

# Rehabs & Renovations How to Spot Trouble

Metrocon '06  
Dallas TX

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## The Building Process From Idea to Reality

- Owners idea / need
- Select Design Professional(s)
- Develop Building Concept
- Feasibility Study
- Assemble Design & Engineering Team

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## The Building Process From Idea to Reality

(cont.)

- Develop Contract Documents
- Building Official(s) Compliance Review
- Contractor Selection
- Subcontractor and Supplier Selection
- Begin Construction
- Compliance Inspections

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## Selection Considerations for Building Materials

- Suitability
- Availability
- Cost
- Appearance
- Preference

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## Building Constraints

- Physical Limitations
- Budget
- Legal Restrictions, etc.
- Building Materials

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## Who Has Primary Responsibility for Building Material Selection?

- Depends on Contractual Arrangements, often
- Designer/Architect,
  - with input from the
    - Owner
    - Contractor

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## Who is Primarily Responsible for Construction Methods?

The *contractor* shall be solely responsible for and have control over means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the contract (*unless instructed otherwise*)

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## Zoning Ordinances

- Generally Imposed by Local Authorities
- Govern Property Use

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## Building Codes

### Purpose

*“... establish minimum construction standards for the protection of life, health, and welfare of the public.”*

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## Building Codes

- **Model Codes** (standardized codes)
  - International Building Code (IBC)
  - Uniform Building Code (UBC)
  - BOCA Building Code (BOCA)
  - Standard Building Code (SBC)

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## Code Revision & Interpretation

- Why Hasn't Everyone Adopted the IBC?
- Revisions - Automatically Enforced?
- Is Interpretation Consistent?

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## Material Information Resources

- American Society for Testing and Materials (ASTM)
- American National Standards Institute
- US Bureau of Standards
- Construction Trade & Professional Associations (Technical specifications often incorporated by 'reference')

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## Building System Choices

- Required functional performance?
- Desired aesthetics / appearance?
- Legally possible (building regulations)?
- Most economical? (1<sup>st</sup> cost, life cycle)
- What is best for environment?

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## Sustainability

- "...meeting the needs of the present generation without compromising the ability of future generations to meet their needs."

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## Sustainable Design & Construction Green Building

- Sustainable Design & Construction Actions
- Sustainability - Addressed on a Life Cycle basis

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## Sustainability Considerations when Selecting Materials

- Origin & Manufacture of Building Materials
- Construction of the Building
- Building Maintenance
- Demolition

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## Performance Vs. Construction

- Design & Performance Issues
- Construction Issues

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## Rehabilitation

Etymology: Medieval Latin *rehabilitatus*, past participle of *rehabilitare*, from Latin *re-* + *habilitare* to habilitate

- **1 a** : to restore to a former capacity
- **1 b** : to restore to good repute : reestablish the good name of
- **2 a** : to restore to a former state (as of efficiency, good management, or solvency) <*rehabilitate* slum areas
- **2 b** : to restore or bring to a condition of health or useful and constructive activity

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## Rehabilitation & Renovation How to spot trouble

- Understanding History
  - materials and function
- Defining Problem
  - examining the effects of constraints
  - application of ideas of renovation types

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## Rehabilitation & Renovation Restrictions

- Structural Design Considerations
- Architectural Design Considerations
- Material Considerations

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## Structural Design Considerations

- Why do firefighters wear red suspenders?
- Foundations
- Static and Dynamic Loads

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## Foundation Requirements

- Safe Against Structural Failure
- Settlement Not Impairing Function
- Technically & Economically Feasible

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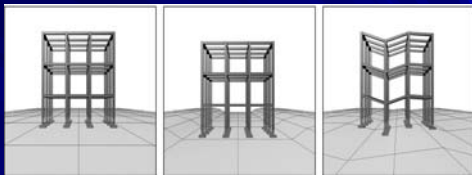
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## Types of Settlement



No Settlement

Uniform

Differential

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## The Leaning Tower of Pisa

One of the Most Famous  
Examples of  
Differential Settlement



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Differential Settlement  
Next to  
A Building Column



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Differential Settlement  
Between an  
Areaway & Sidewalk



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## Architectural Design & Material Considerations

- Construction
  - Wood
  - Concrete
  - Masonry

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## Exterior Finishes

- Structural Framing & Sheathing
- Roofing
- Exterior openings and siding windows & Doors
- Coatings. Finishes water and solvent based

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## Interior Finishes

- Partition framing
- Rough ins & equipment
- Thermal insulation
- Ceilings and walls
- Floors
- Millwork and finishes
- MEP fixtures, devices and appliances

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## How to Spot Trouble

- Investigation
- Assumptions
- Sources

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## How to Spot Trouble

### ■ Testing

- Non-destructive
- Destructive

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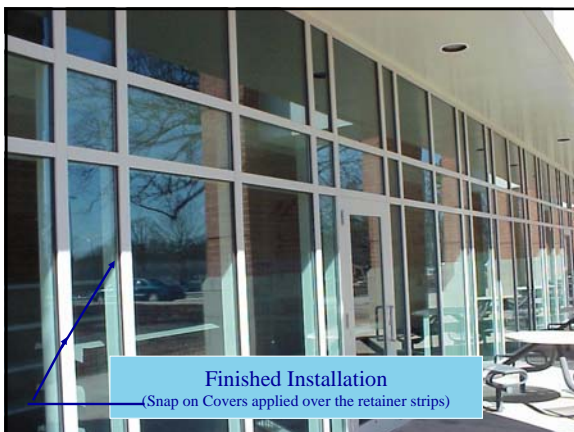
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## Five Forces Moving Water thru Cladding

- Gravity
- Momentum
- Surface Tension
- Capillary Action
- Wind Currents

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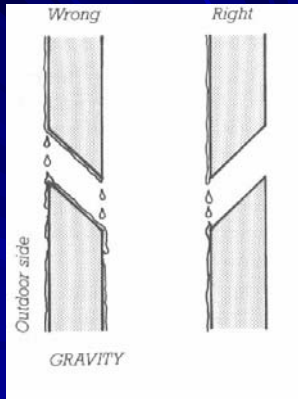
### Gravity

#### Problem:

The Forces of Gravity cause water to enter the cladding

#### Solution:

Slope joints/openings to the outside



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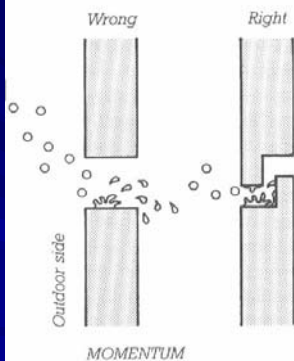
### Momentum

#### ■ Problem:

- The momentum from rain falling at an angle carries the water into the cladding

#### ■ Solution:

- Joint cover
- Labyrinth (maze)



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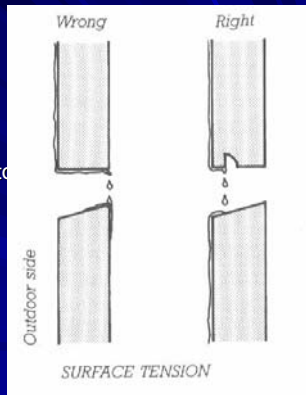
## Surface Tension

### Problem:

- Water adheres to joint & is drawn into the cladding

### Solution:

- Drip groove



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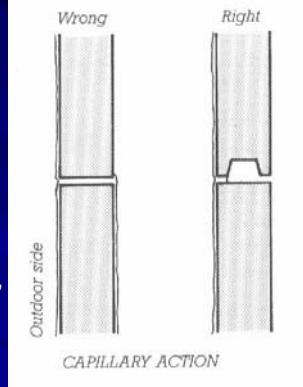
## Capillary Action

### Problem:

- Water pulled into the cladding

### Solution:

- Opening larger than a drop of water can bridge, or install a capillary break
- Capillary break



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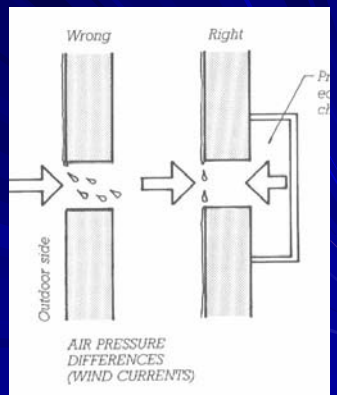
## Air Pressure

### Problem:

- Differences in air pressure push, or pull water into cladding

### Solution:

- Pressure Equalization Chamber



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Project Management

Facilities Management

Rehabilitative & Renovation Construction

*Seminars & Consulting*

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