Real Envelopes

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(Modified by J. Mitchell)
Brick

- Brick Veneer
- Note the light and dark brown colors of the brick
Concrete Block

- Glazed concrete blocks. Note the different patterns and colors
Loadbearing Stone

- Loadbearing stone masonry walls. This goes back to the beginning of the century with massive gravity wall construction.
Stone Veneer

- Stone cladding is popular for high-rise buildings. Surface is polished and therefore impermeable. Has high resistance to rain penetration.
Stucco

- Stucco is commonly used for housing and residential construction. Metal lath is used to provide resistance to shrinkage cracking.
EIFS

- Drivett system. A heavy duty stucco with a rough more durable surface
Glass Block

- Glass block
- Note the confined effect of the steel frame.
Mixed Materials

- Combined brick, steel, concrete block and glass block
Wood

- Wood cladding. Note the flashing at the window top.
PROBLEMS WITH BUILDING ENVELOPE

- Efflorescence
Movement

- Cracking due to lack of movement joint
Differential Movement

- Vertical cracking due to differential movement between the concrete frame and the veneer
Spalling

- Spalling of exterior water-repellent coating due to moisture in the brick
Spalling due to Glazing

- Spalling of glazed brick due to freeze-thaw cycles
Staining

- Deterioration of flashing and staining
Poor Workmanship

- Unfilled vertical mortar joints of brick veneer can cause significant water penetration
Unsecured Veneer

- Brick veneer was not secured to the backup wall
Improper Application

- Stucco failure due to improper application
- Do we know from looking at it whether it is poor design or poor workmanship?
Wind Load delamination

- Exterior Insulation and Finish Systems (EIFS) have had poor structural performance under severe wind
Rain Penetration

- Moisture damage due to rain penetration of EIFS
Construction
Insulation board

- Rigid foam board is the most common insulation placed in the cavity of masonry walls
Foam Insulation

- Pumping foam insulation
Flashing

- Flashing in brick-block cavity wall system
Self-Adhering Flashing

- Self-adhering flashing is easy to size and place
Parging

- Parging mortar was applied at the backup wall to improve water permeance of masonry walls.
Weep Holes

- Mortar droppings collectors keep the weeps open, allowing the drainage system to function as intended
Special Blocks

- New dry stack (interlocking) block to accommodate insulation, reinforcing and wiring/piping
Water Repellents

- Water repellents can reduce water penetration through a masonry wall if it is selected, applied and maintained properly.
- Must NOT be vapor retardant.
Barrier Membrane

- Waterproofing concrete masonry basement walls
Testing
Water Penetration

- ASTM 514 laboratory test for water permeance of brick masonry walls
  - Pressure Difference of 0.3” water
Water Penetration

- A modified version of ASTM 514 laboratory test can be used to evaluate water penetration through existing masonry walls
Drainage Test

- In-situ drainage test can evaluate the drainage capacity of existing walls