and cooling systems, electrical, lighting, smoke detectors

WHAT TO LOOK FOR:
Water damage: Stains, soft wood (rot), peeling paint, salt crystals
Signs of infestation: Droppings, dead insects, holes in wood
Anything unusual or different since your last inspection…observed change.

Winter Semester 2013 - GHPR 651 Principles of Preservation Technology

Lecture # **4: Looking for Trouble… Water is Your Enemy**