

MOISTURE INTRUSION

Presented by

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Presenter Bio: Rick Abbott

- Born and raised in Minnesota (Snow, Ice, Lakes)
- BS Civil Engineering – University of MN 1989
- Masters of Engineering (Civil) – Cornell 1990
- 26 years of engineering experience
 - 1 year with construction material testing
 - 1 year masters program
 - 19 years structural design
 - 5 years forensic structural engineer
- Licensed PE in 9 states
- Licensed SE California
- President of Abbott Consulting
- Working 5 state area of MN, IA, WI, ND, SD



Forensic Engineering

- ASTM E2713-11 Standard Guide to **Forensic Engineering**
- ASTM E678-07(2013) Standard Practice for **Evaluation of Scientific or Technical Data**
- ASTM E620-11 Standard Practice for **Reporting Opinions** of Scientific or Technical Experts



Scientific Method

Engineering is problem solving

1. Propose or define a non-biased question.
2. Information Gathering Stage –site observations of damaged and not damaged conditions, surrounding area observations, and storm data information.
3. Construct a Hypothesis
4. Test individual hypothesis one by one. Analyze the data and draw conclusions, and accept or reject the hypothesis.
5. Communicate the results.



1. We weigh the evidence.
2. We rarely ever reach 100% certainty.
3. There is a different level of proof needed in criminal case.
4. No one benefits from a wishy washy vague opinion.



Questions?

As we go



Moisture Intrusion - Agenda

- Lesson 1 - Introduction
 - Define the problem of water intrusion
 - Why is water intrusion important to prevent?
 - How does moisture move?
- Lesson 2 - The Physics of water.
- Lesson 3 - The 4 Sources of Water
 - Where is it coming from and along what path?
- Lesson 4 - The Building Envelope
- Lesson 5 - The Building Interior
- Lesson 6 - Causation
- Lesson 7 - Moisture Detection Tools

10 Examples



Defining The Problem

Buildings Get Wet

1. During Construction
2. After Construction

The basic role of a building is to protect the inside from the outside.



The Design Approach

3 Basic Design Rules Concerning Water

1. Prevent unwanted water from entering the building.
2. If it enters, we need to control how it can get out.
3. Control all wanted sources of moisture within the building.



THE MOISTURE INTRUSION ASSIGNMENT

What questions needs to be
answered?

- Origin and Cause
- Extent of Damage
- Scope of Repairs



Definition

Origin = Source of water + Path

Only 4 Sources

Cause

a person or thing that acts, happens, or exists in such a way that some specific thing happens as a result.

What one thing can I point at and say,
“if this had not acted, happened, or existed
the moisture would not have shown up



Definition

Damage

physical harm caused to something in such a way as to impair (lessen, weaken, reduce, diminish) its value, usefulness, or normal function

Has moisture lessen, weakened, reduced, or diminished its value, usefulness, or normal function?



Assignment Procedures

- Assignment is received.
- Scope Call
 - What is going on?
 - What is the claim?
 - What are the questions that need to be answered?
- Inspection
 - Observations only.
 - Includes an interview.



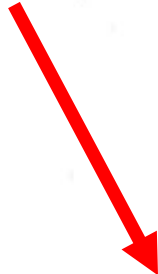
Cause



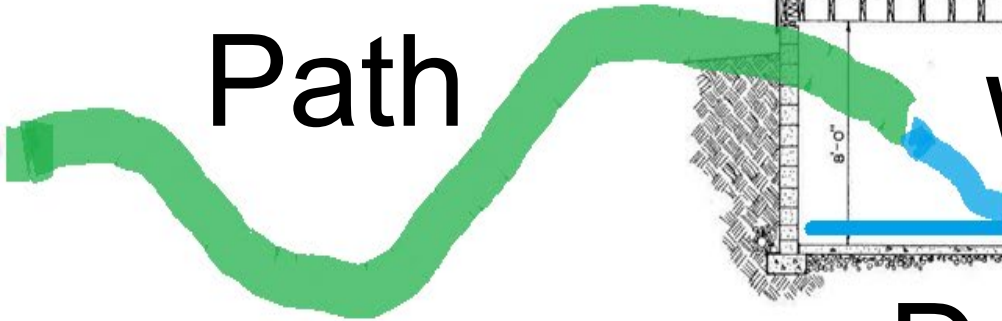
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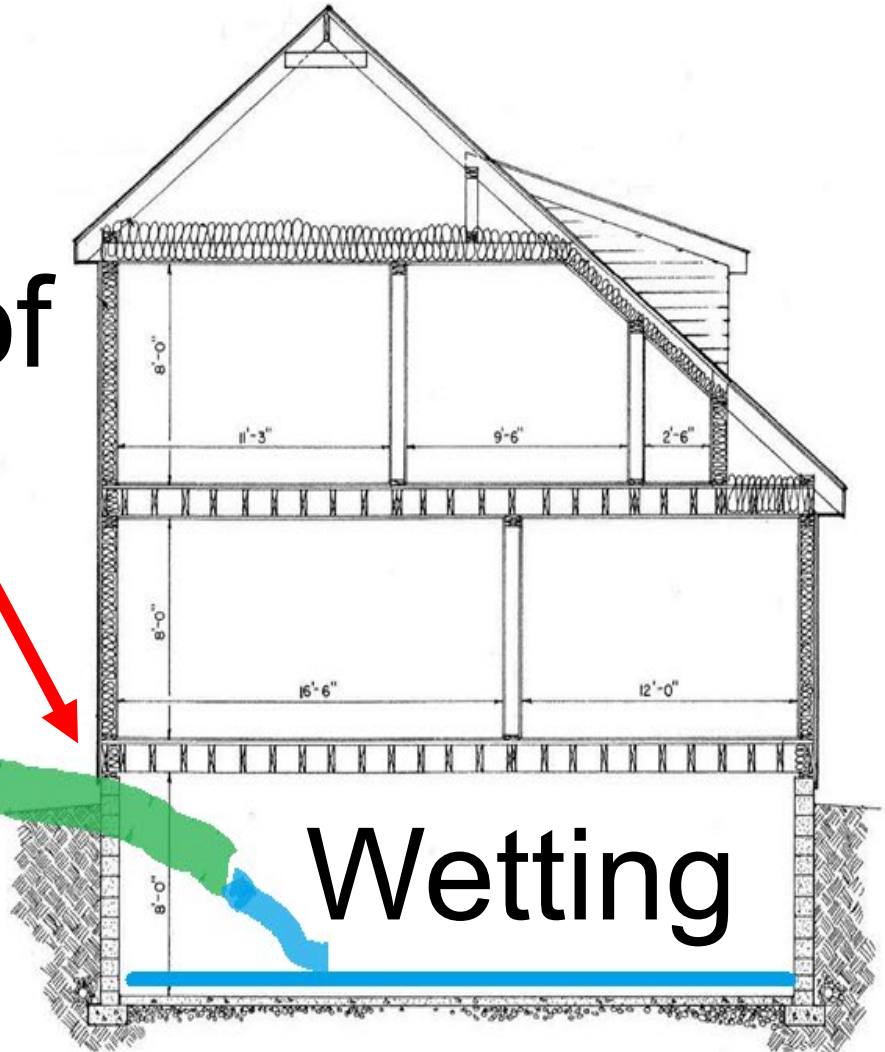
Point of Entry



Path



Wetting



Damage?



Timing Problem

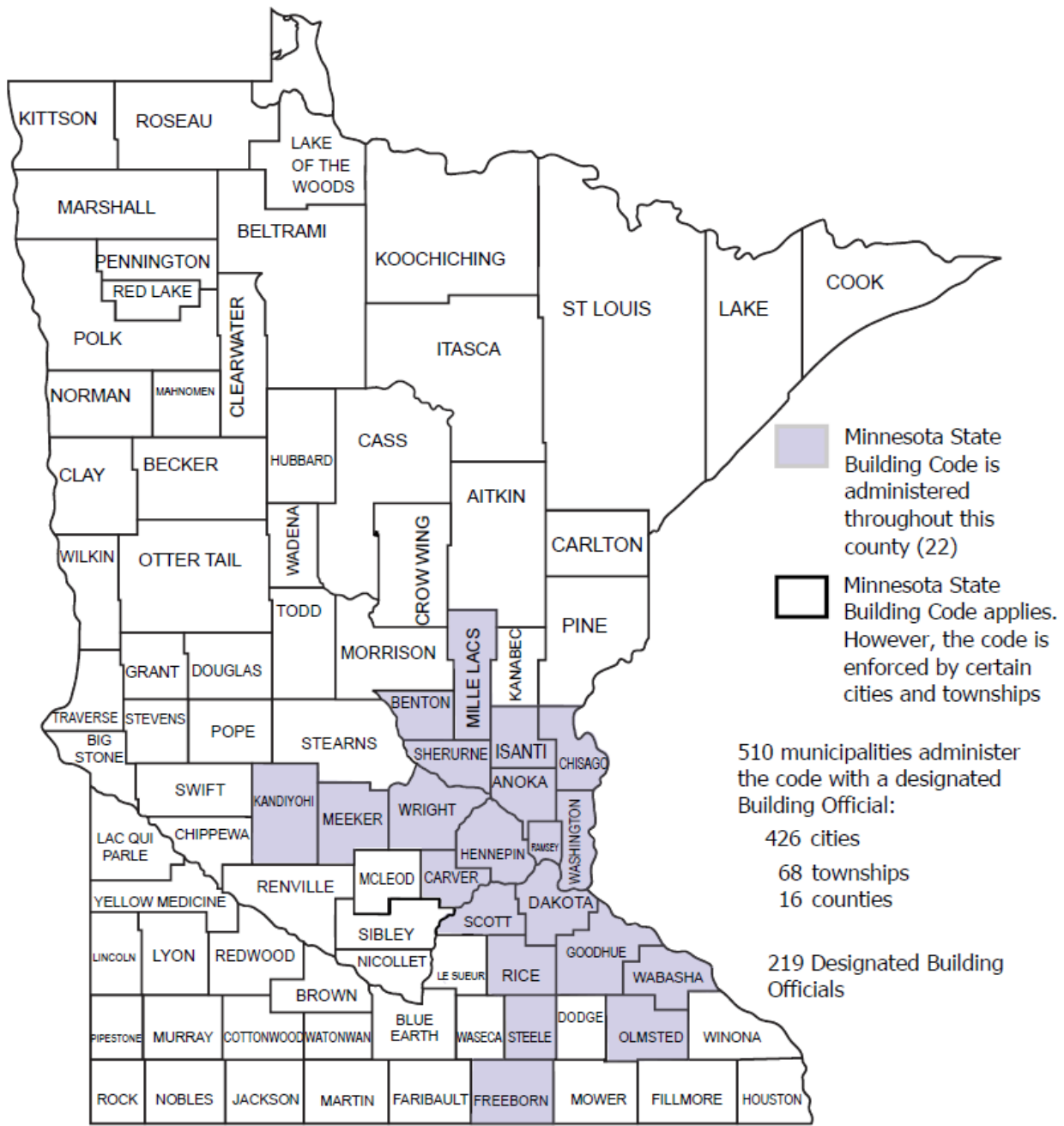
- Observations need to be made
- Non-Destructive Testing may be required
- Destructive Testing may be required
- It is important to fully evaluate damage
 - so, WAIT, we can't clean it up!!
- It is important to clean up quickly.
 - “We live here. Mold is setting in.”
 - so, GO, GO, GO, clean it up and fix it.



Scope of Repairs

- Eliminate Moisture Source(s)
 - Stop the water from coming in.
 - Therefore, it must be correctly identified, else it will continue
- Repair water damaged components
 - Therefore, the extent of damage must be identified.
 - Hidden moisture
- Are design changes needed
- Are material changes needed
- Are code upgrade issues going to be a problem

Minnesota State Building Code



- Minnesota State Building Code is administered throughout this county (22)
- Minnesota State Building Code applies. However, the code is enforced by certain cities and townships

510 municipalities administer the code with a designated Building Official:
 426 cities
 68 townships
 16 counties

219 Designated Building Officials

August 1, 2008
 State Building
 Code
 becomes the
 statewide
 standard

