Types of Building Envelopes

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Cavity wall construction is one of the most common types of walls used in the north-east of the US.
Brick with its rich colors and textures offers attractive and durable material for building envelopes.
Use of a variety of materials for building envelope
- Brick Veneer
- Note the light and dark brown colors of the brick
- Glazed brick offers attractive and durable cladding of buildings
Stone cladding is popular for high-rise buildings. Surface is polished and therefore impermeable. Has high resistance to rain penetration.
Loadbearing stone masonry walls. This goes back to the beginning of the century with massive gravity wall construction.
Stucco is commonly used for housing and residential construction. Metal lath is used to provide resistance to shrinkage cracking.
Drivett system. A heavy duty stucco with a rough more durable surface
- Glass block
- Note the confined effect of the steel frame.
- Composite brick and block with a collar joint. Note the composite action to resist vertical and lateral loads.
- Combined brick, concrete block and glass block
- A variety of building envelope materials can be noted.
- Note that the brick is painted.
Wood cladding. Note the flashing at the window top.
Glazed concrete blocks. Note the different patterns and colors.
Concrete block backup wall to receive a brick veneer. Note the ties to connect the brick veneer to the backup system.
A variety of cladding-brick, block, stucco, vinyl
- Insulation board
Pumping foam insulation
Foamed insulation can improve the thermal efficiency of basement walls
Rigid foam board is the most common insulation placed in the cavity of masonry walls.
New dry stack (interlocking) block to accommodate insulation, reinforcing and wiring/piping
A modified version of ASTM 514 laboratory test can be used to evaluate water penetration through existing masonry walls.
ASTM 514 laboratory test for water permeance of brick masonry walls
Water repellents can reduce water penetration through a masonry wall if it is selected, applied and maintained properly.
In-situ drainage test can evaluate the drainage capacity of existing walls
- Flashing in brick-block cavity wall system
Mortar droppings collectors keep the weeps open, allowing the drainage system to function as intended
Self-adhering flashing is easy to size and place.
Waterproofing concrete masonry basement walls
Parging mortar was applied at the backup wall to improve water permeance of masonry walls.
PROBLEMS WITH BUILDING ENVELOPE

- Efflorescence
Cracking due to lack of movement joint
- Vertical cracking due to differential movement between the concrete frame and the veneer
Spalling of exterior water-repellent coating due to moisture in the brick
Deterioration of flashing and staining
Unfilled vertical mortar joints of brick veneer can cause significant water penetration
Spalling of glazed brick due to freeze-thaw cycles
Brick veneer was not secured to the backup wall
Stucco failure due to improper application
Exterior Insulation and Finish Systems (EIFS) have had poor structural performance under severe wind
Moisture damage due to rain penetration of EIFS