Walls
The Effect of Climate
Water Control Layer
Air Control Layer
Vapor Control Layer
Thermal Control Layer
Cladding
Control layers
Structure
Diagram showing layers: Slab, Control layers, Stones, Earth.
Parapet

Wall

Footing

Slab

Roof
Control layer
Control layer
Roof structure
Configurations of the Perfect Wall
Brick veneer/stone veneer

Drained cavity

Exterior rigid insulation — extruded polystyrene, expanded polystyrene, isocyanurate, rock wool, fiberglass

Membrane or trowel-on or spray applied drainage plane, air barrier and vapor retarder

Concrete block

Metal channel or wood furring

Gypsum board

Latex paint or vapor semi-permeable textured wall finish

Vapor Profile
Brick veneer/stone veneer
Drained cavity
Exterior rigid insulation — extruded polystyrene, expanded polystyrene, isocyanurate, rock wool, fiberglass
Membrane or trowel-on or spray applied drainage plane, air barrier and vapor retarder
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

Vapor Profile
Brick veneer/stone veneer
Drained cavity
Exterior rigid insulation — extruded polystyrene, expanded polystyrene, isocyanurate, rock wool, fiberglass
Membrane or trowel-on or spray applied drainage plane, air barrier and vapor retarder
Non paper-faced exterior gypsum sheathing, plywood or oriented strand board (OSB)
Insulated wood stud cavity
Gypsum board
Latex paint or vapor semi-permeable textured wall finish

Vapor Profile
DIFFUSION

Higher Dewpoint Temperature
Higher Water Vapor Density or Concentration
(Higher Vapor Pressure)
on Warm Side of Assembly

Low Dewpoint Temperature
Lower Water Vapor Density or Concentration
(Lower Vapor Pressure)
on Cold Side of Assembly

AIR TRANSPORT

Higher Air Pressure

Lower Air Pressure
Building Science Corporation

Joseph Lstiburek  34
Rain
Hydrostatic pressure
### Pascals vs. mph

<table>
<thead>
<tr>
<th>Pascals</th>
<th>mph</th>
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<tbody>
<tr>
<td>50 Pa</td>
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<td>500 Pa</td>
<td>65 mph</td>
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<tr>
<td>1,000 Pa</td>
<td>90 mph</td>
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Rain Screen
Beer Screen?
Drain the Rain on the Plane
If You Want to Save Cash…Flash
Don’t Be a Dope…Slope
Flashings are installed with the upturned leg and base sloped to the exterior. The diagram illustrates the correct orientation and purpose of install the flashings.
Rain enters cup due to momentum ("kinetic energy")

Cup drains water to exterior
Rain enters cup due to momentum ("kinetic energy")

Wind enters cup—pressurizing cup; no rain entry due to wind driven rain

Cup can still drain water to exterior

Entire wind pressure taken here
Baffle to deflect raindrops hitting face of cup due to momentum ("kinetic energy")

Pressure in cup is same as pressure outside on face of baffle

Momentum driving force converted to gravity—water drains away

Wind enters cup—pressurizing cup; no rain entry due to wind driven rain

Cup can still drain water to exterior

Entire wind pressure taken here
Outer seal sees water but not pressure; no pressure difference across this seal, therefore no rain entry.

Pressure in chamber is same as pressure outside on face of assembly.

Air enters and pressurizes chamber.

Key seal is interior seal as it takes maximum wind load but it does not see water.

Entire wind pressure taken here.

Pressure chamber.
Intent of sealant is to limit this lateral flow of water between sheathing and building wrap.
Capillarity
Capillary break on exterior foundation wall

Capillary break under slab

Capillary break on top of footing
Siding Laps
Film of water on surface of siding

Water film draws up between laps of siding by capillary suction

Building paper

Sheathing
Coat back and front of trim pieces

Seal all end cuts