Exterior Insulation Finish Systems
EIFS
Exterior Insulation Finish Systems
EIFS
Barrier System
Face-Sealed Not Water Managed
EIFS No Longer Has Issues
Stucco

Expanded polystyrene insulation (EPS)

Air gap

Water control layer

Non paper-faced exterior gypsum sheathing, plywood or oriented strand board (OSB)

Uninsulated steel stud cavity

Gypsum board

Latex paint or vapor semi-permeable textured wall finish
Stucco

Expanded polystyrene insulation (EPS)

Air gap

Water control layer

Non paper-faced exterior gypsum sheathing, plywood or oriented strand board (OSB)

Insulated wood stud cavity

High density spray polyurethane foam (SPF)

Gypsum board

Latex paint or vapor semi-permeable textured wall finish
Life Is Hard Enough As It Is
It’s Harder When You Are Stupid
Don’t Do Stupid Things
Side Trip To Vancouver....
Side Trip To Vancouver….  
Vancouver Condo Crisis….  
Should Have Put Everyone on Notice
What Happened In Vancouver?
OSB Instead of Plywood
Non Traditional Building Wraps
Interior Vapor Barriers
Increased Thermal Resistance
Portland Cement Instead of Lime
Materials
Inward Drive
Energy
Water Vapor Permeance of Sheathing Materials

Mean Relative Humidity, %

Water Vapor Permeance, US perms

Dry Cup

Wet Cup

Plywood

OSB
Sheathing

Penetrating Water
Rain Screen
Beer Screen?
Flashings are installed to prevent water from entering the building. The illustration shows a flashing with an upturned leg that slopes to the exterior and a drip edge. An arrow indicates that the flashing should be installed "down" and "out."
- Furring
- Wood Siding (cladding)
- Building Paper (drainage plane)
- Sheathing
- Flashing
Hydrostatic pressure
Hydrostatic head

Cladding
Wind Speed (mph) vs. Stagnation Pressure (Pa)

<table>
<thead>
<tr>
<th>Pascals (Pa)</th>
<th>mph</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>20</td>
</tr>
<tr>
<td>100</td>
<td>30</td>
</tr>
<tr>
<td>150</td>
<td>35</td>
</tr>
<tr>
<td>250</td>
<td>45</td>
</tr>
<tr>
<td>500</td>
<td>65</td>
</tr>
<tr>
<td>1,000</td>
<td>90</td>
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Back To Stucco....
Lime vs Portland Cement
Polymer Modification
<table>
<thead>
<tr>
<th>Stucco Type</th>
<th>Permeability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional Lime Stucco</td>
<td>Greater than 20 perms</td>
</tr>
<tr>
<td>Lime/Portland Cement Stucco</td>
<td>5 to 10 perms</td>
</tr>
<tr>
<td>Portland Cement Stucco</td>
<td>1 to 5 perms</td>
</tr>
<tr>
<td>Polymer Modification</td>
<td>Less than 1</td>
</tr>
</tbody>
</table>
Horizontal “scoring” provides mechanical bond and “shelf” for water during “wet” curing.
Figure 1c. Gypsum, hydrated from plaster of paris and water, porosity 30 per cent.

Figure 1b. Brick, sintered clay, porosity 40 per cent.
Calculating capillary rise

\[ h = \frac{2 \sigma \cos \theta}{g \rho r} \]
Capillary rise versus diameter
Ancient Modification Additives
Cow Dung
Egg Whites
Pig Blood
Non Traditional Building Wraps
Dimensionally unstable hygroscopic wrb's "good"
Side Trip To My Backyard….
Building Science 2007
Three-coat hard-coat stucco rendering
Two layers of building paper (concealed barrier)
Engineered wood sheathing (OSB)
Flashing

Exterior

Interior

Timber frame
Cavity insulation
Interior gypsum linir
“Lumpy Stucco”….
Should Have Been The Big US Warning….
Back To America….Pennsylvania…. And Then Pretty Much Anywhere It Rains…
Back To Lumpy Stucco....
Easy Solution....
Rainwater Entry
Mass Assembly
Latex paint

Stucco rendering

Concrete block

Rigid insulation (vapor semi-permeable) — unfaced extruded polystyrene, unfaced expanded polystyrene, glass fiber-faced isocyanurate

Uninsulated steel frame wall

Non-paper faced gypsum board

Latex paint or vapor semi-permeable textured wall finish

Vapor Profile
Vapor permeable coating — greater than 10 perms ("latex paint")

Polymer modified (PM) or standard Portland cement stucco

Masonry wall

Seat in concrete slab

Weep screed

Concrete slab

Gravel capillary break and drainage pad (no fines)

Concrete grade beam

Polyethylene vapor barrier extended under grade beam where it also acts as a capillary break

Vapor semi-permeable rigid insulation — expanded polystyrene, extruded polystyrene, fiber-faced isocyanurate

2x2 wood furring

Non-paper faced gypsum board

Latex paint or other permeable or vapor semi-permeable interior finish

Hold gypsum board up from slab 4"
Stucco (cladding)

Masonry wall

Concrete slab

Weep Screed Flashing (provides drainage at stucco - masonry connection)

"Seat" in slab acting as a flashing for masonry - slab connection
Reminder…
Don’t Do Stupid Things
Vapor semi-permeable rigid insulation — extruded polystyrene

Wood furring

Polymer modified (PM) or standard Portland cement stucco

Masonry block wall

Gypsum board

Latex paint or other permeable interior finish

Drying to interior and exterior