

Joseph Lstiburek, Ph.D., P.Eng, ASHRAE Fellow

Building Science

Adventures In Building Science

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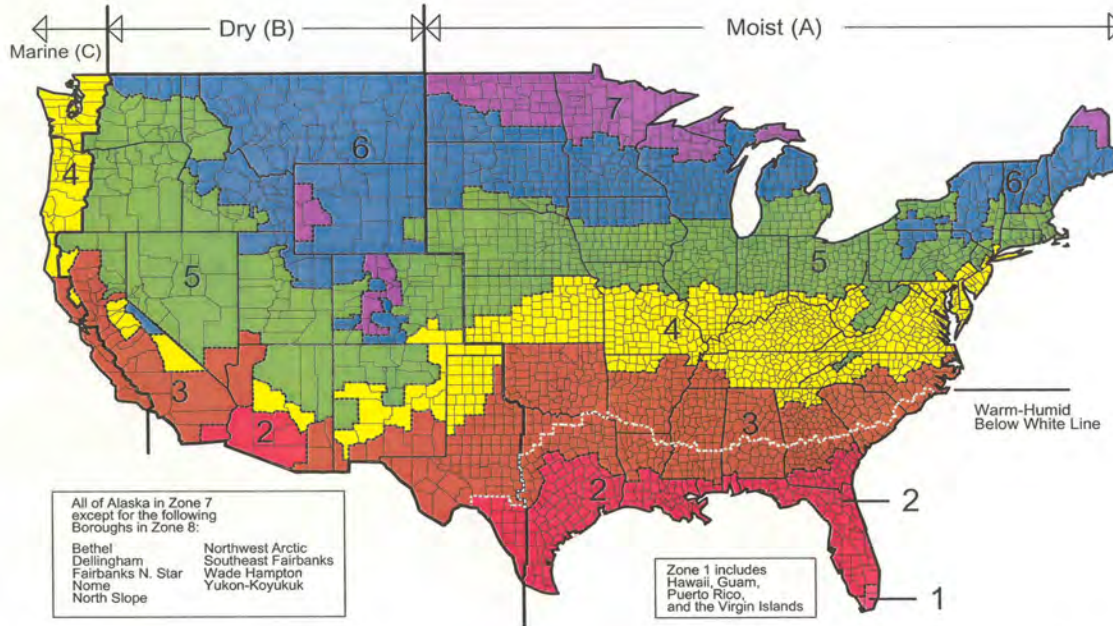
Walls

The Effect of Climate









Map of DOE's Proposed Climate Zones



March 24, 2003



Exposure

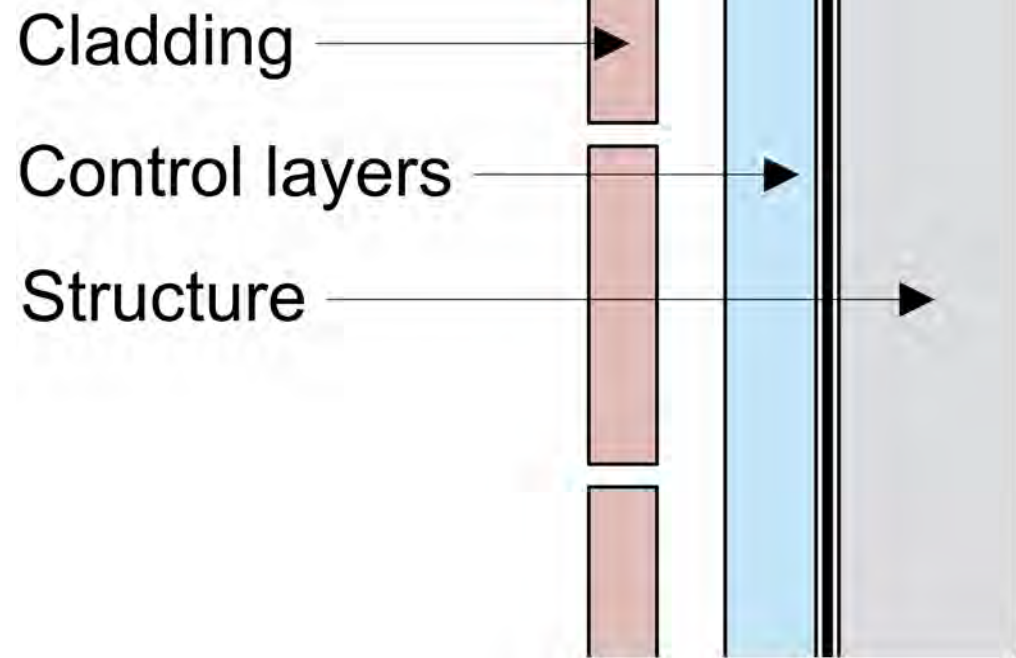
Extreme		Over 60"
High		40" - 60"
Moderate		20" - 40"
Low		Under 20"

Water Control Layer

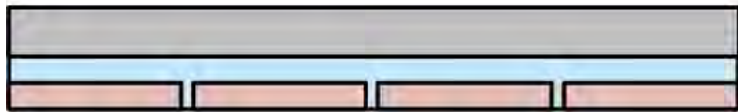
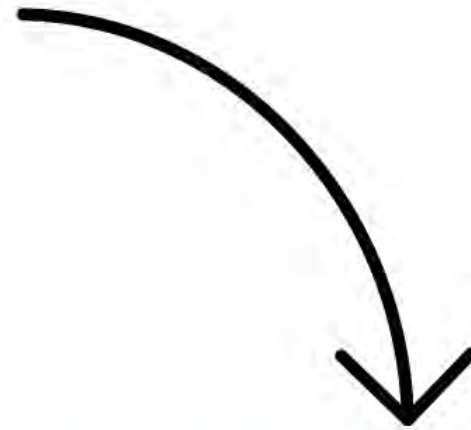
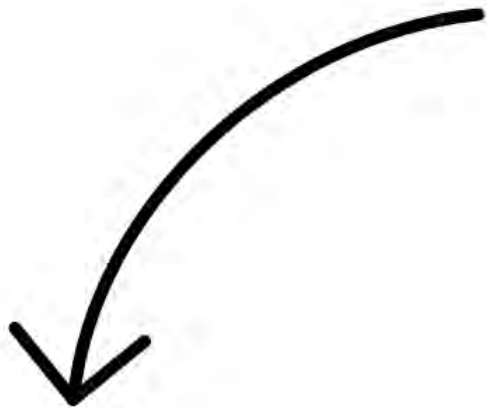
Air Control Layer

Vapor Control Layer

Thermal Control Layer



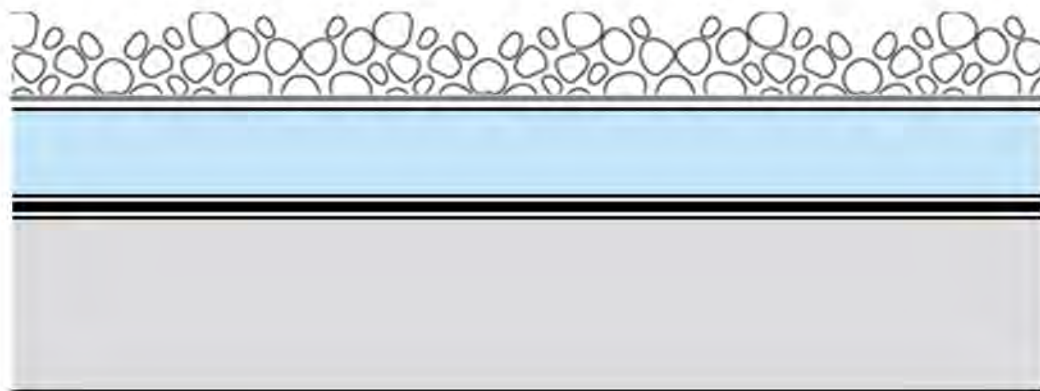
Wall



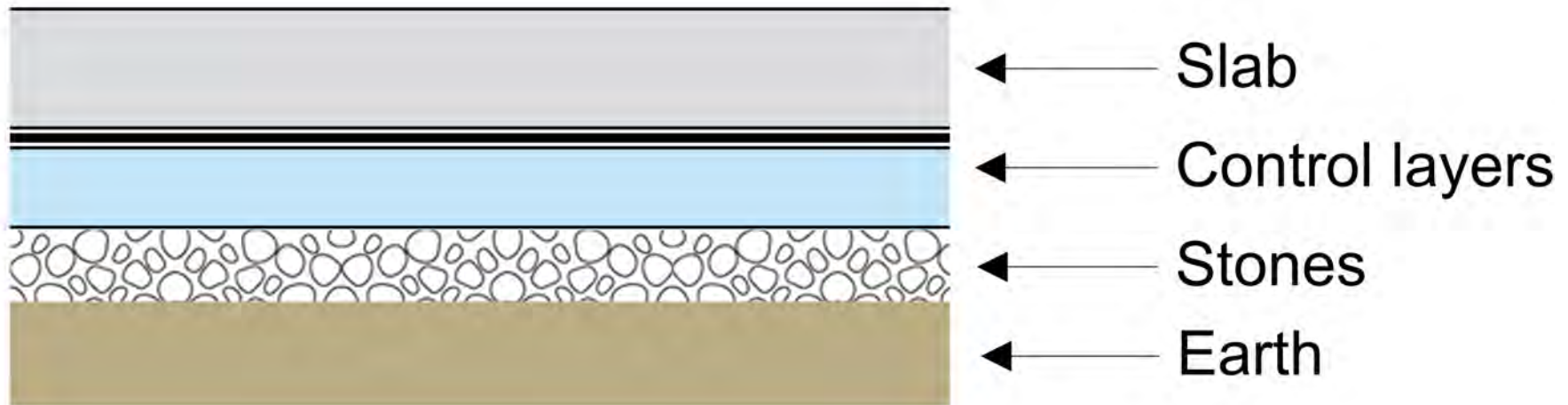
Slab

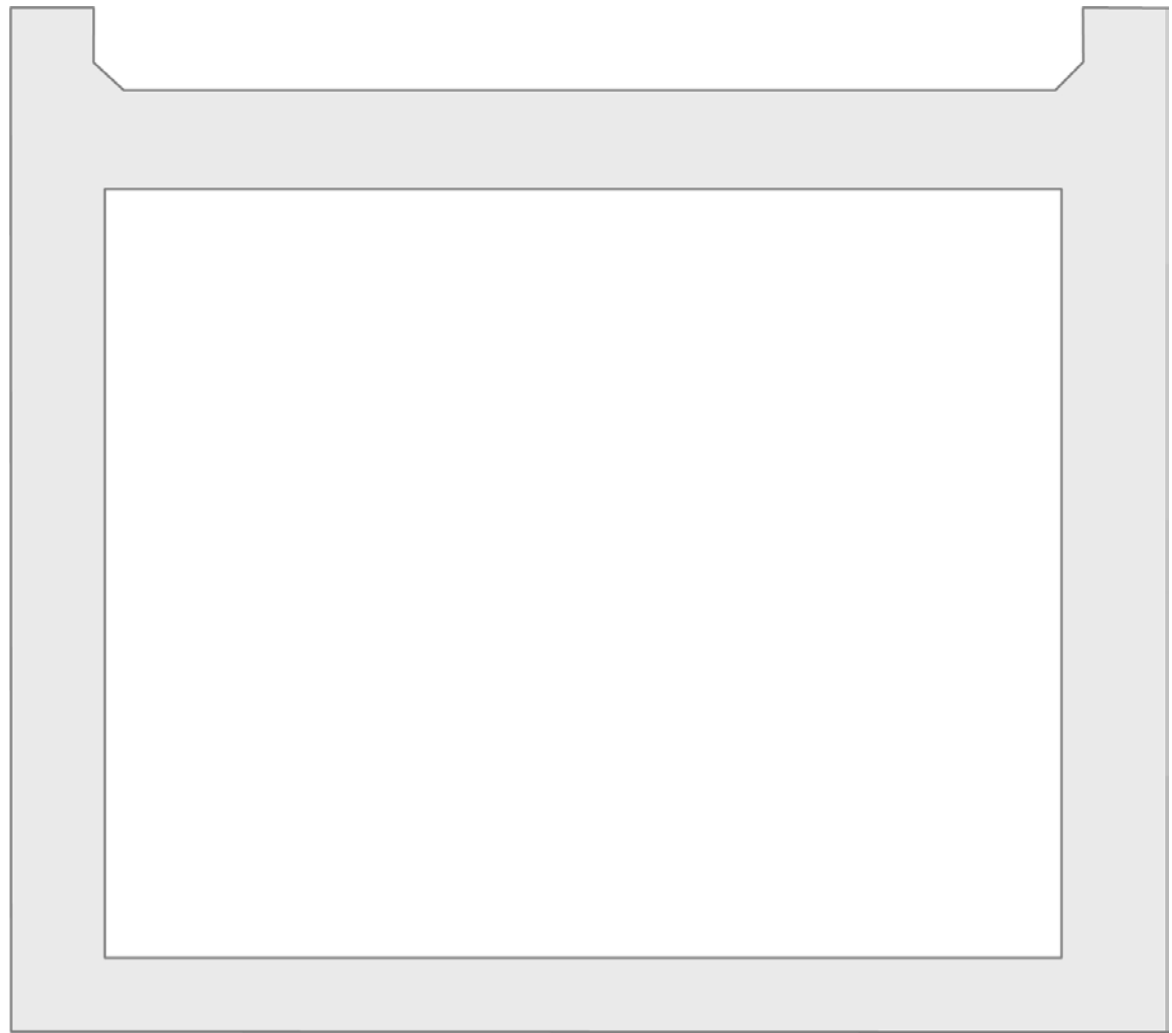


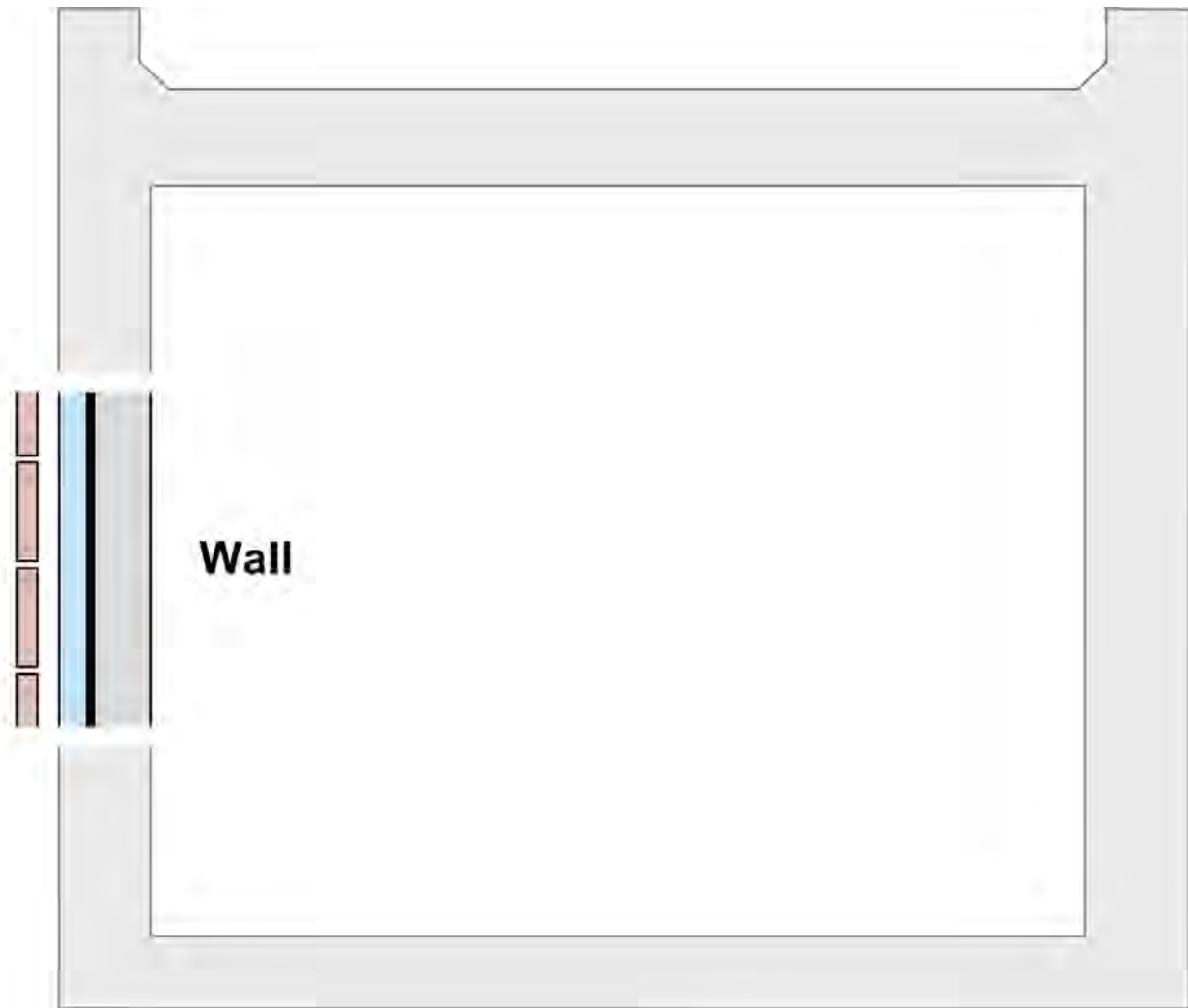
Roof

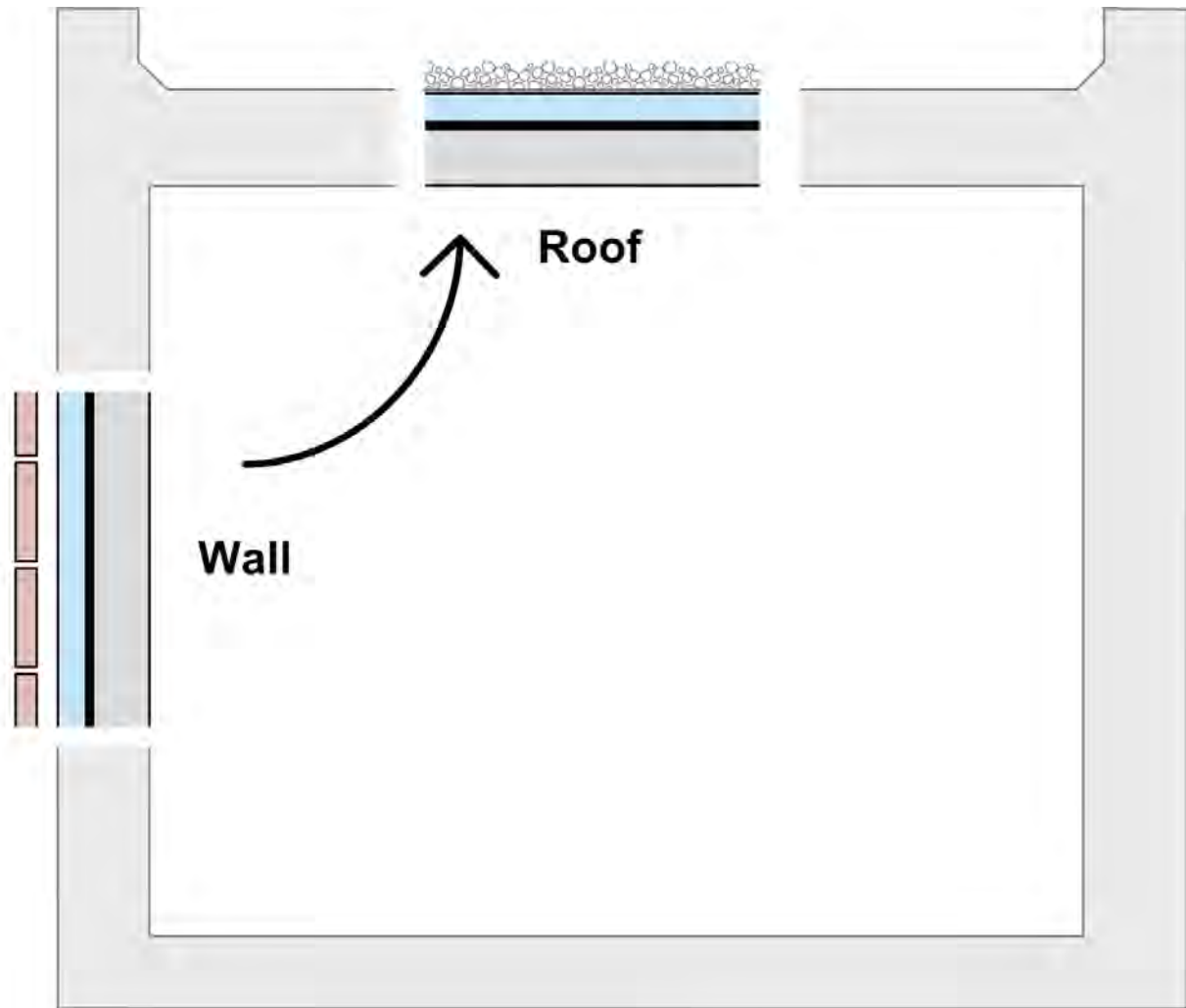


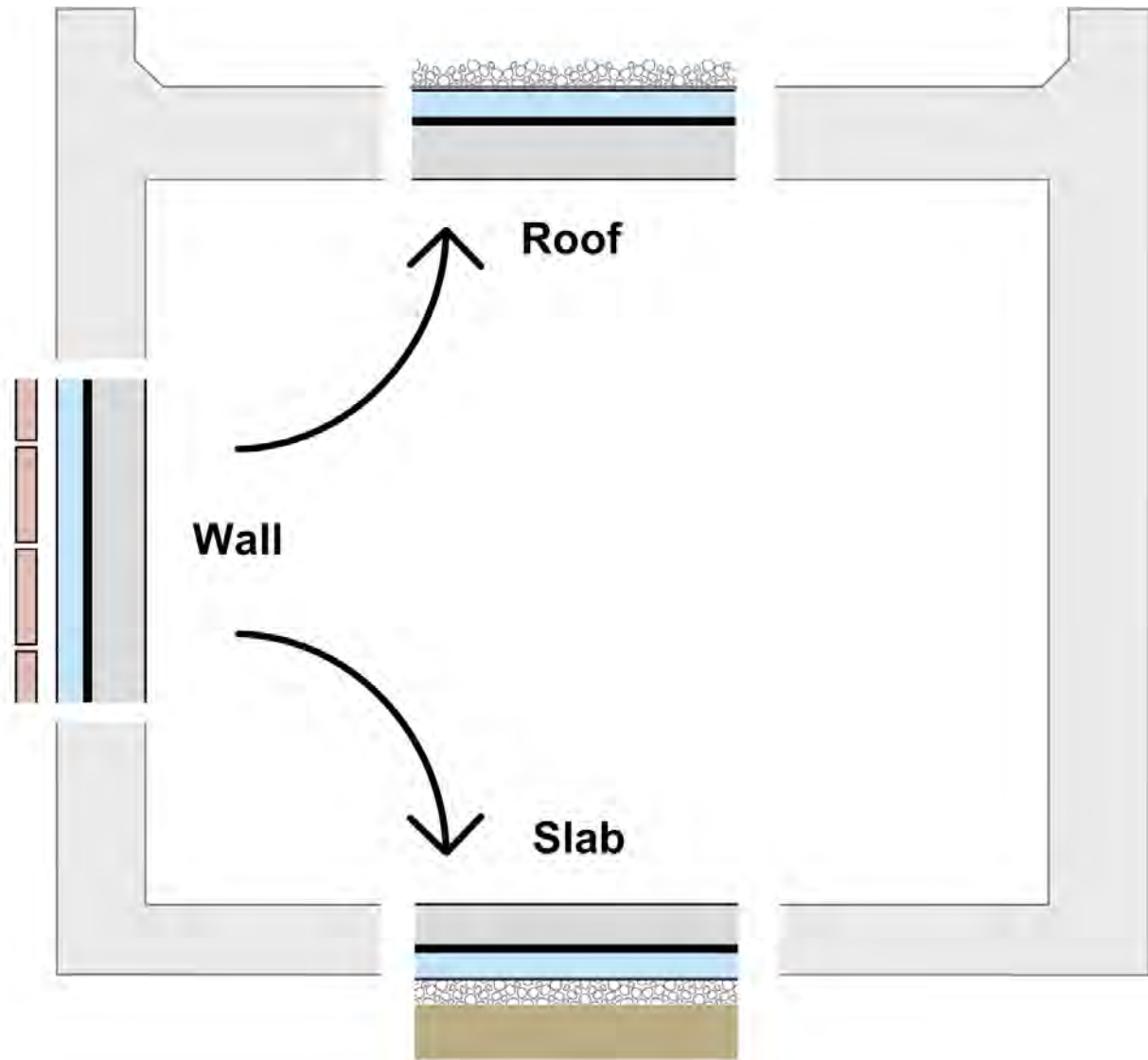
- ← Ballast
- ← Filter fabric
- ← Control layers
- ← Roof structure

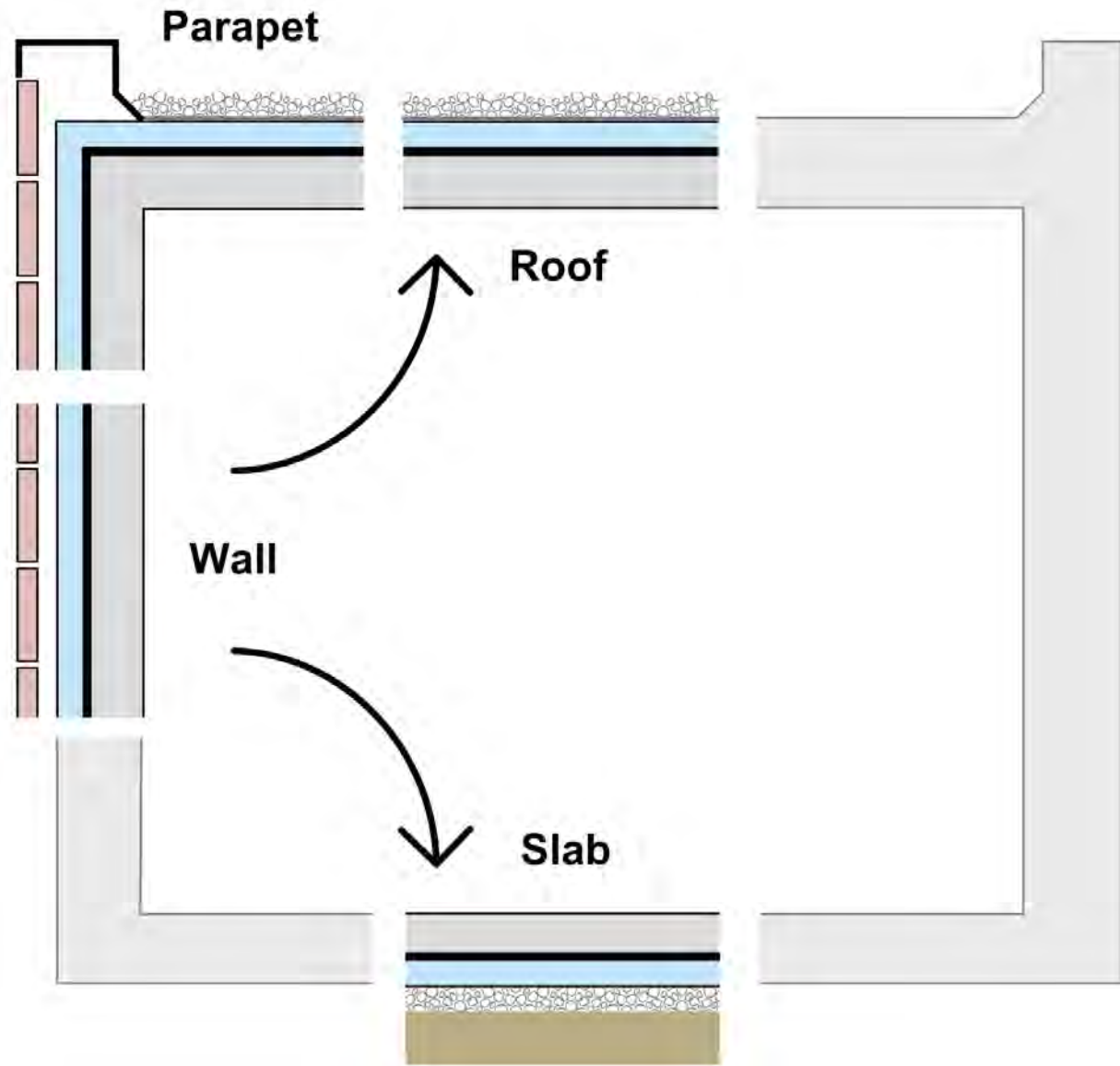


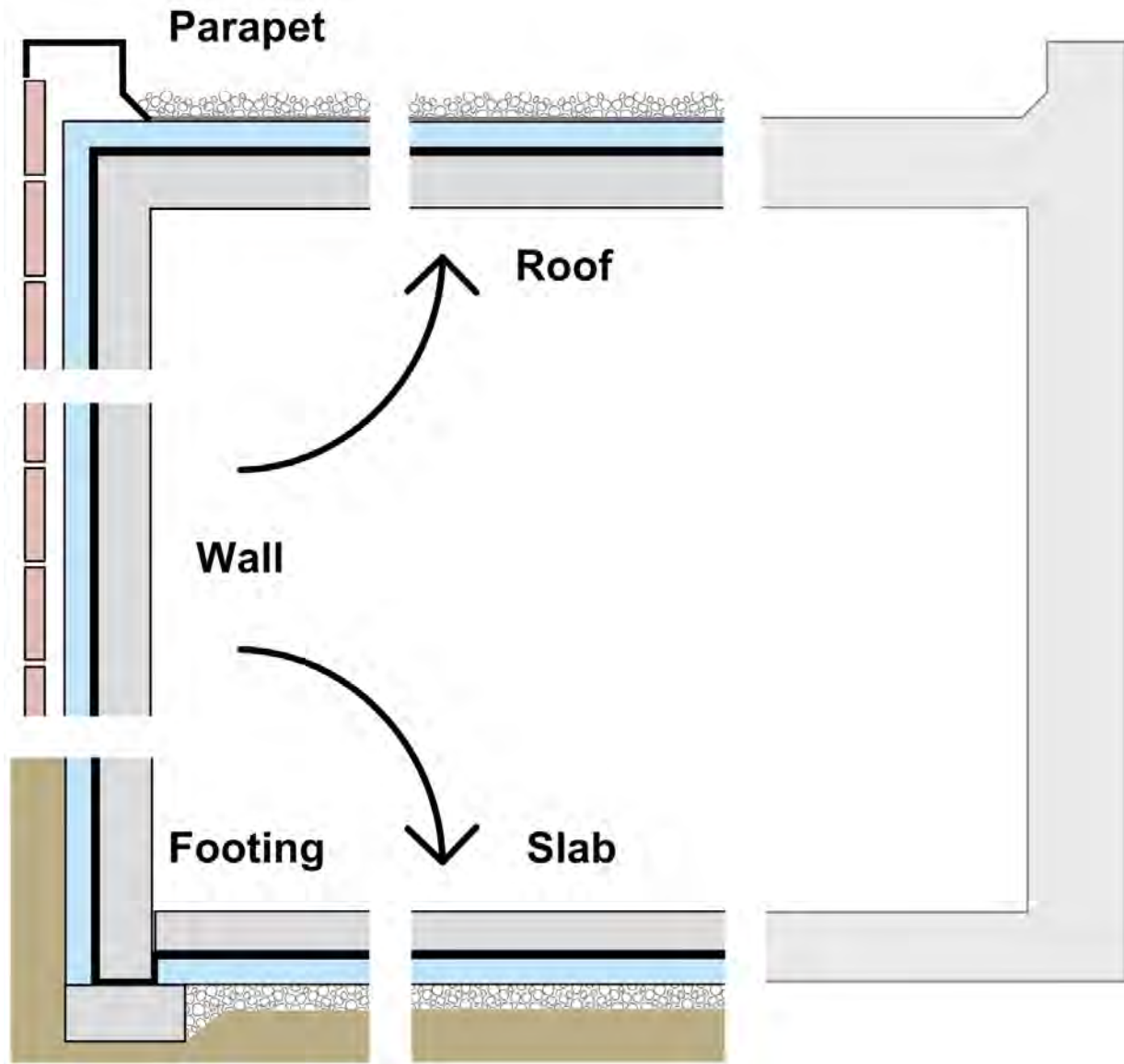


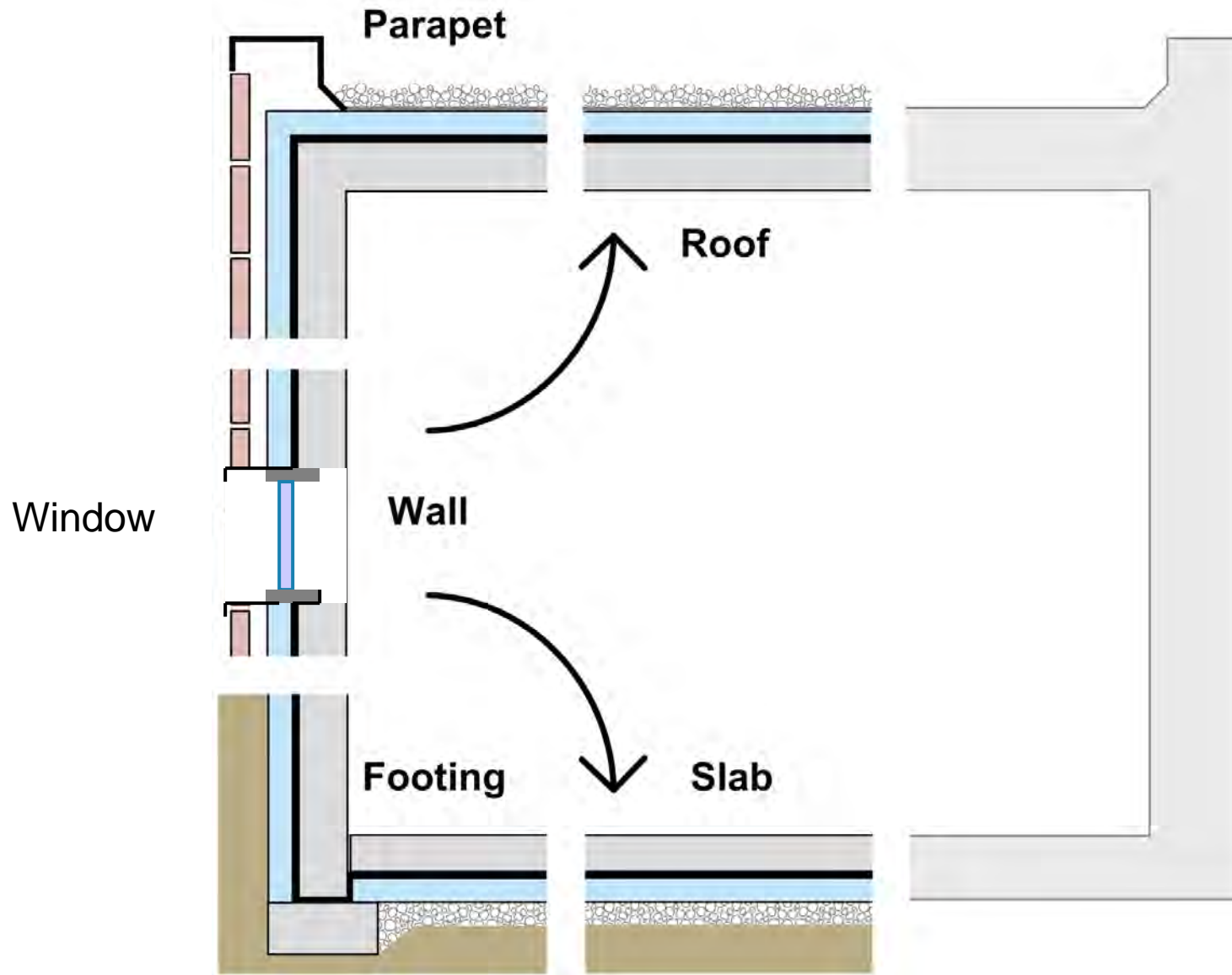


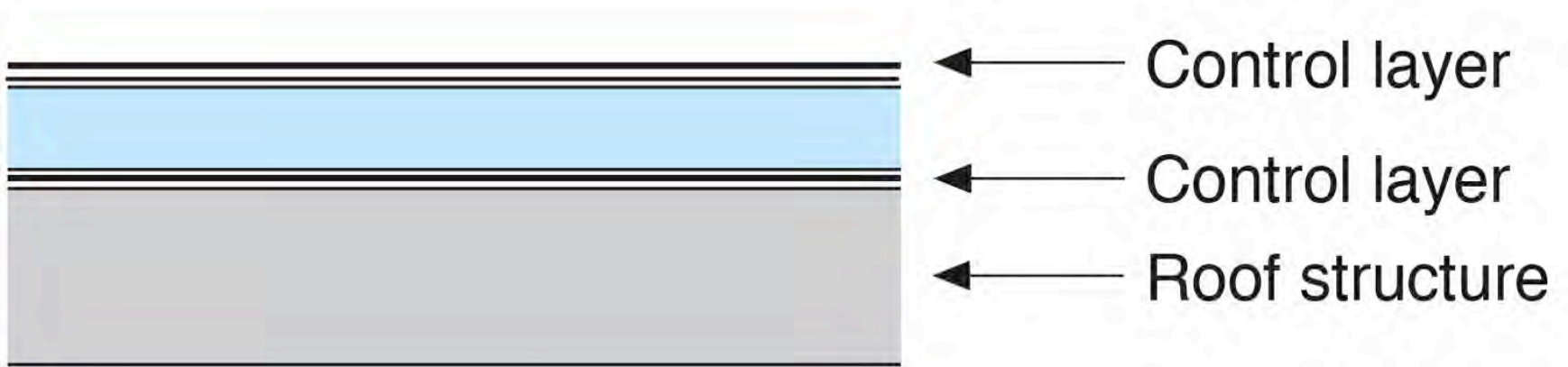


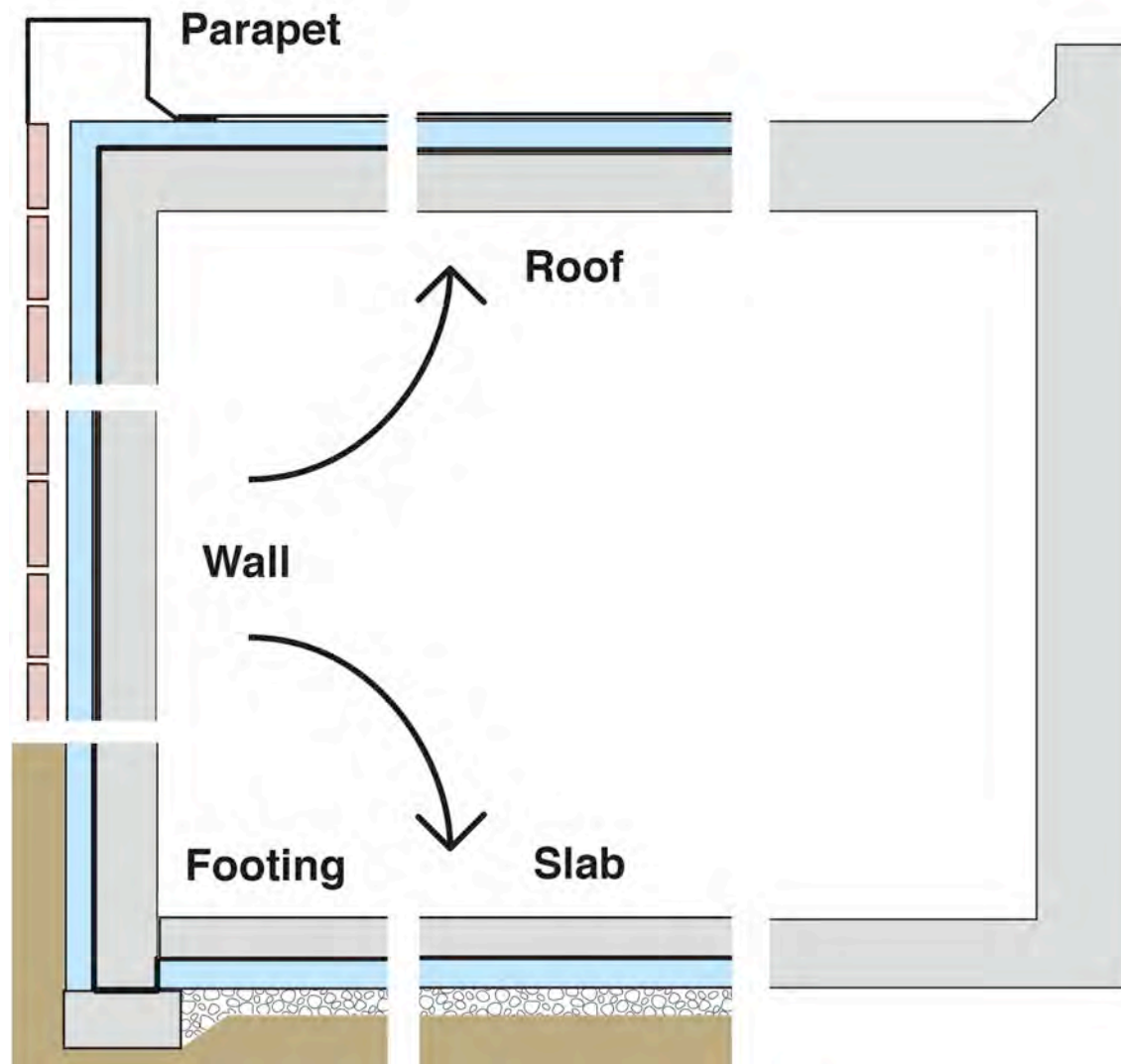


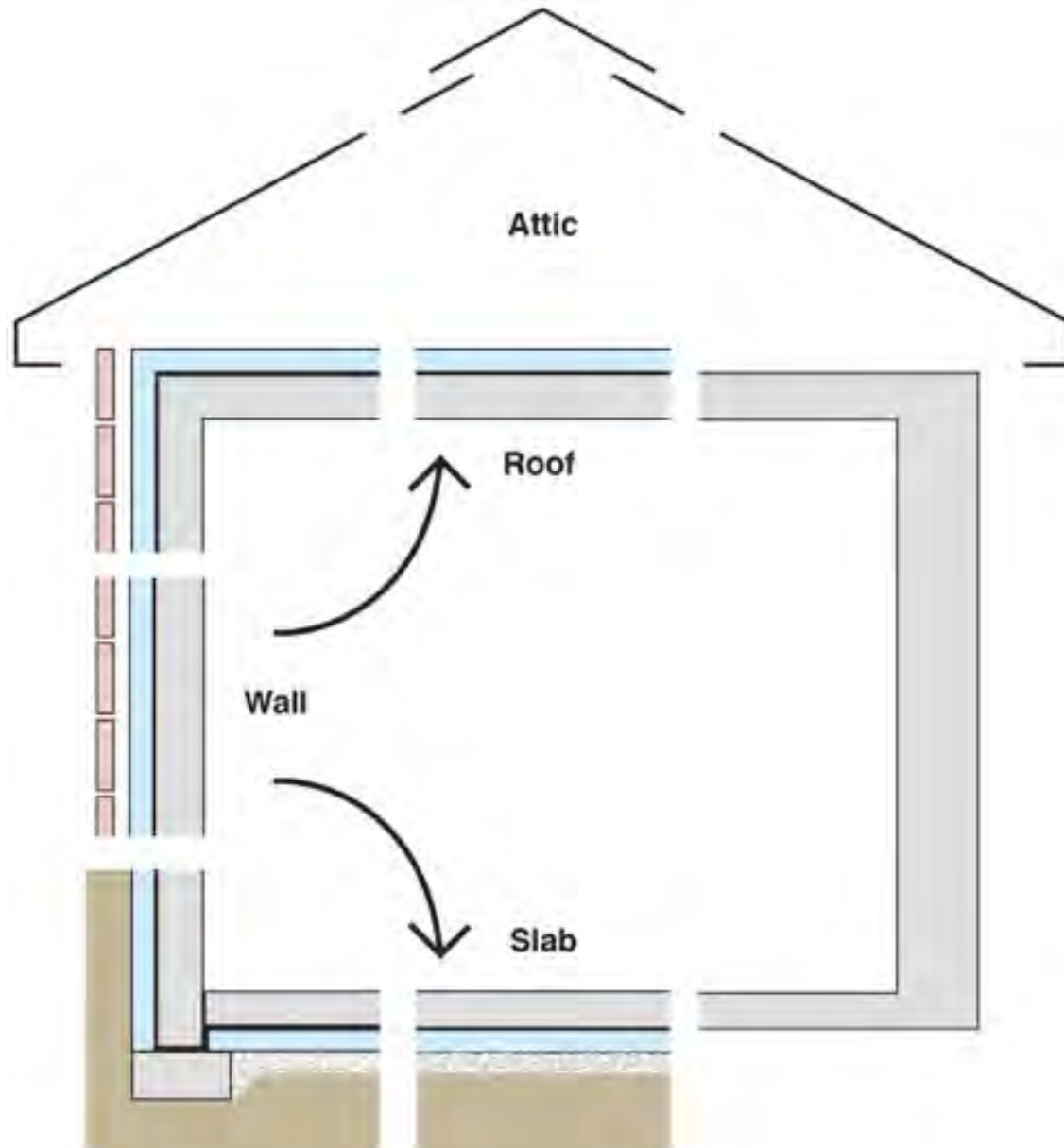


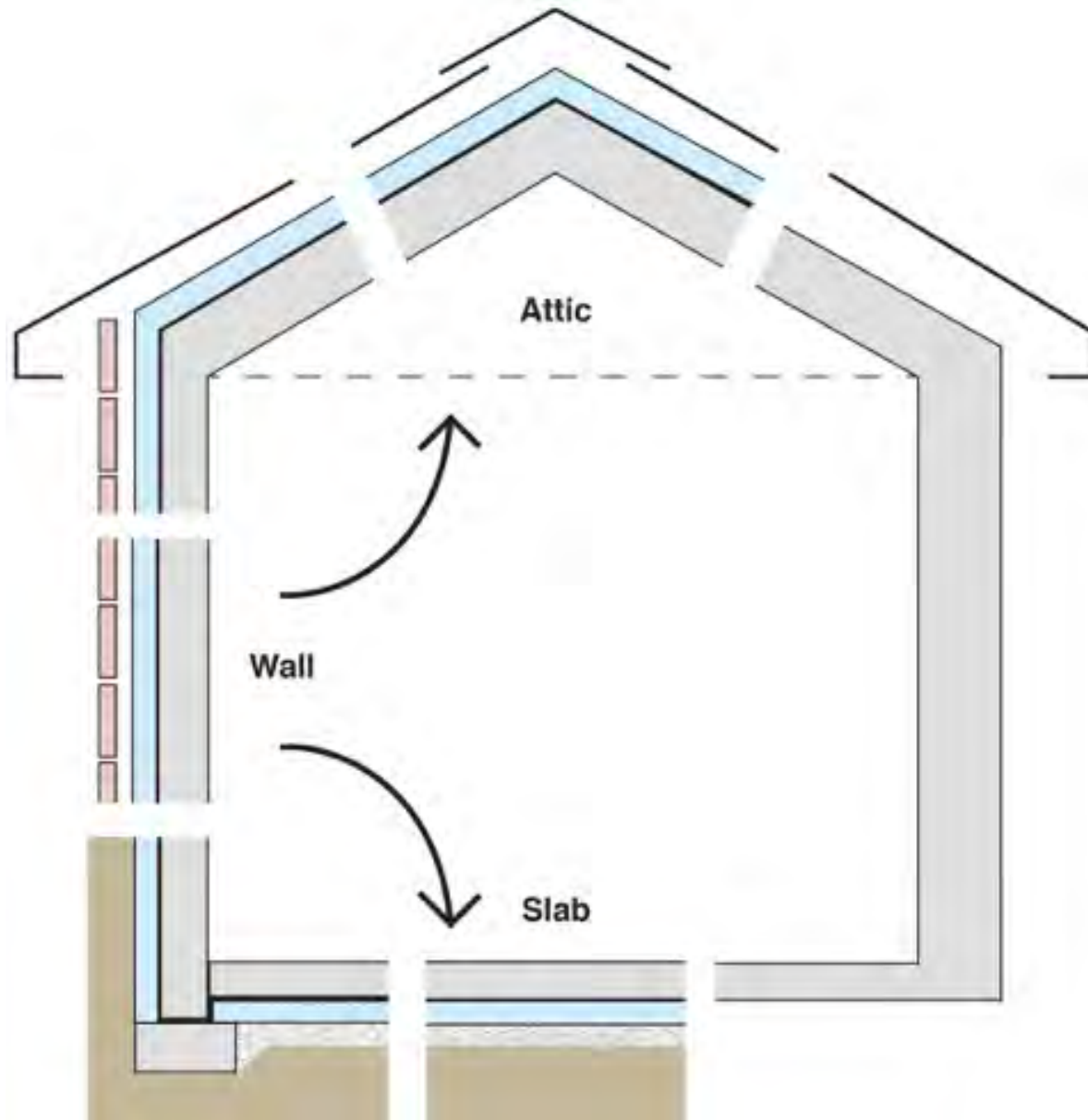


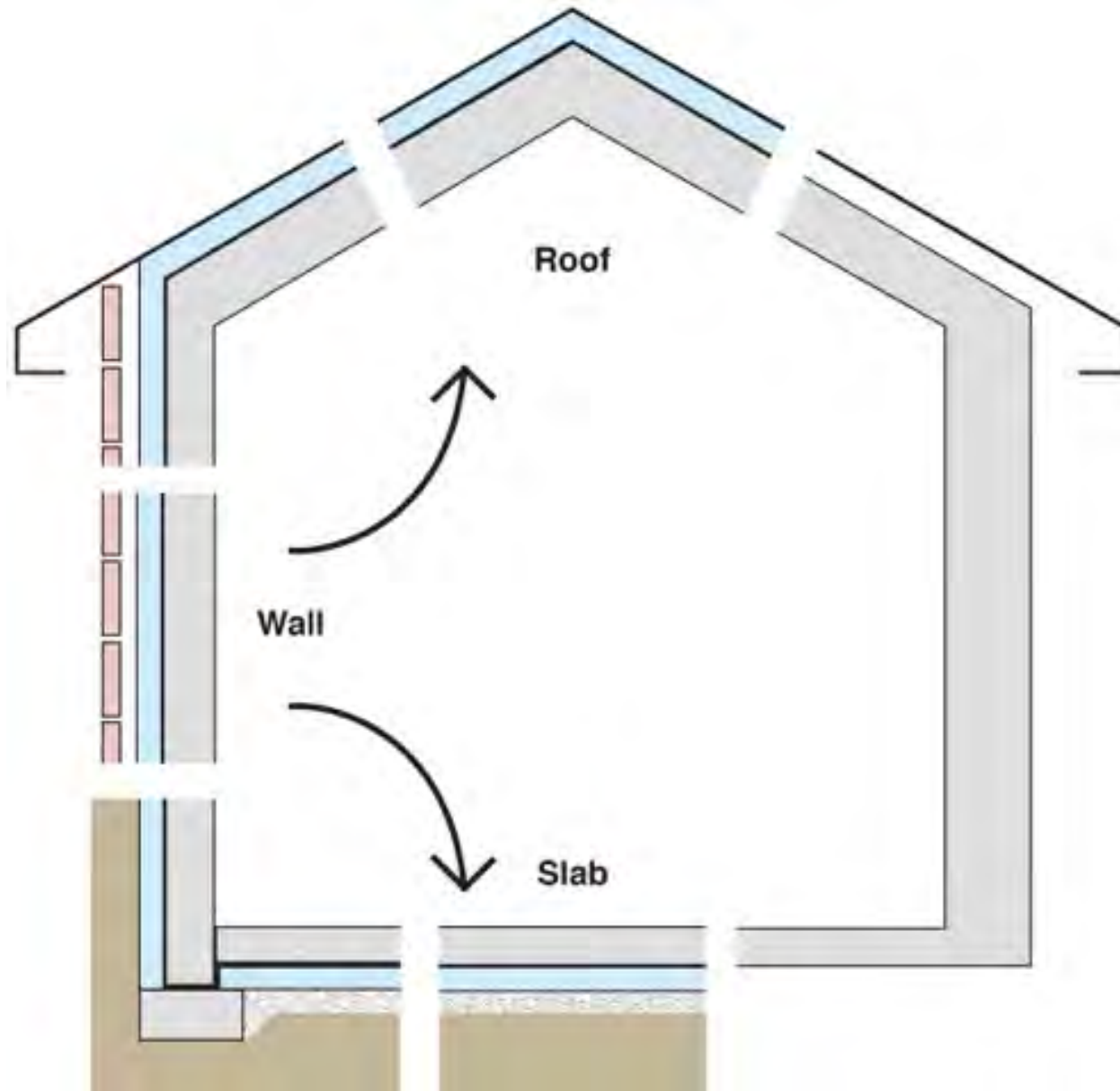


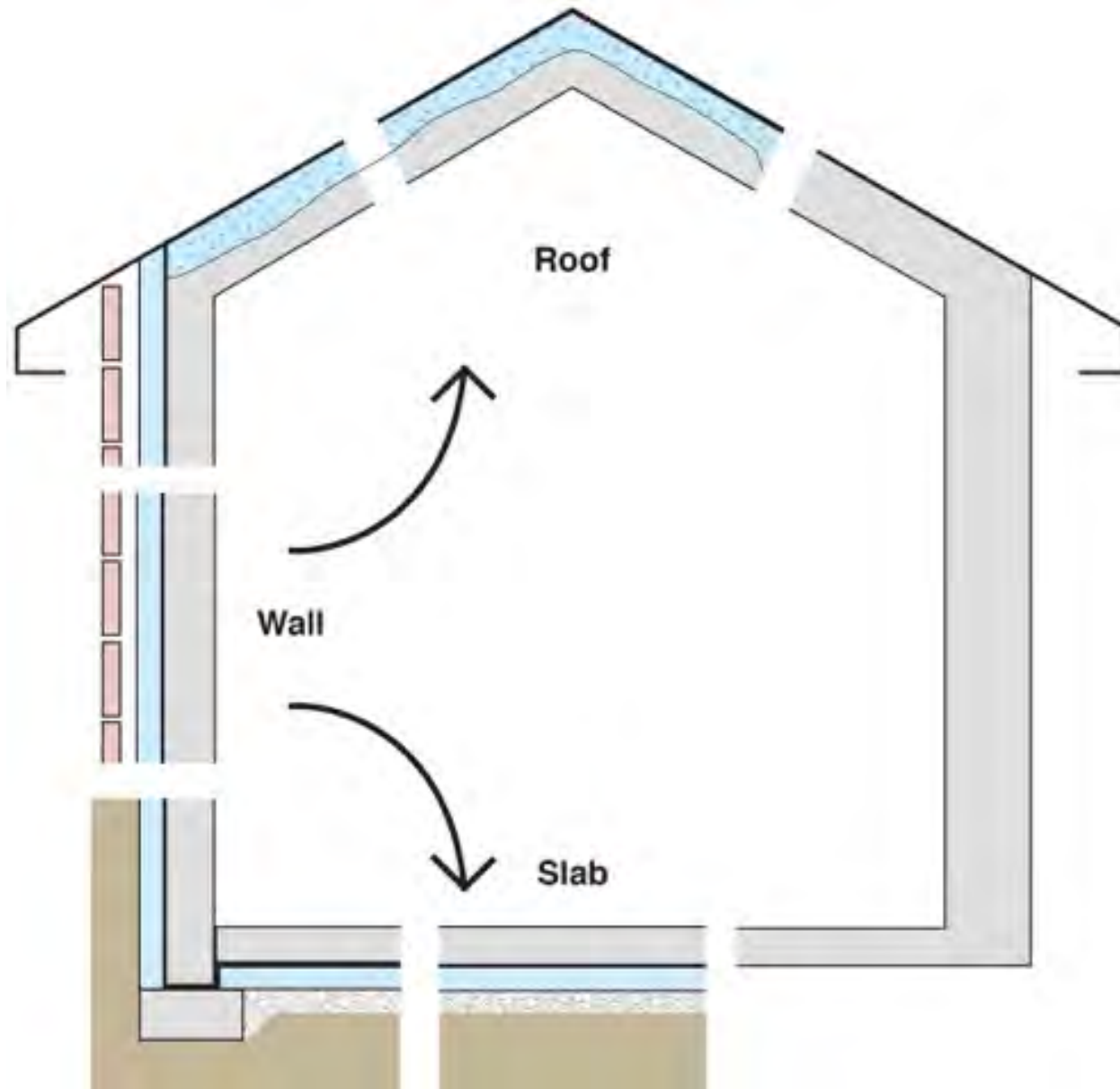




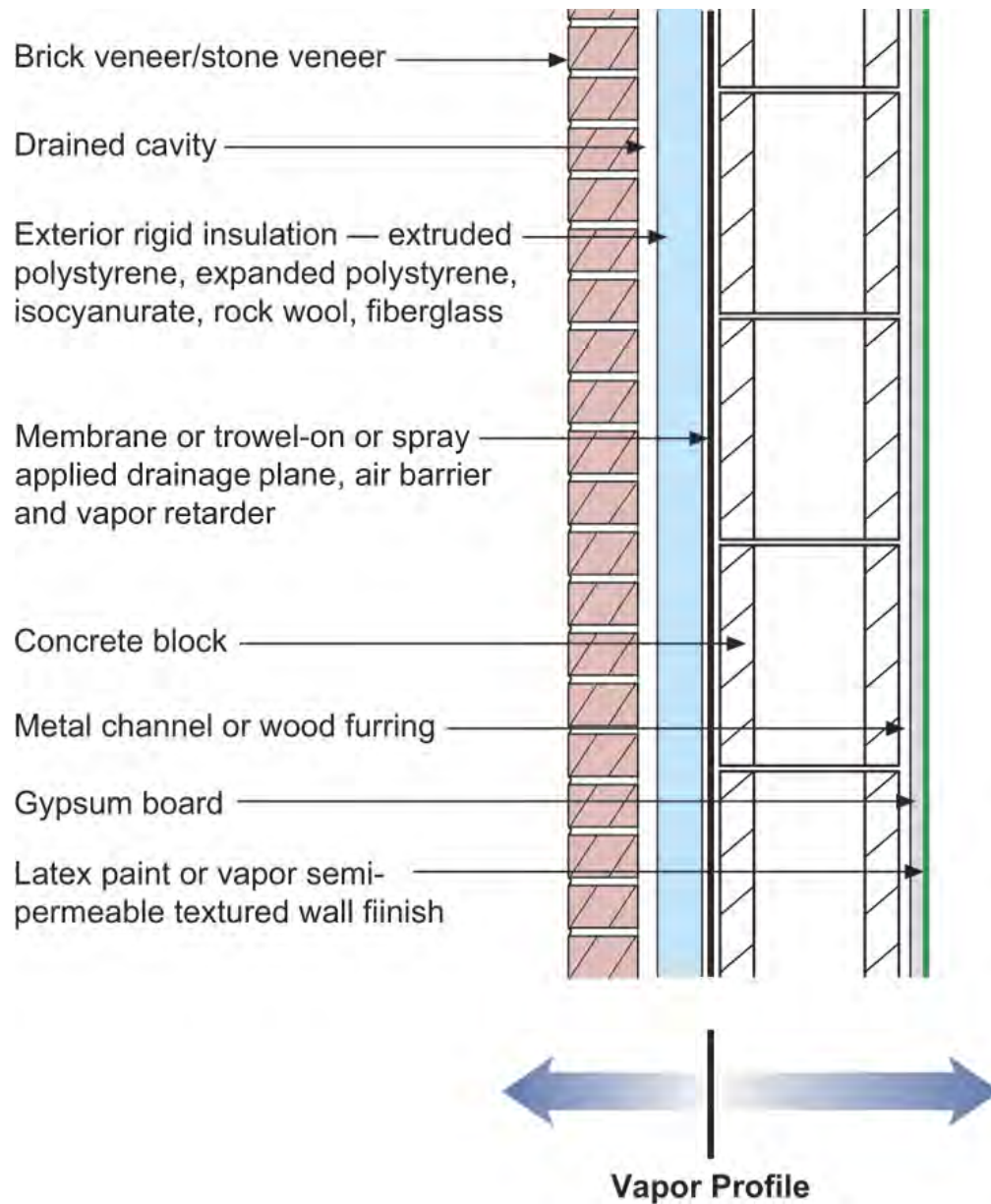


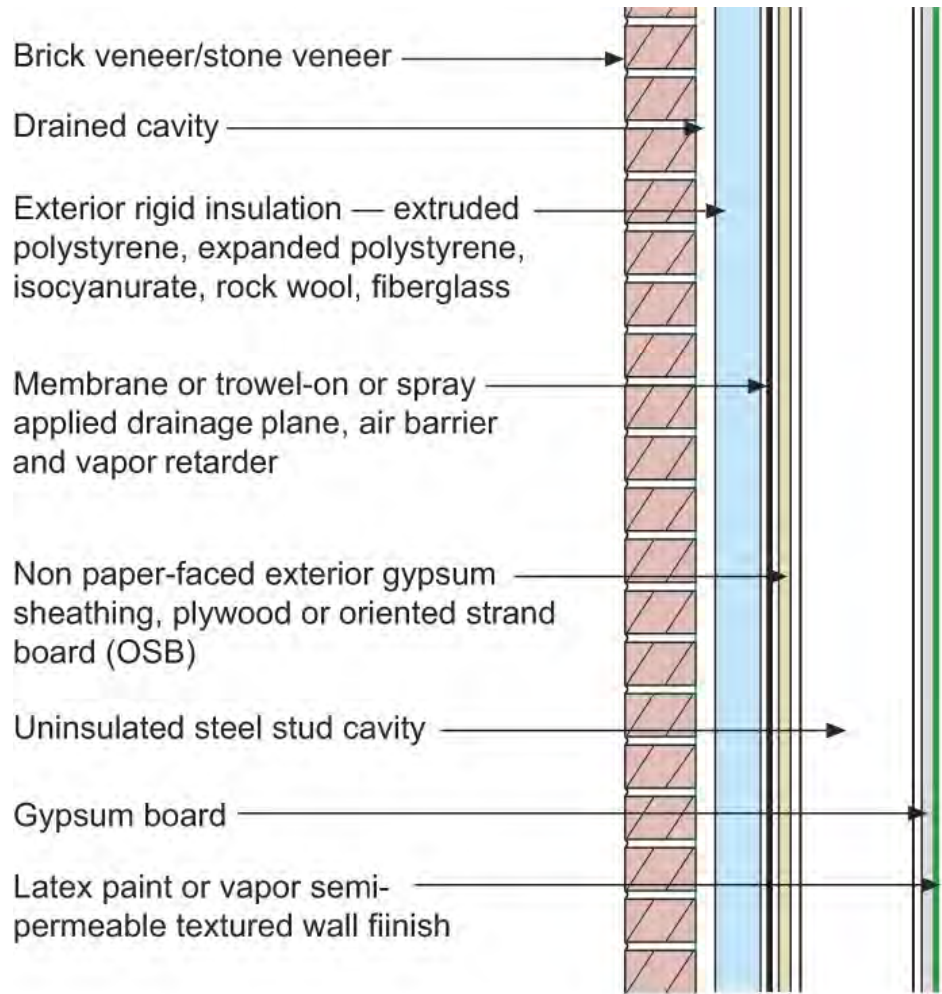


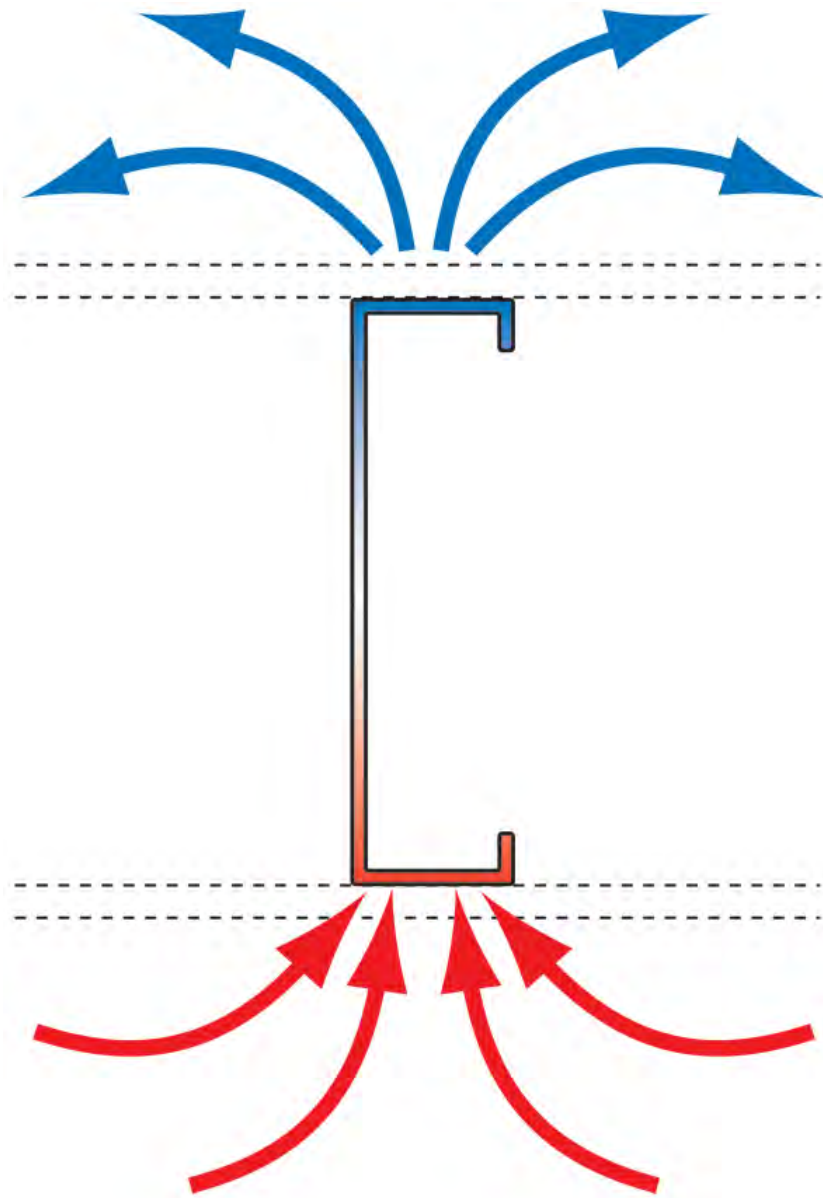




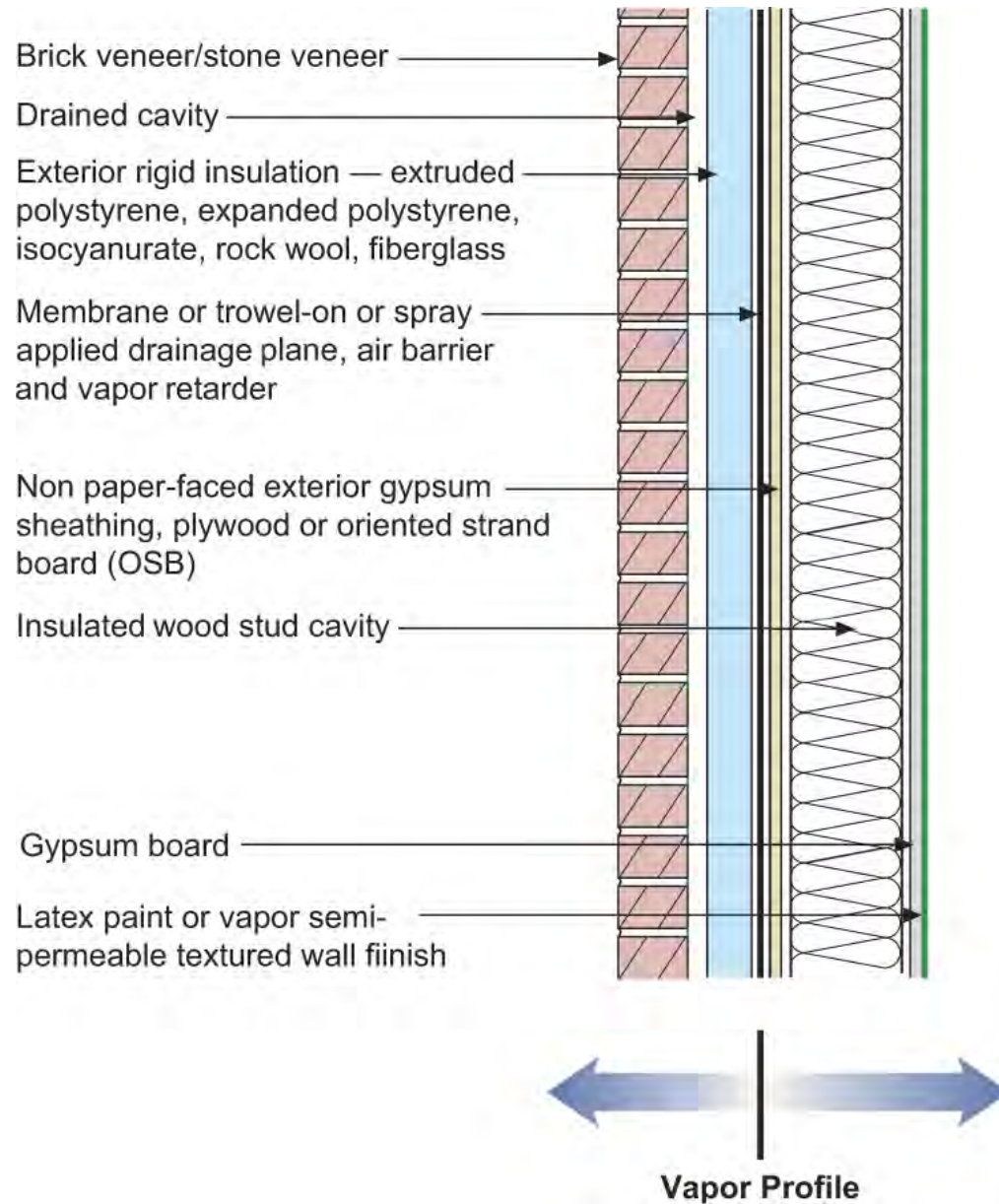
Configurations of the Perfect Wall

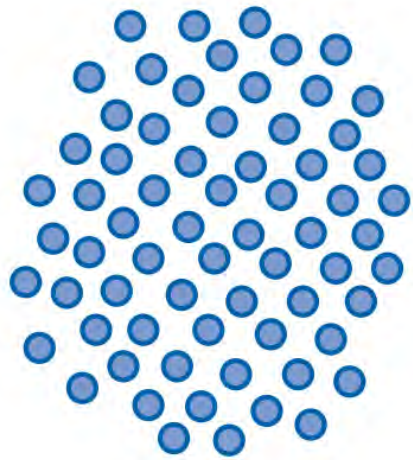












DIFFUSION



**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**

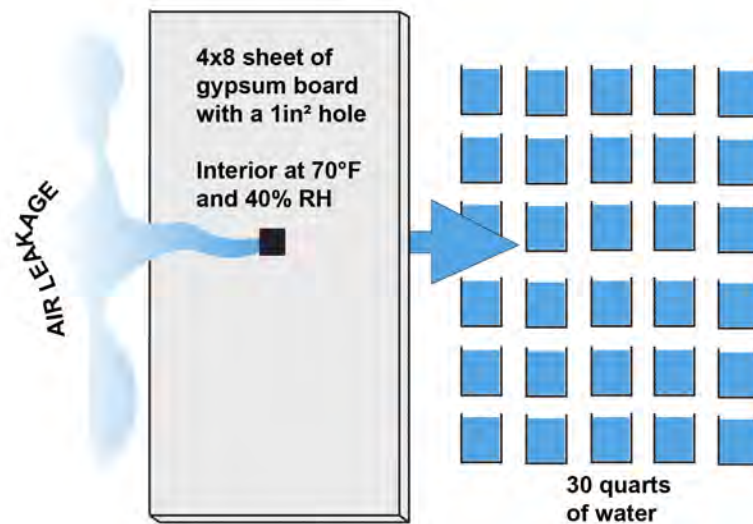
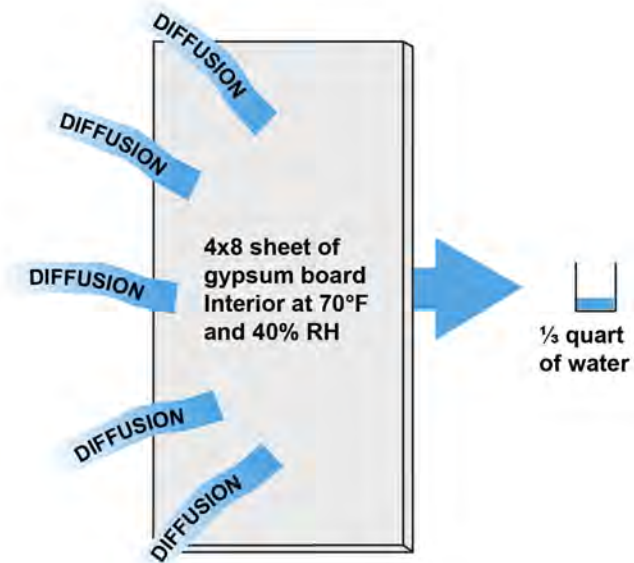


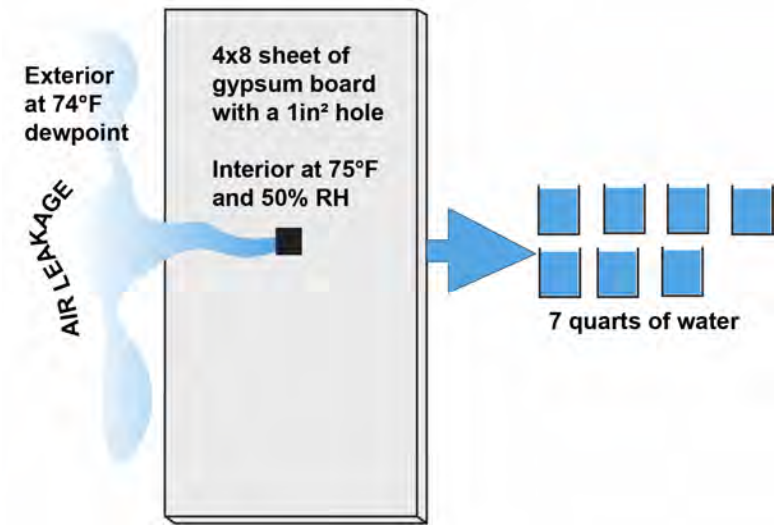
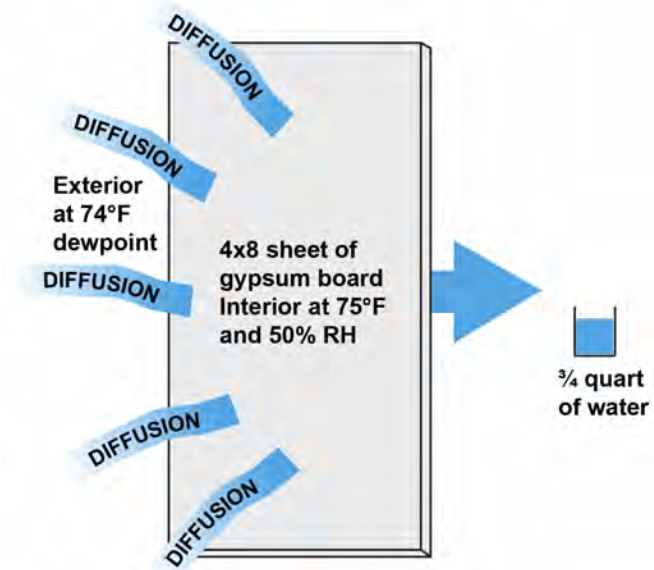
AIR TRANSPORT



**Higher Air
Pressure**

**Lower Air
Pressure**

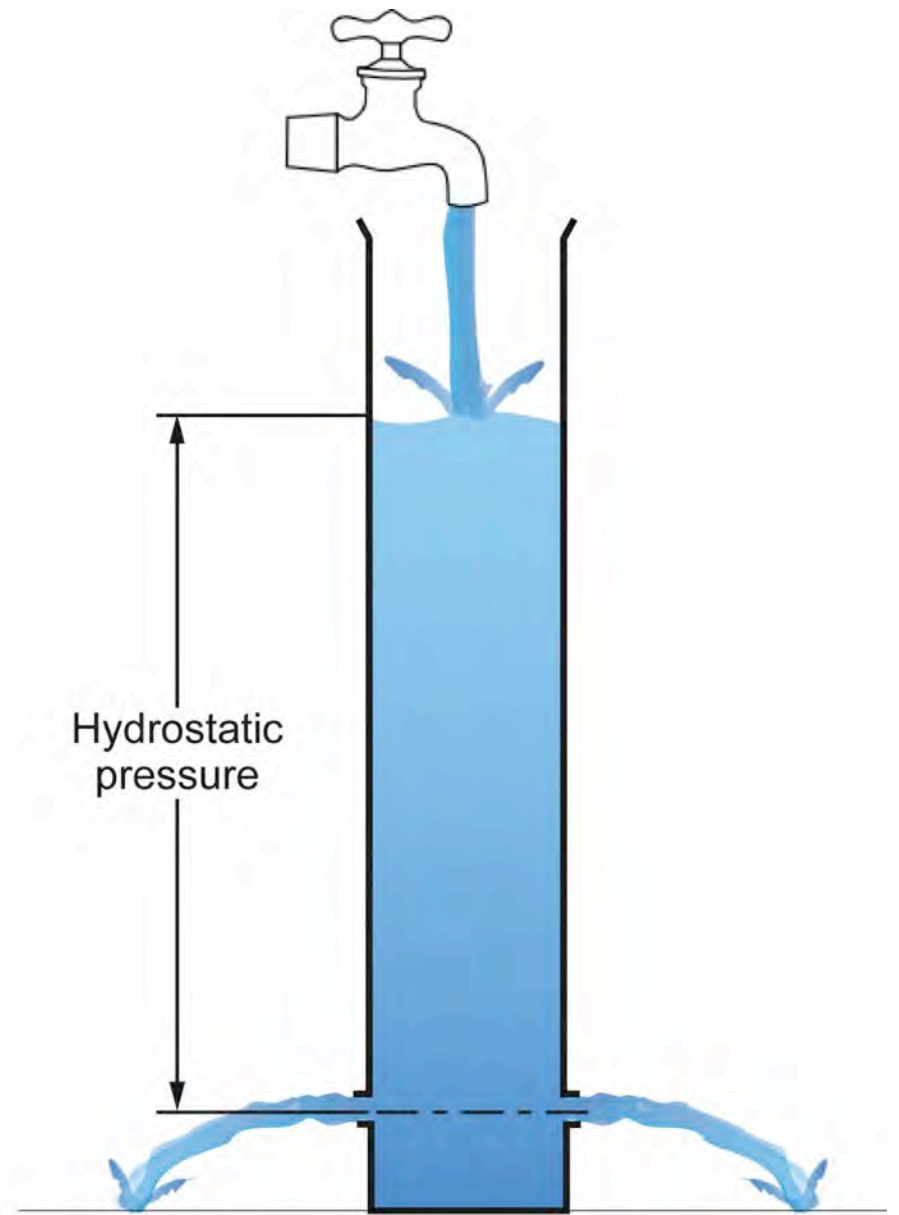
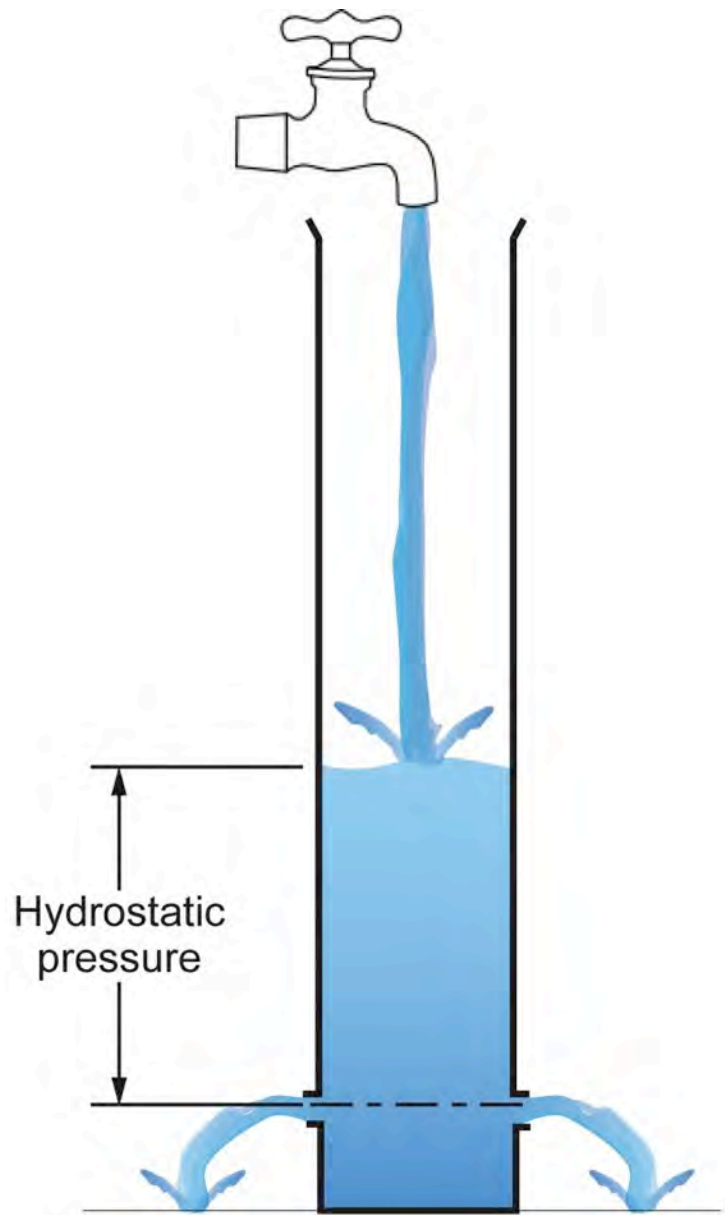




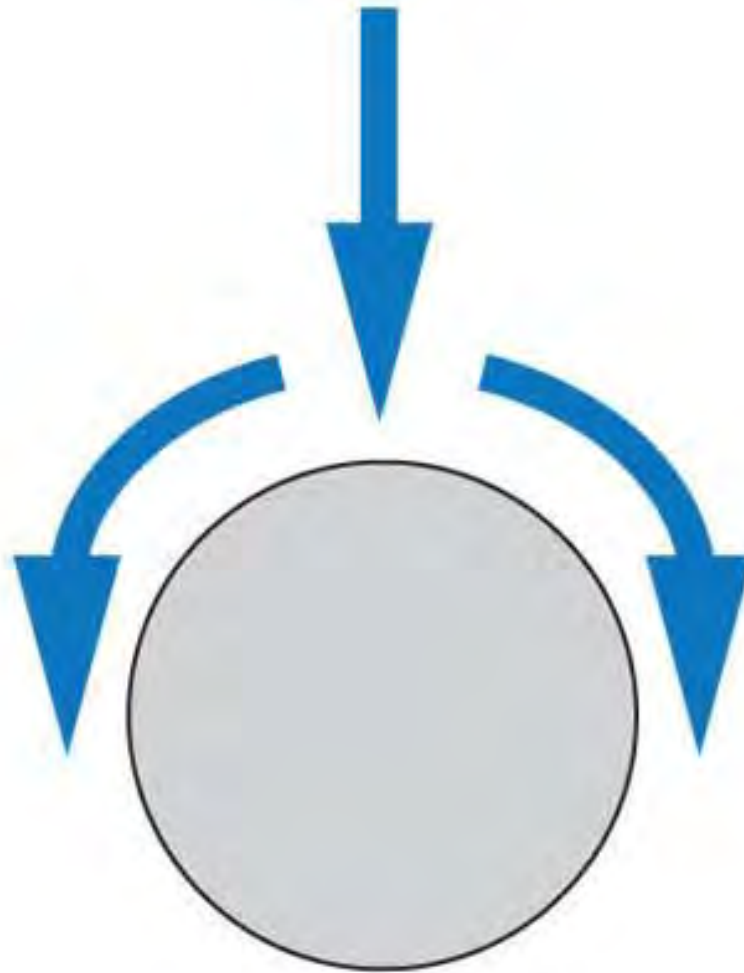
Rain

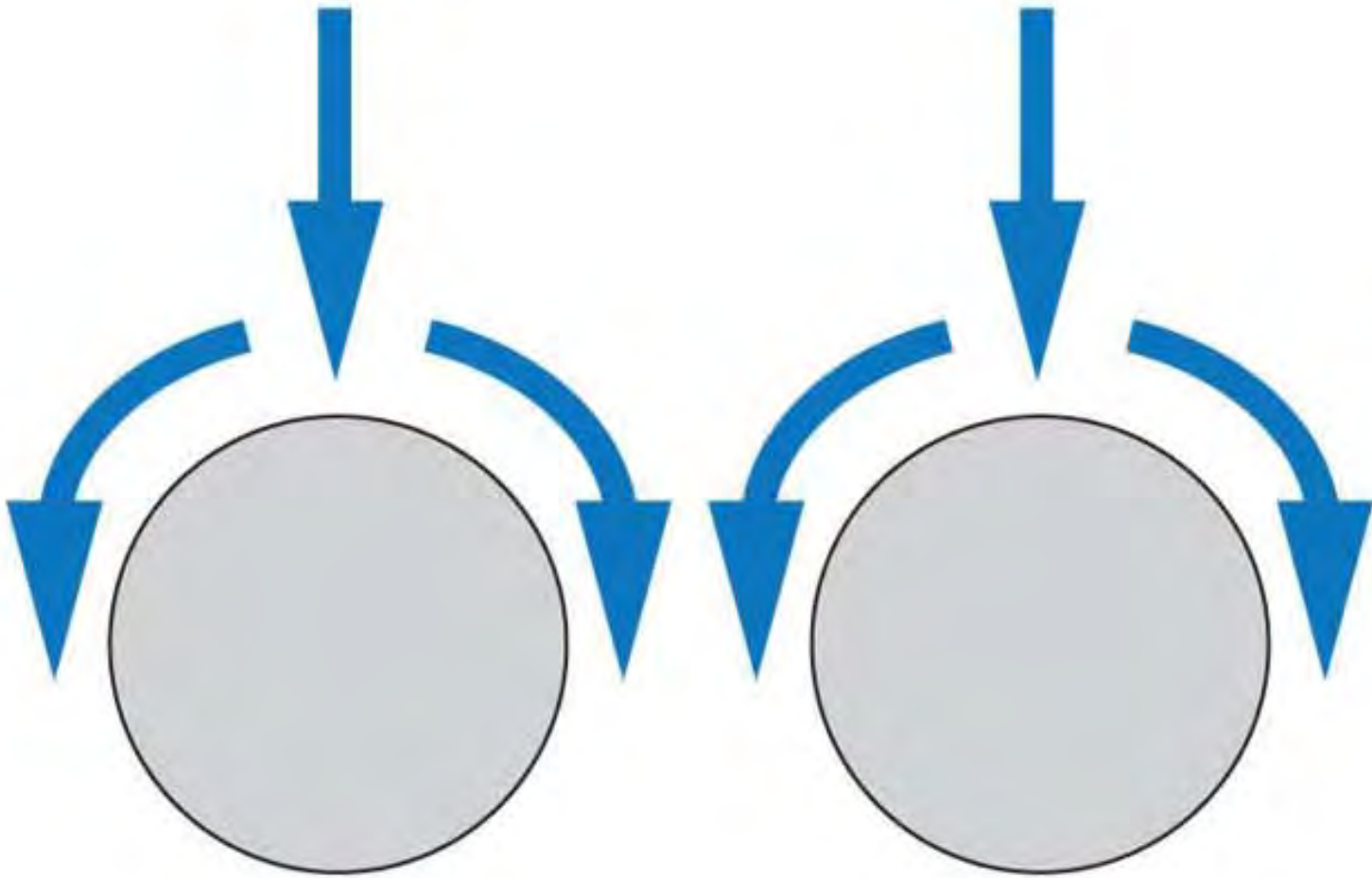


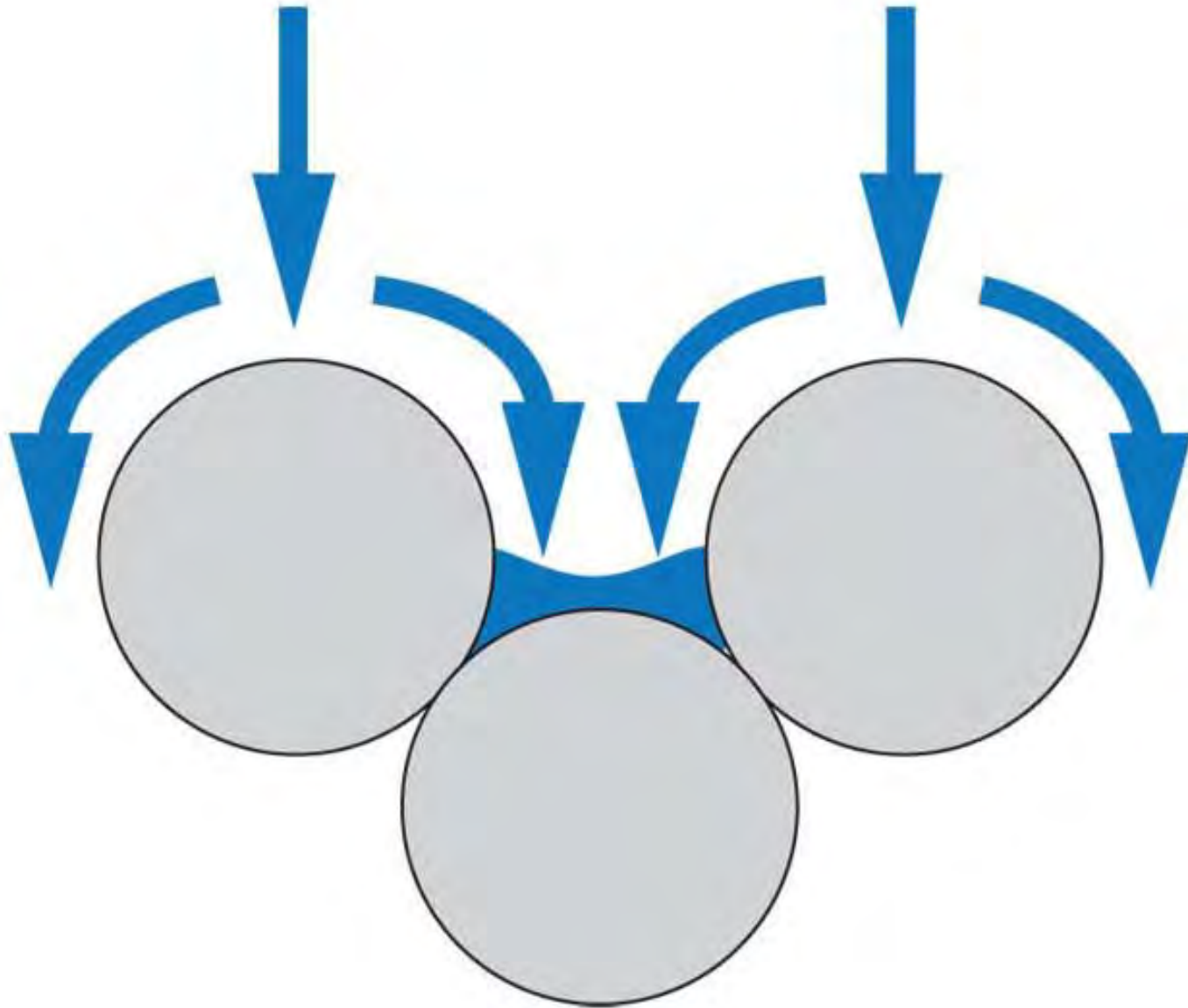




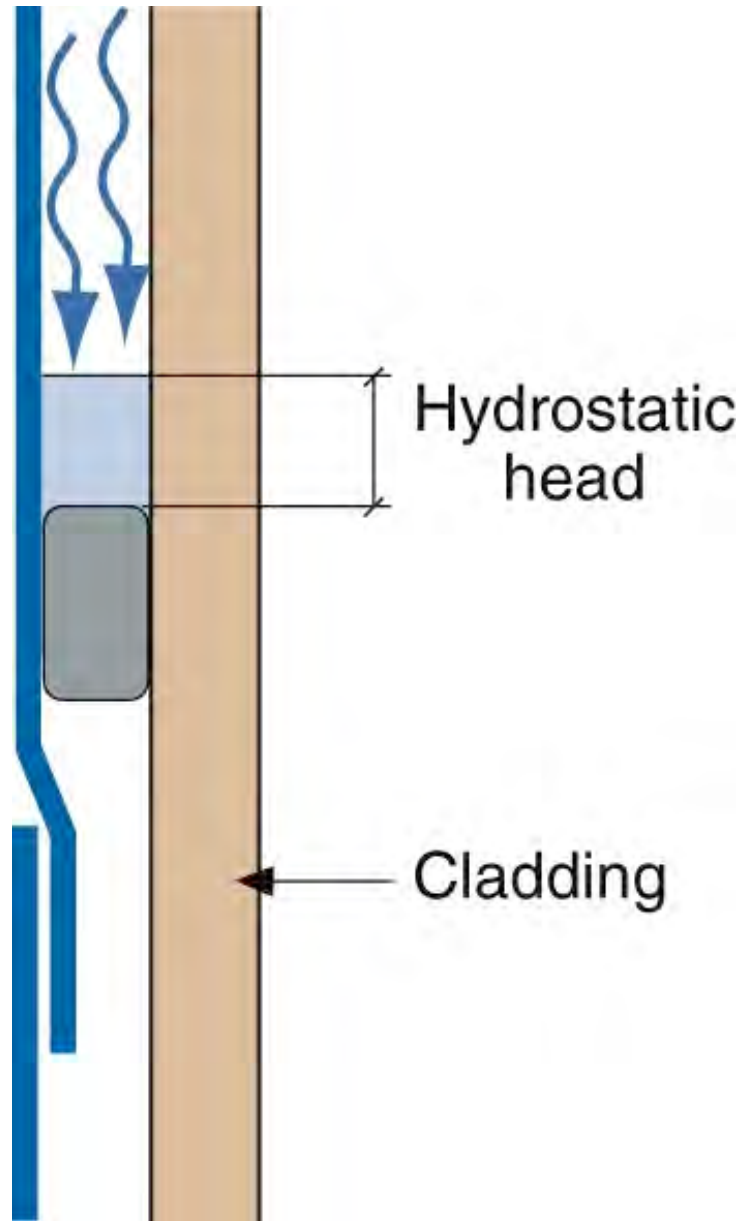


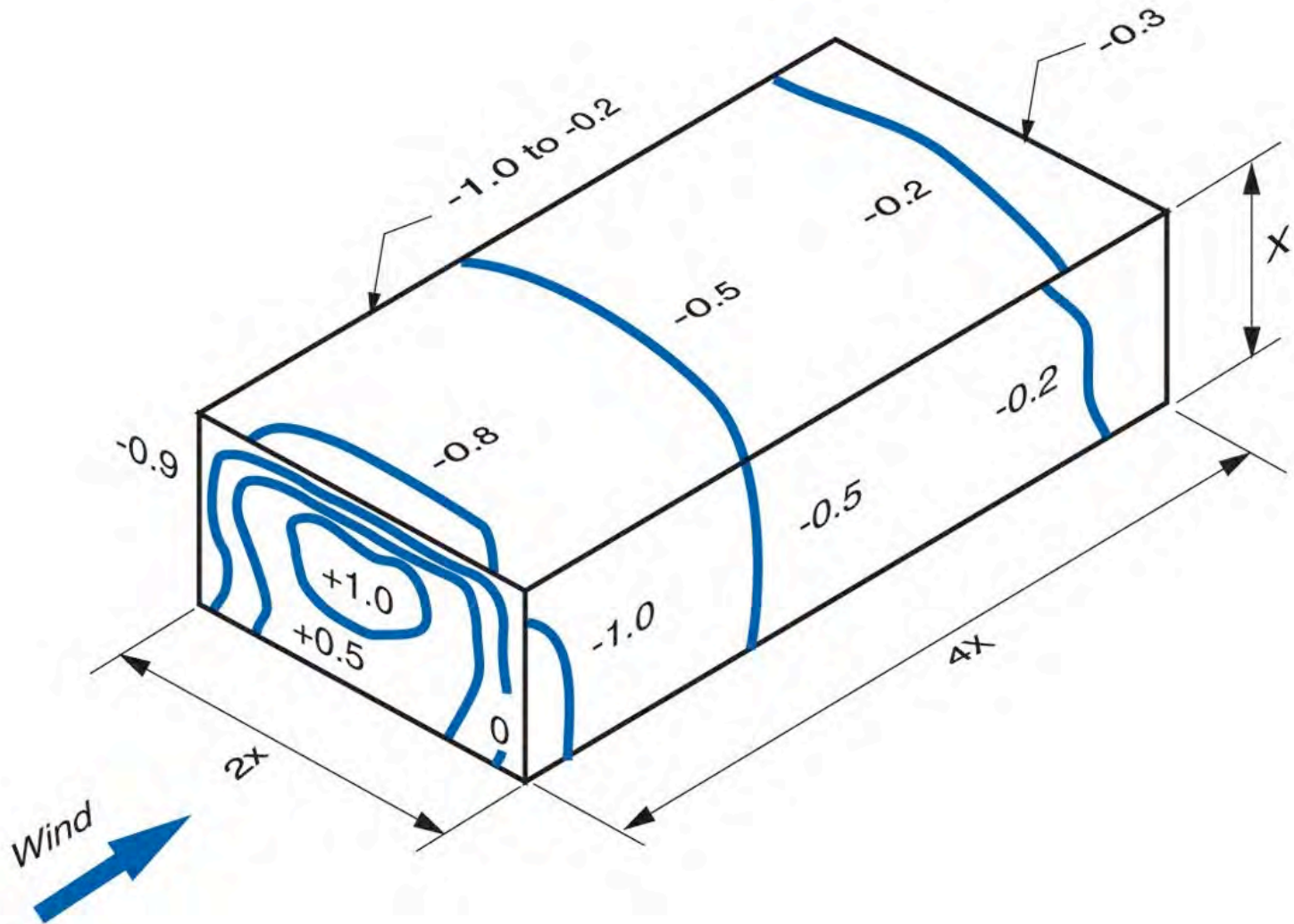








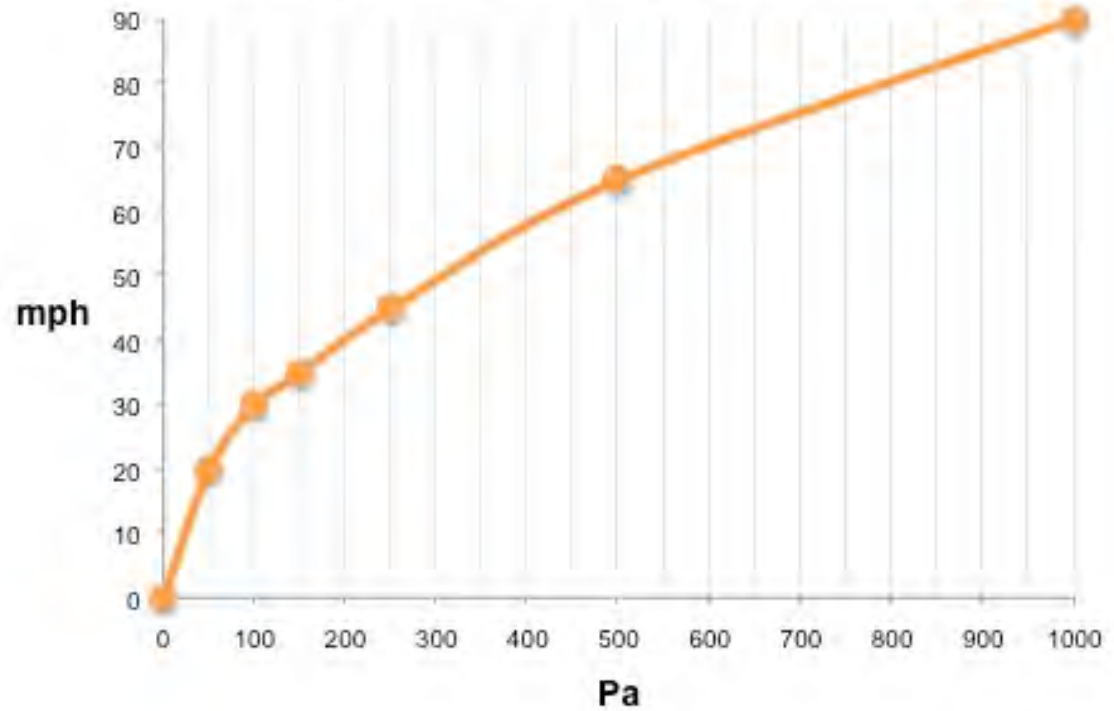




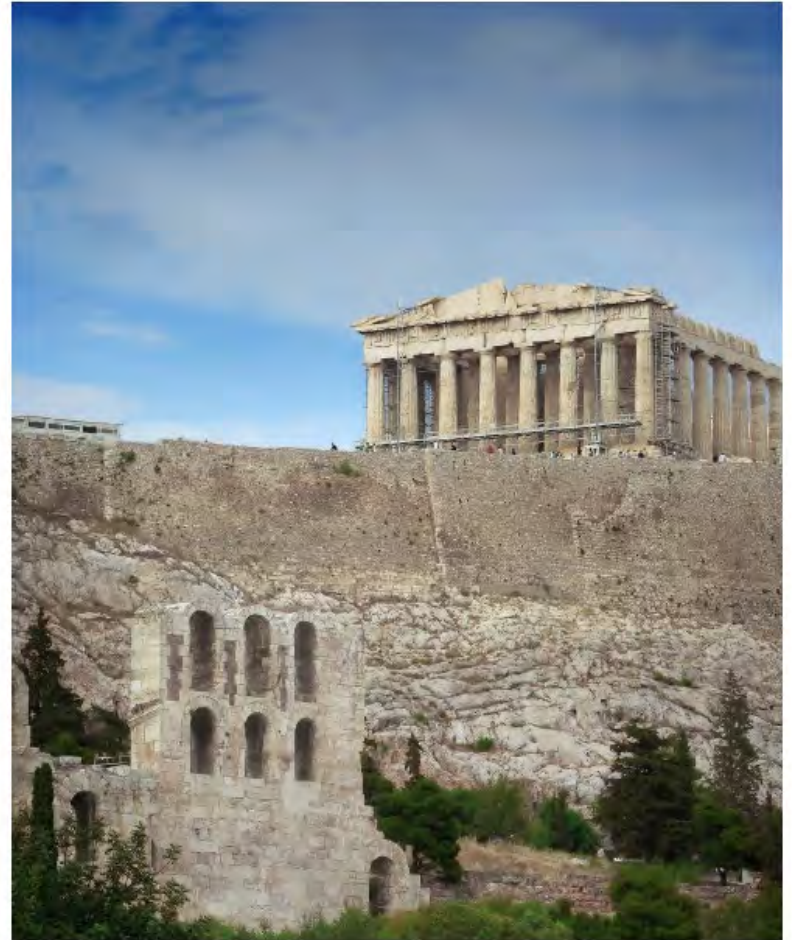
Pascals mph

50 Pa =	20 mph
100 Pa =	30 mph
150 Pa =	35 mph
250 Pa =	45 mph
500 Pa =	65 mph
1,000 Pa =	90 mph

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















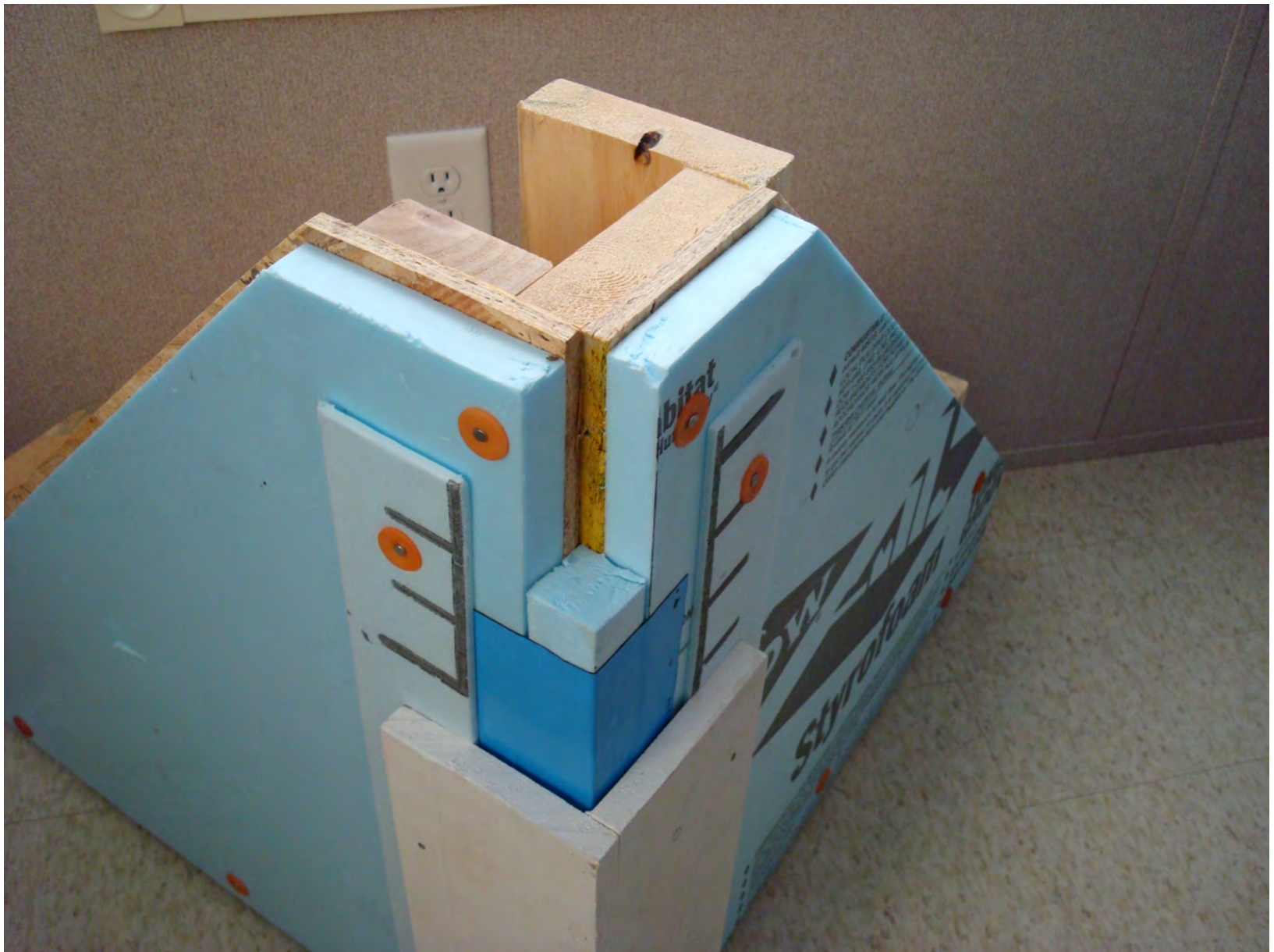
LOWER N-2

MEETS: CAN 2-31.72
U.S. 2008 2008
210 1-800-463-0073

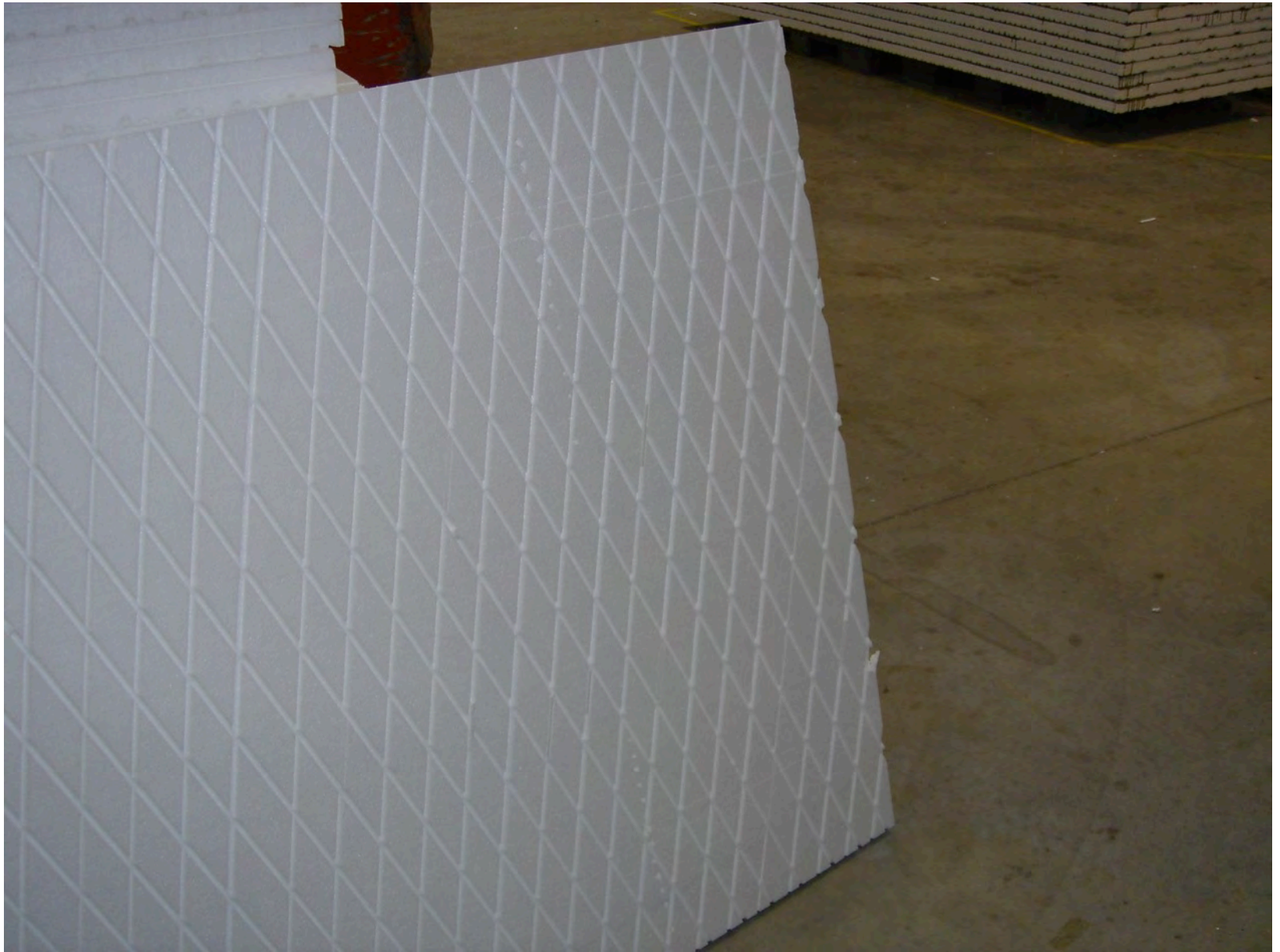




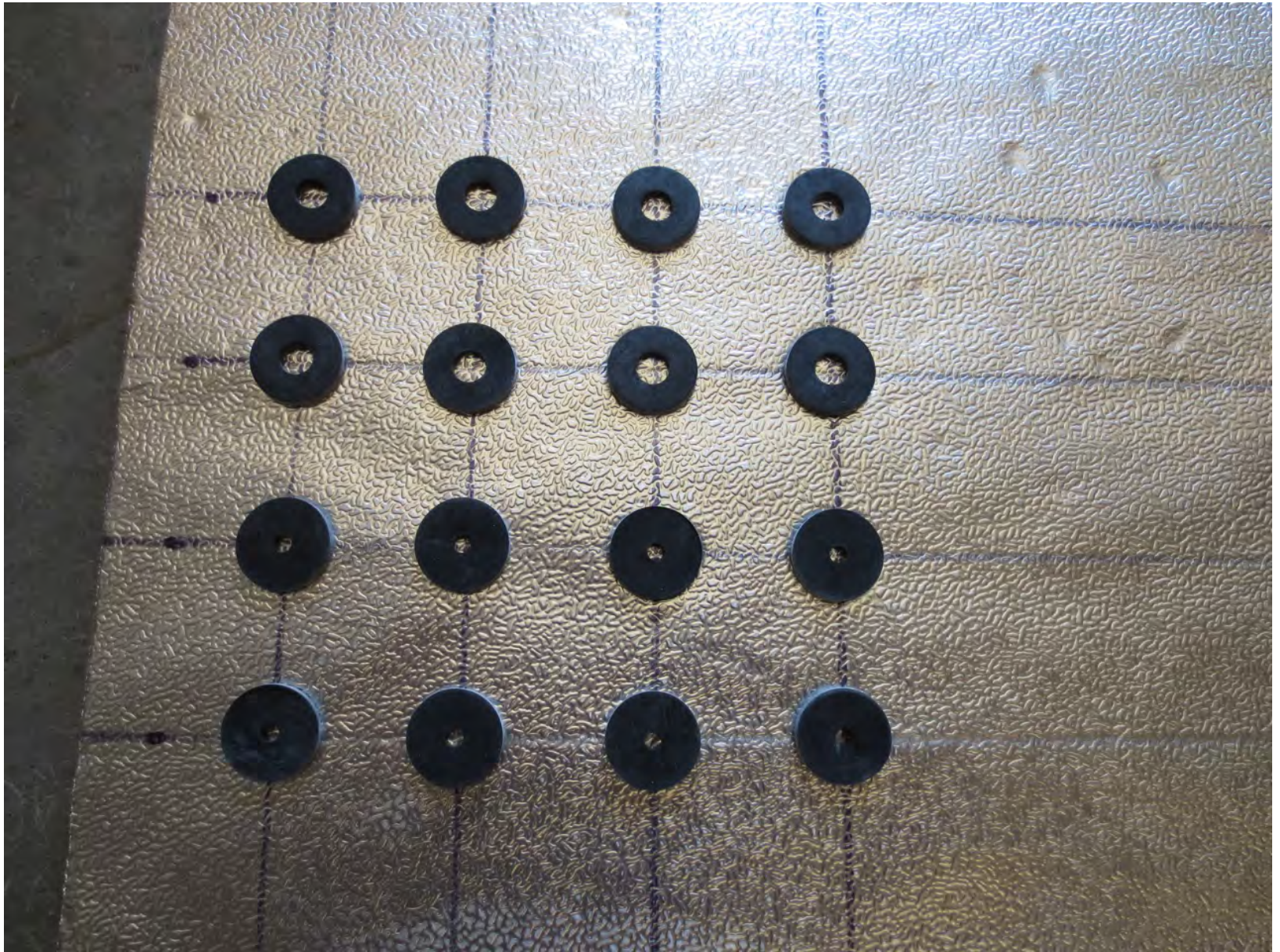




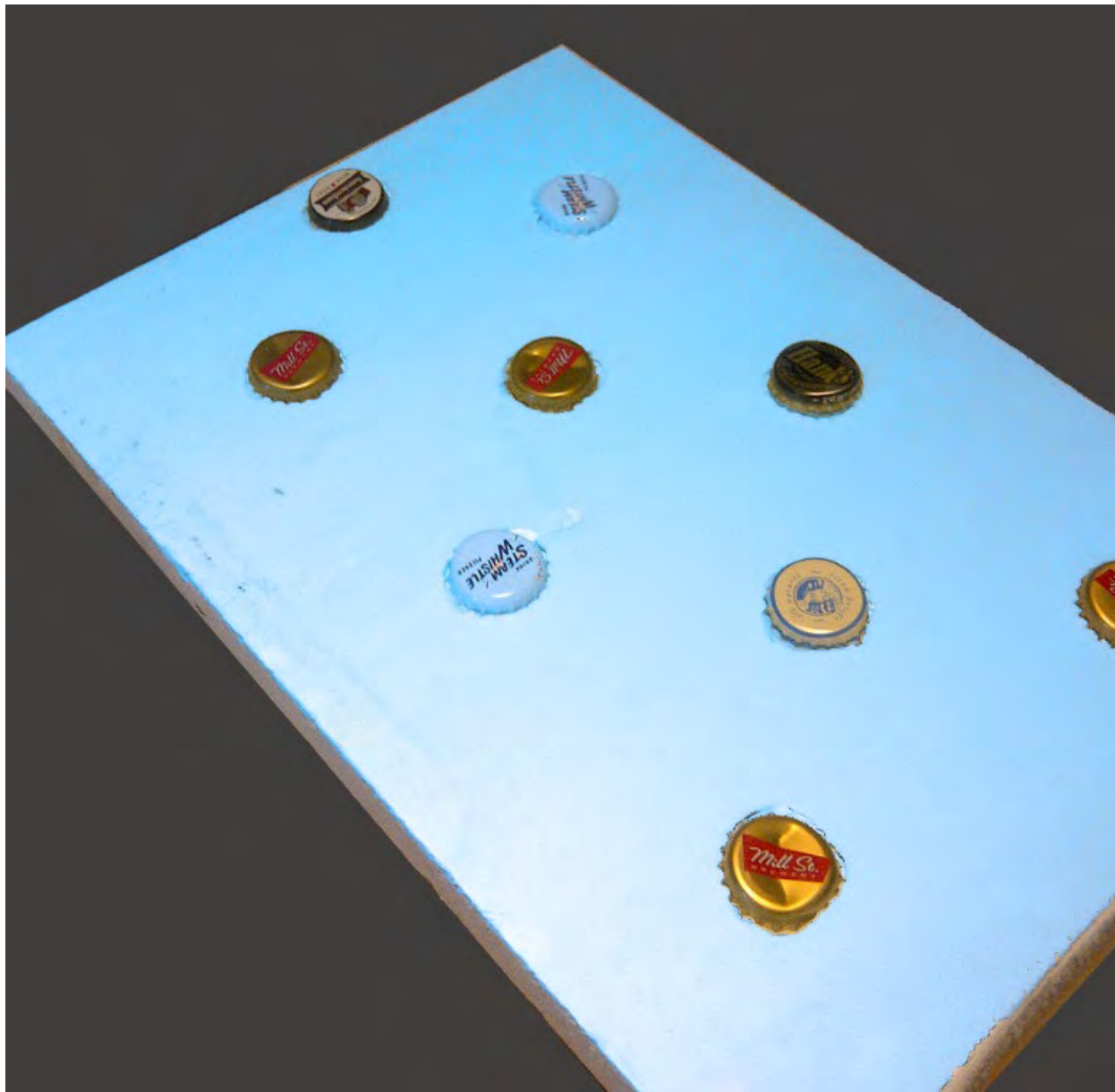




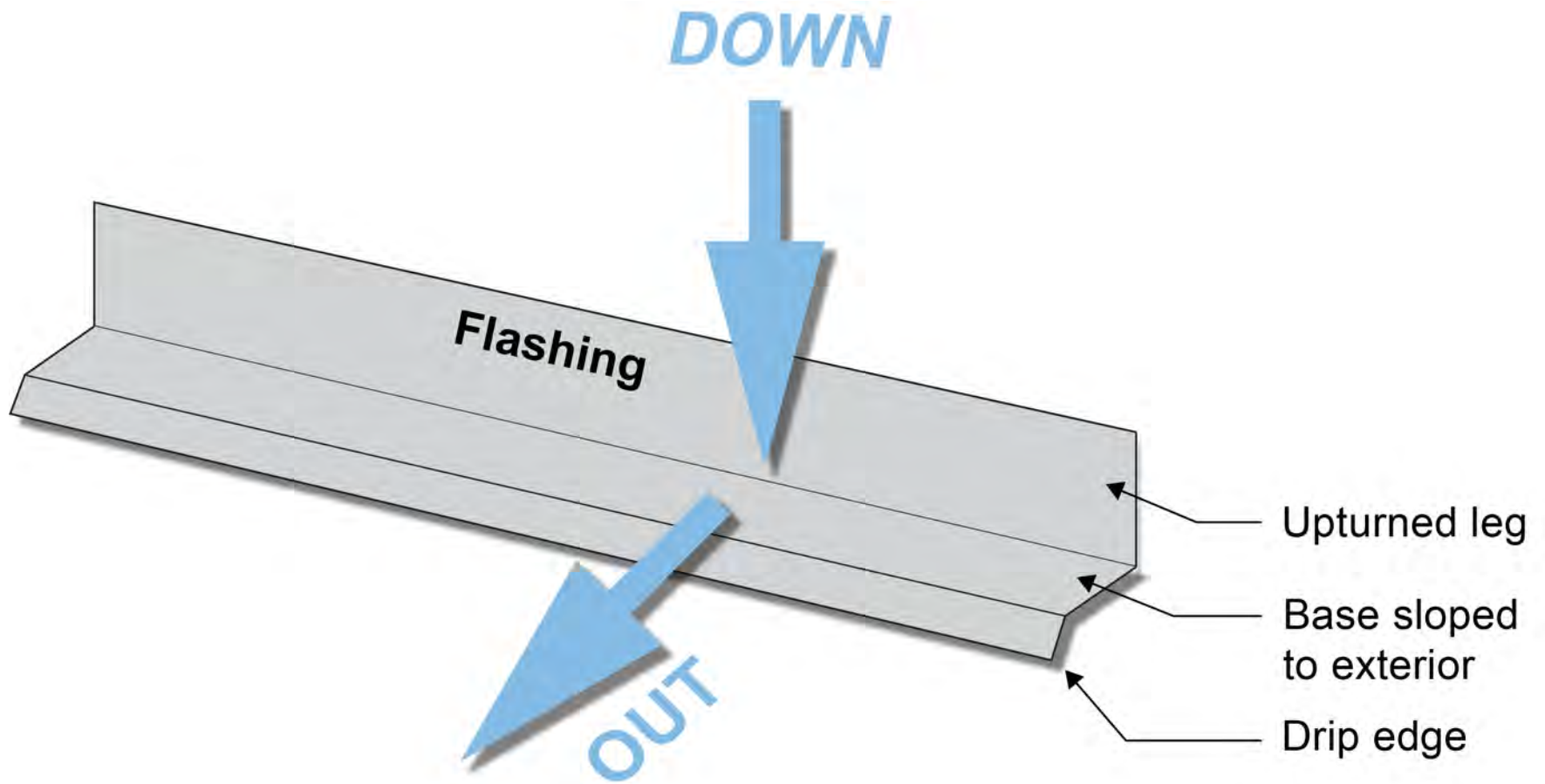
Rain Screen

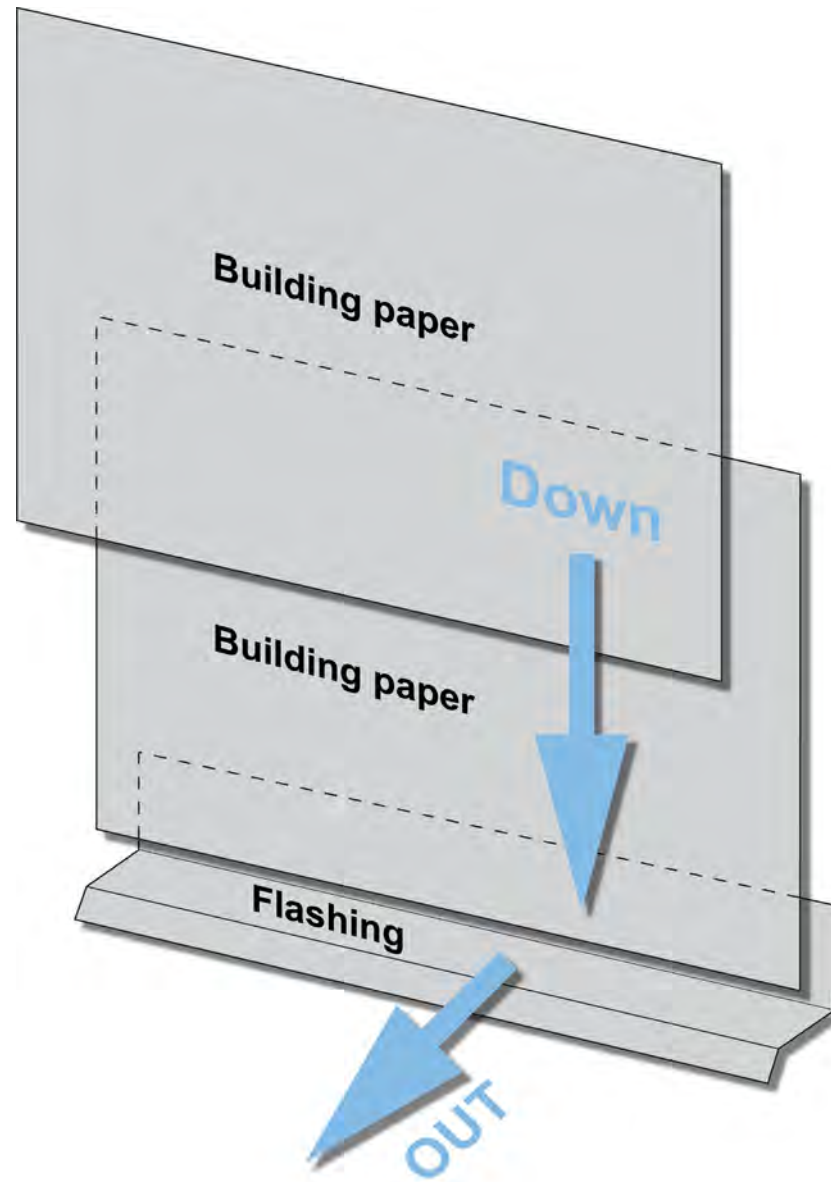


Beer Screen?

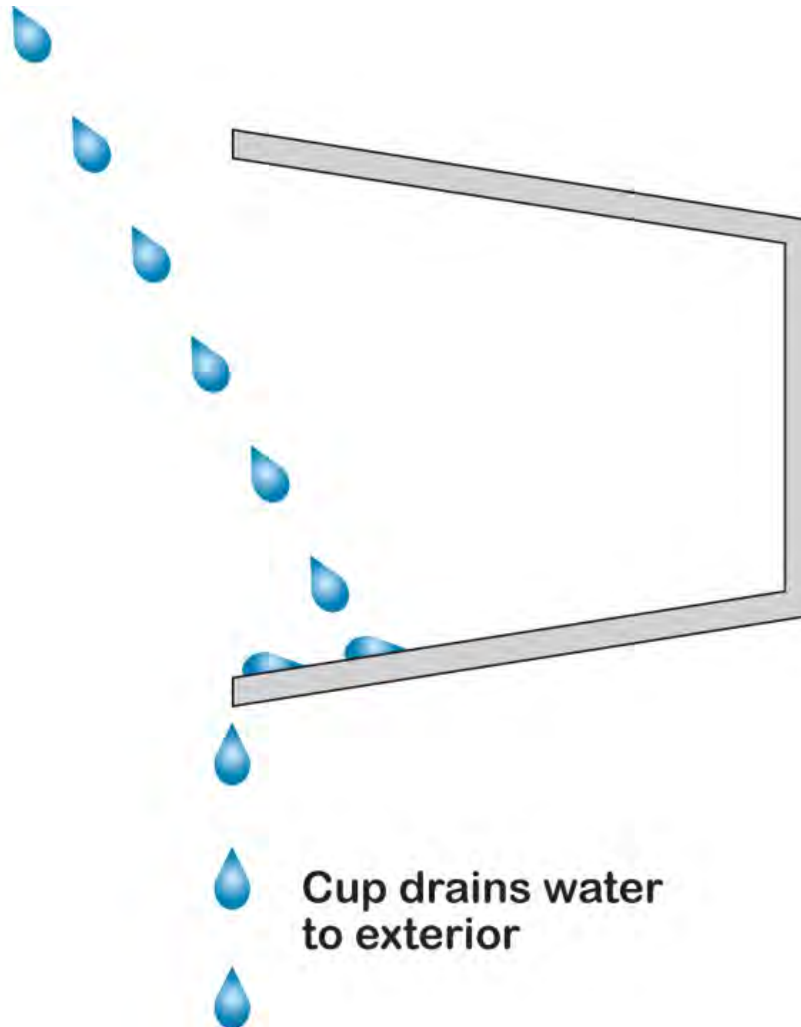


Drain the Rain on the Plane
If You Want to Save Cash...Flash
Don't Be a Dope...Slope





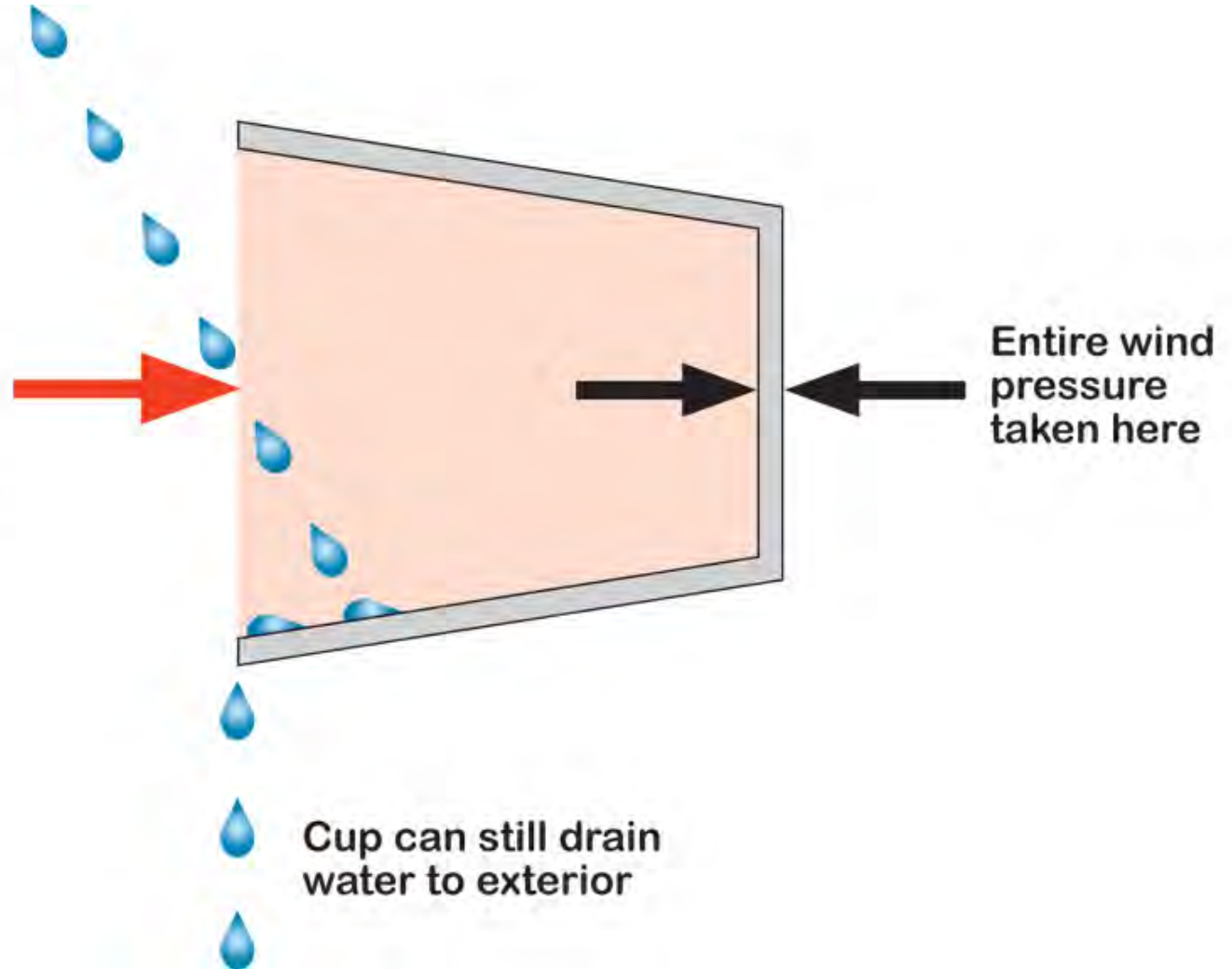
**Rain enters cup
due to momentum
("kinetic energy")**



**Cup drains water
to exterior**

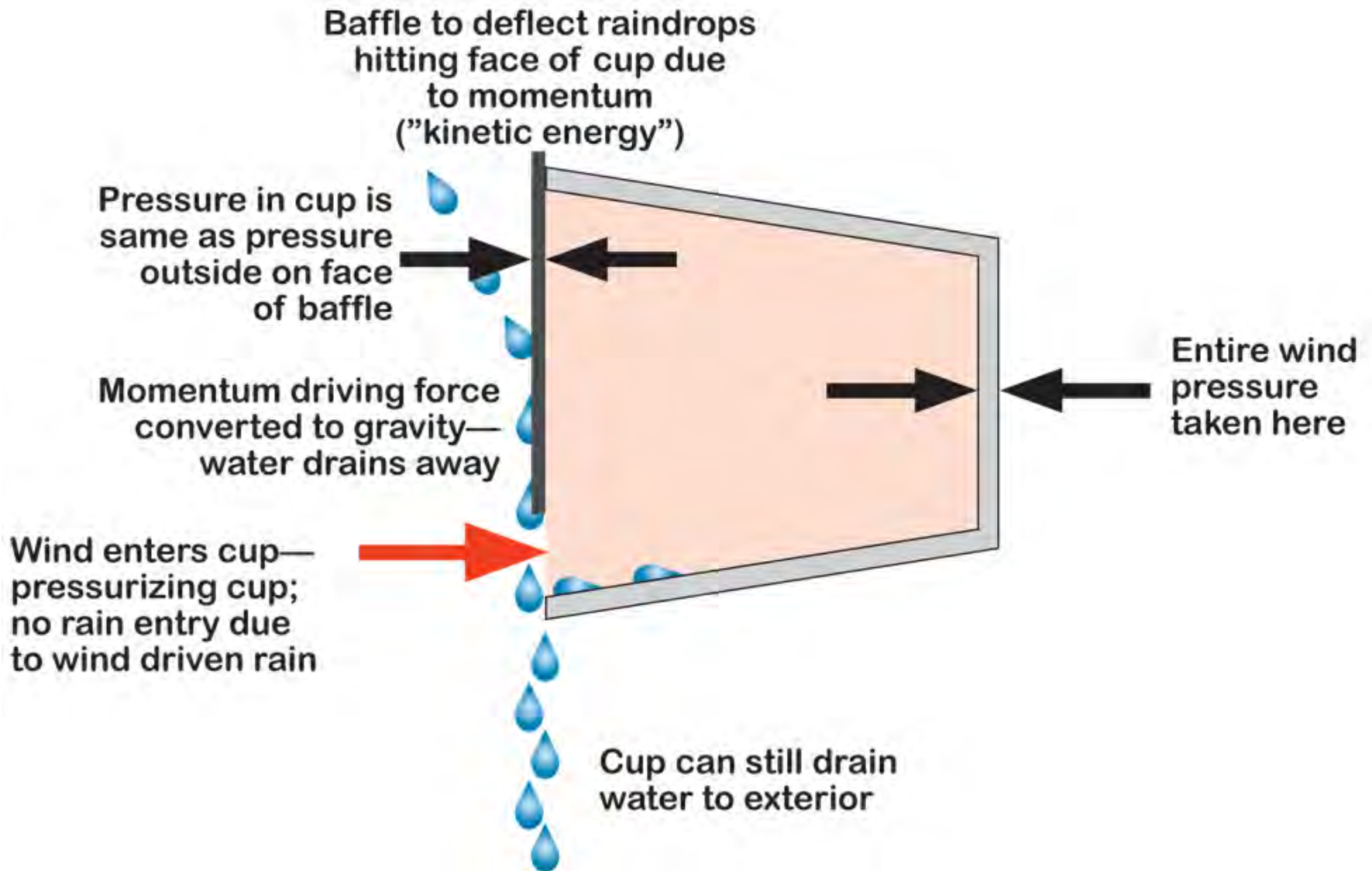
Rain enters cup due to momentum ("kinetic energy")

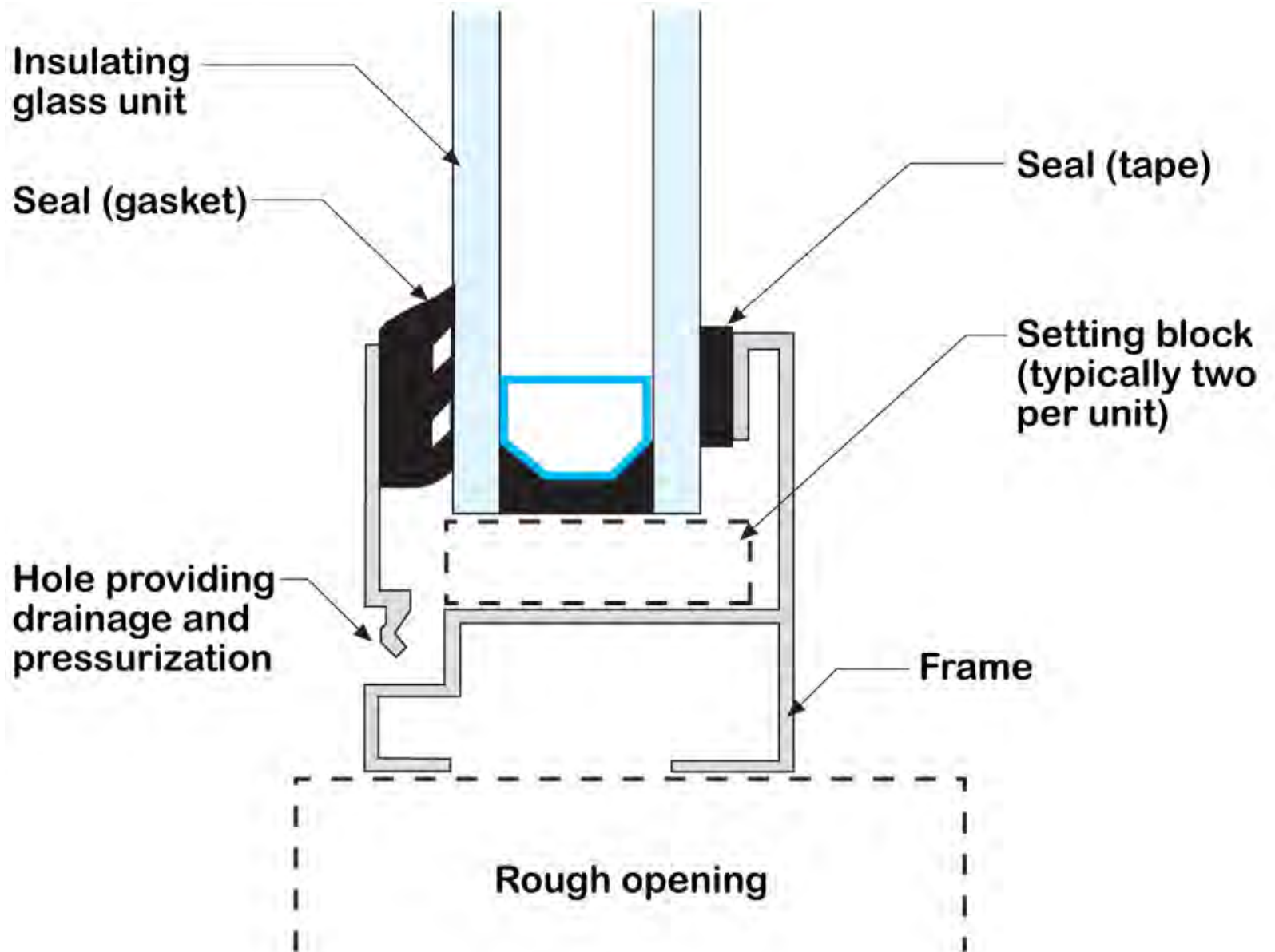
Wind enters cup—pressurizing cup; no rain entry due to wind driven rain

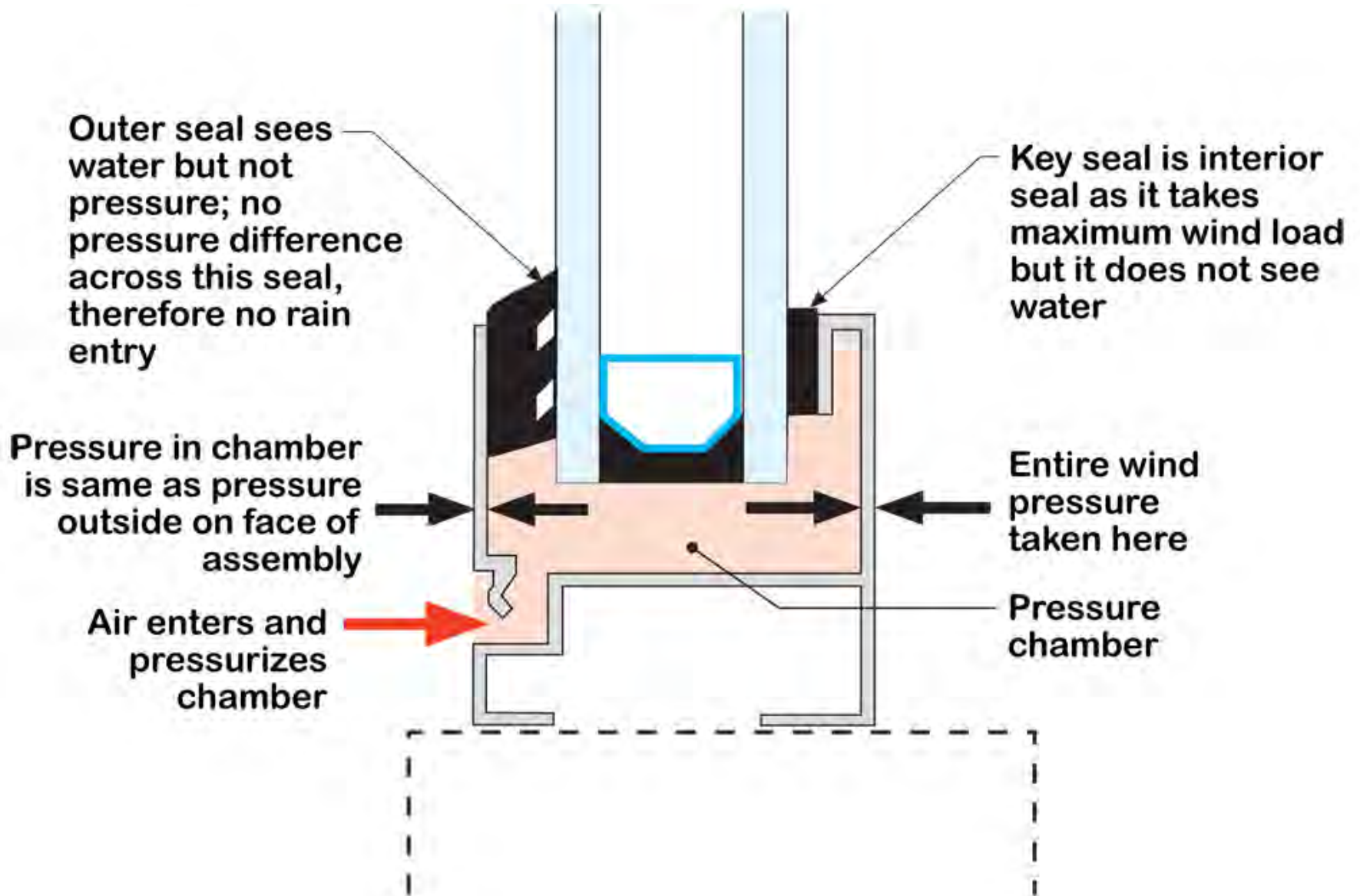


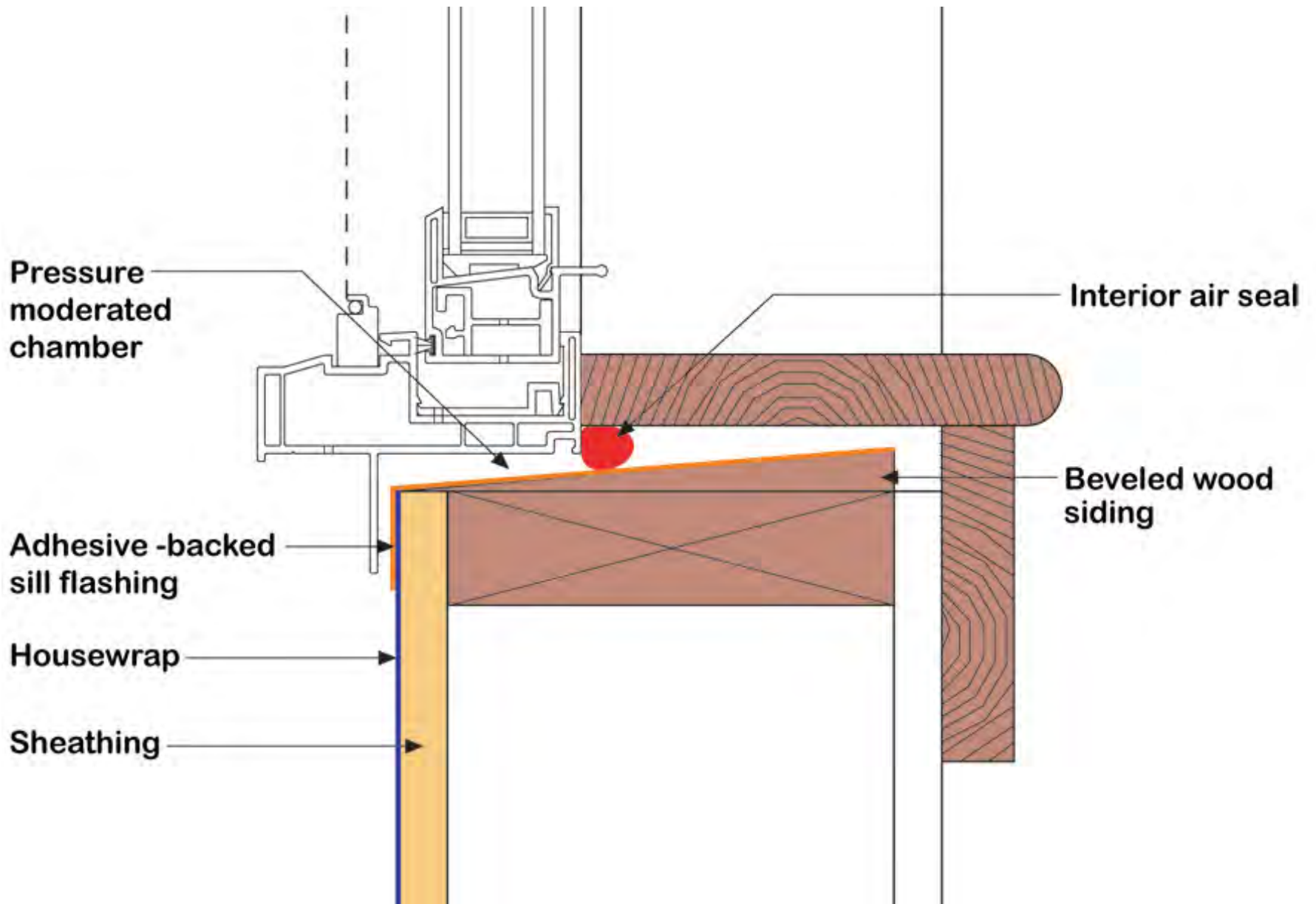
Entire wind pressure taken here

Cup can still drain water to exterior







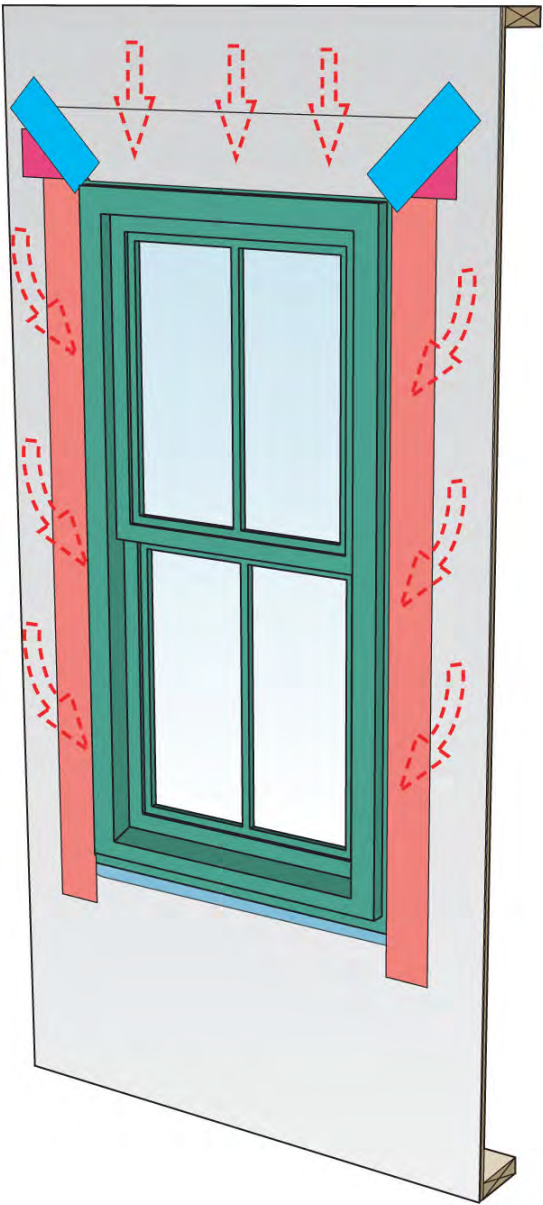


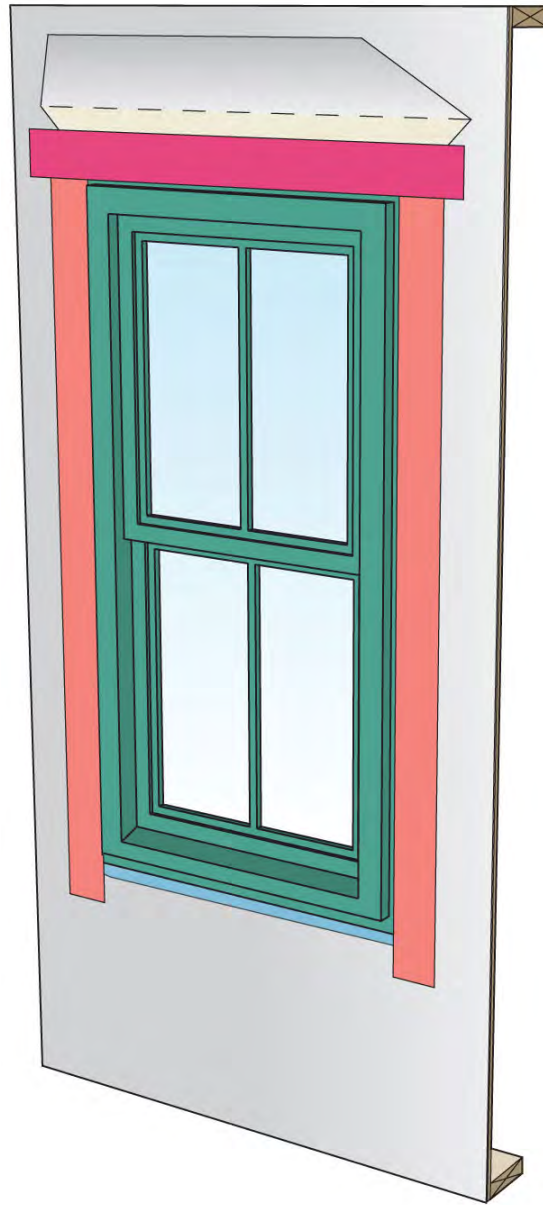




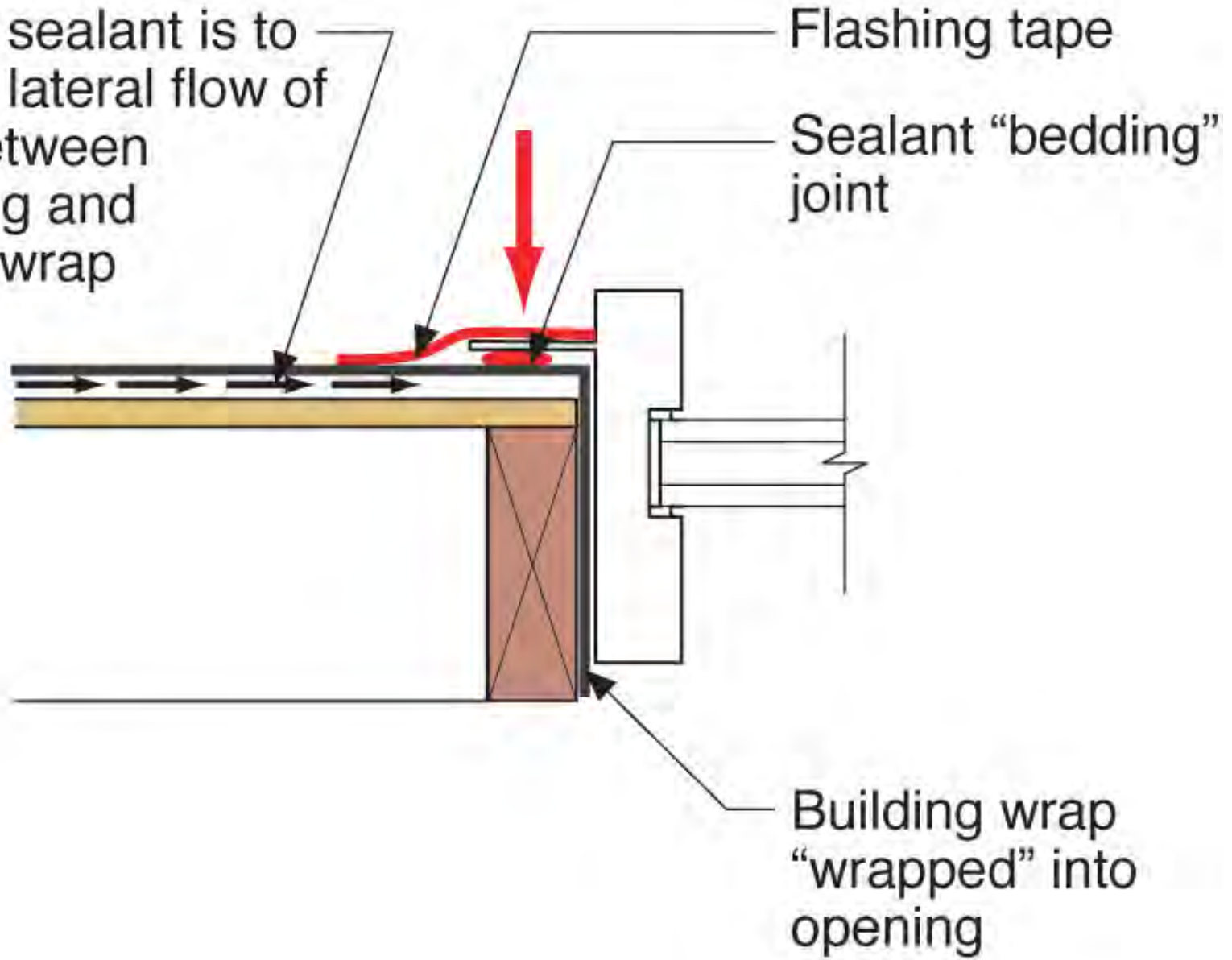


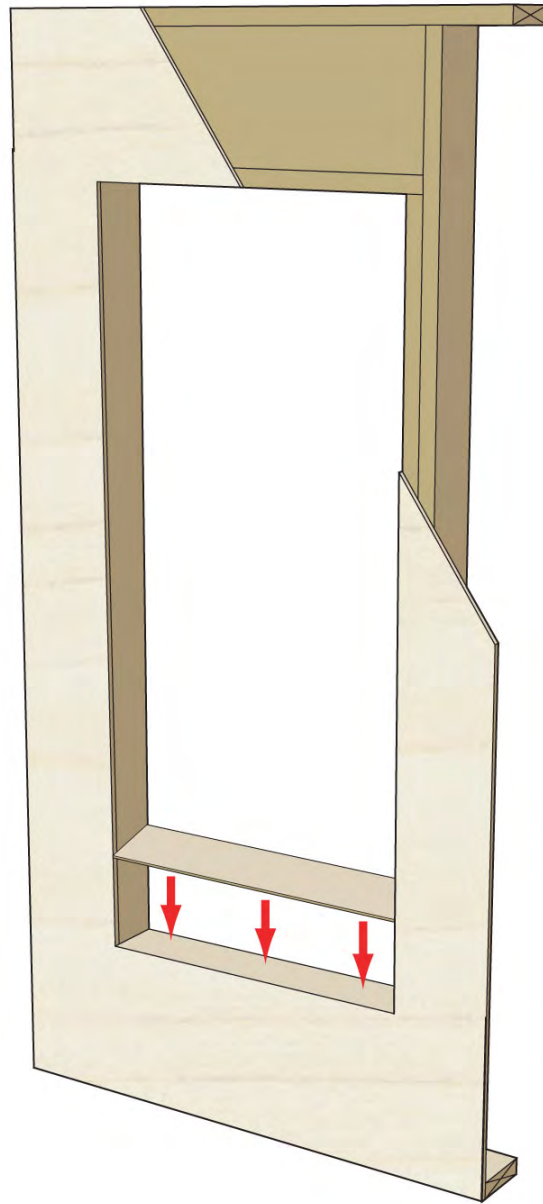


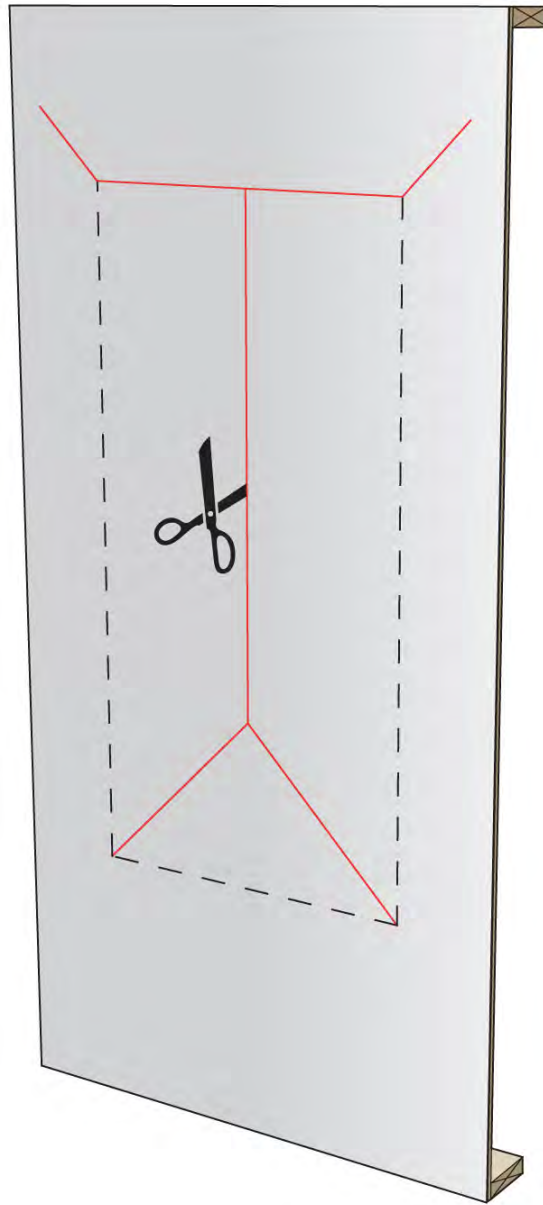


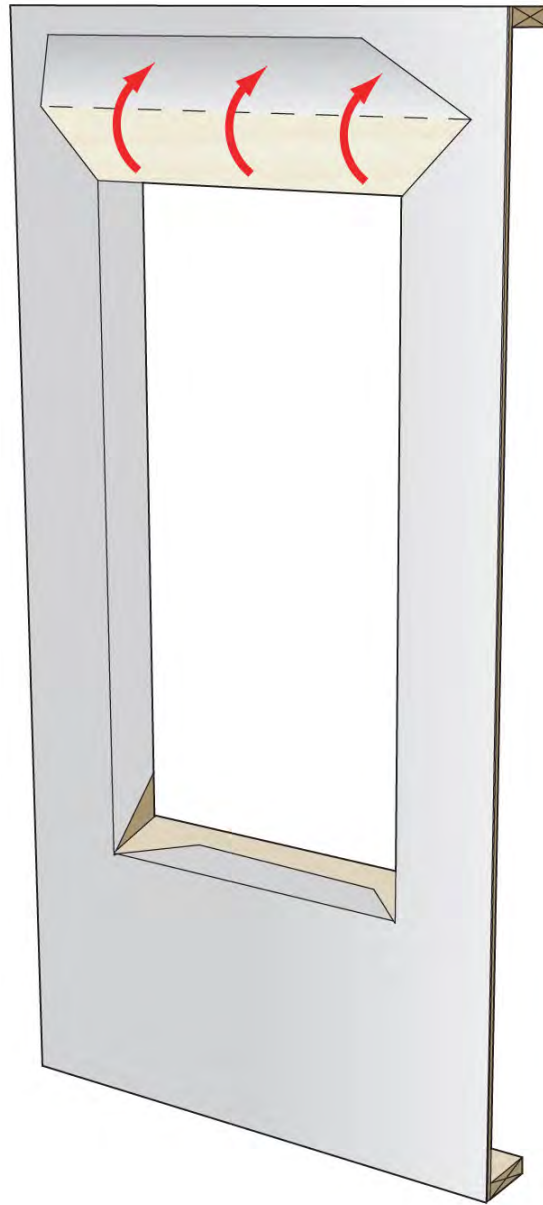


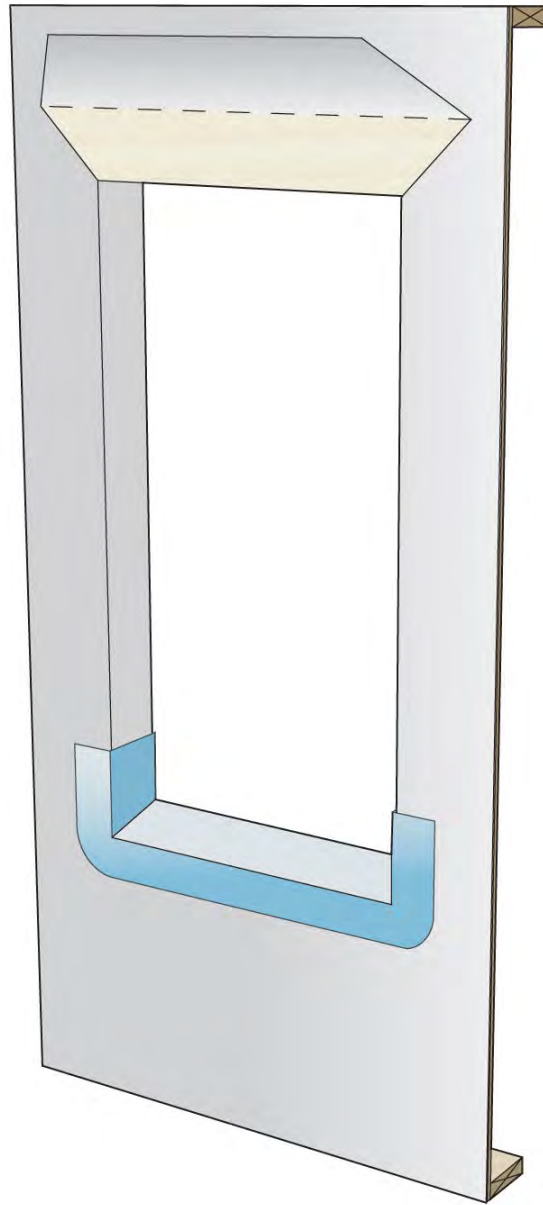
Intent of sealant is to limit this lateral flow of water between sheathing and building wrap

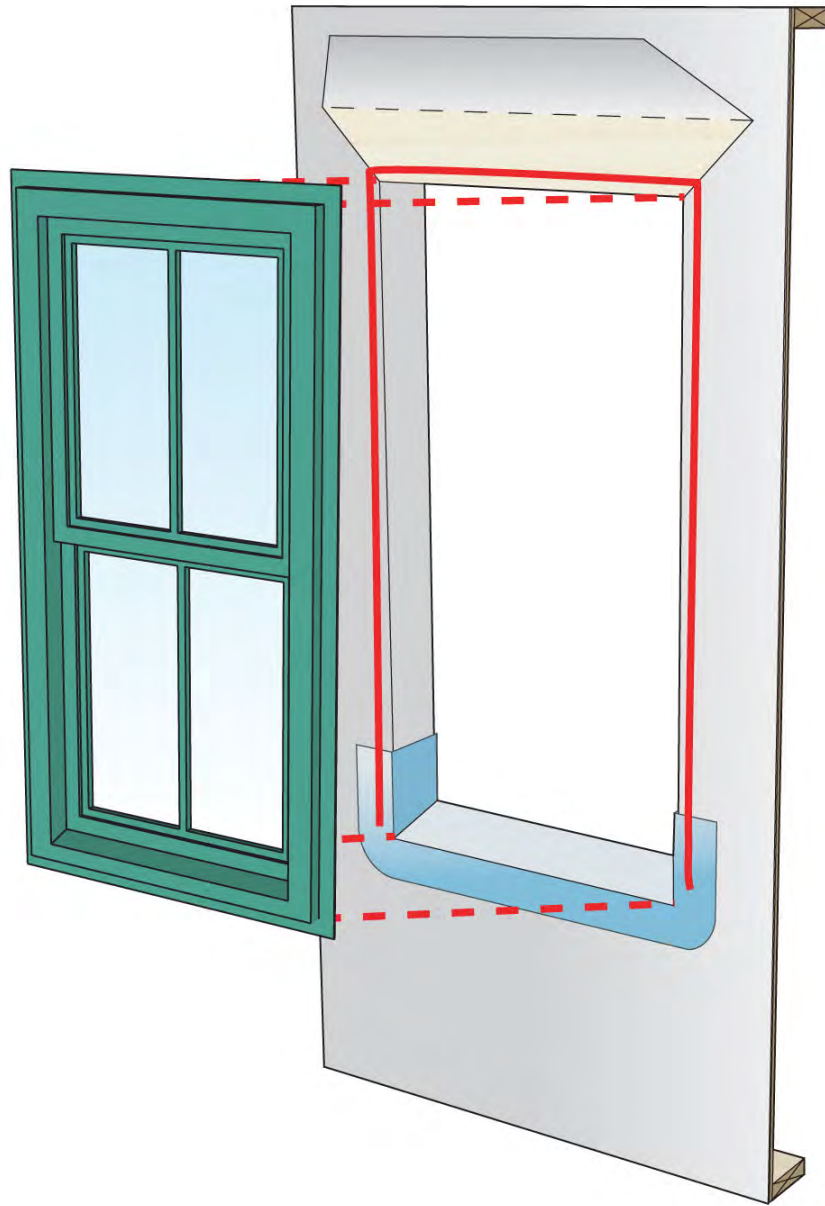


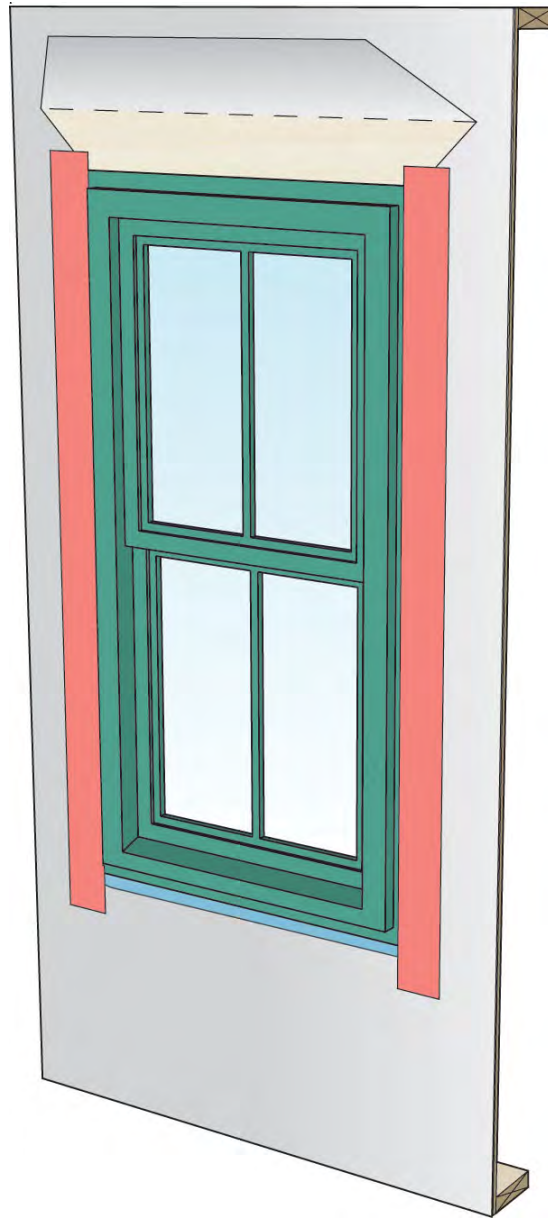


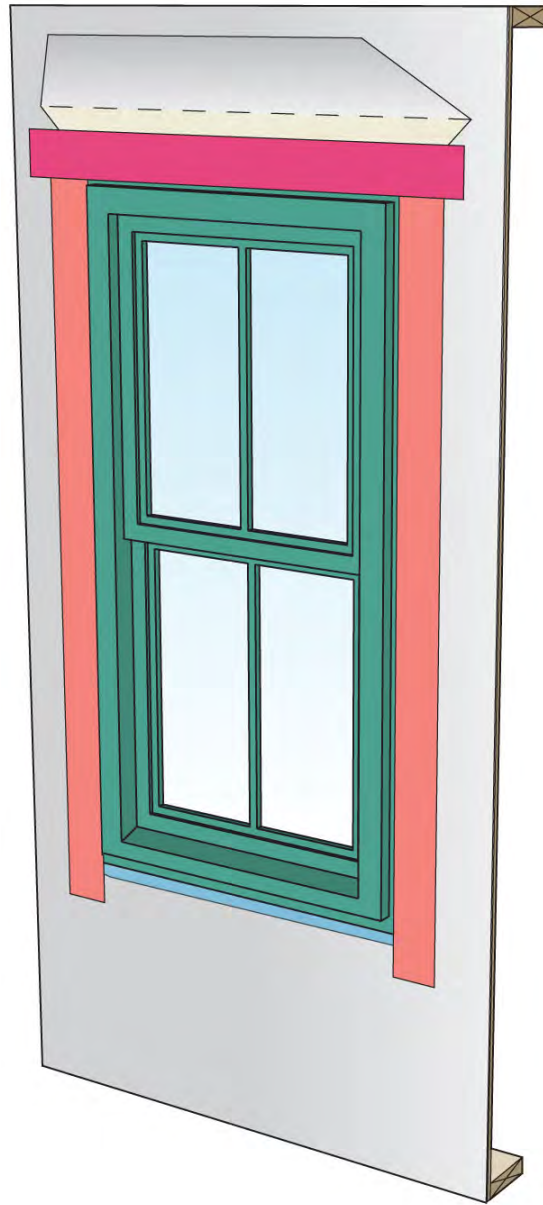


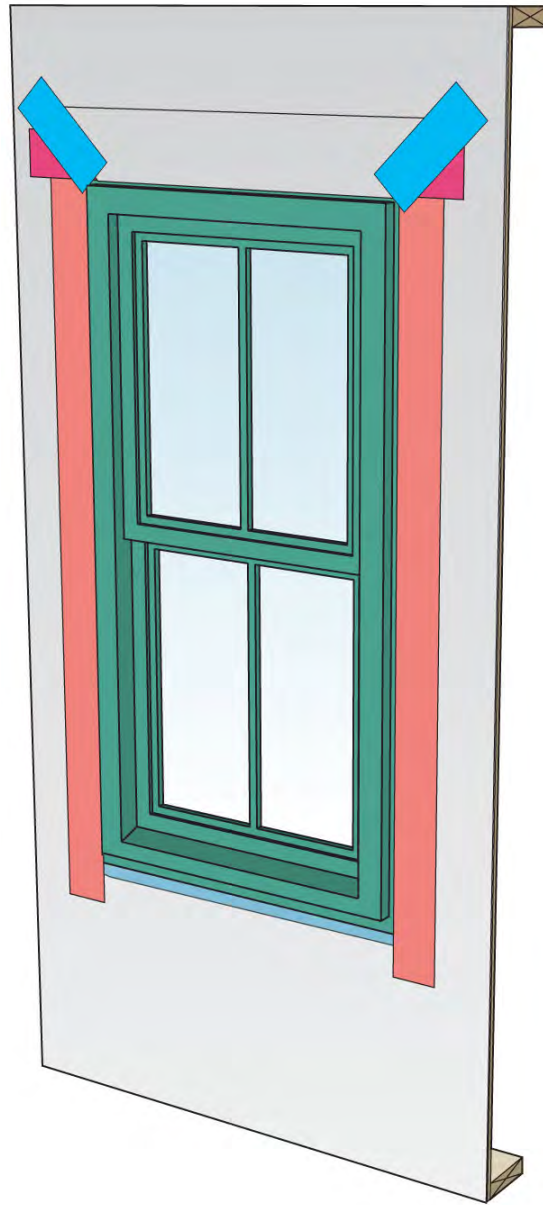


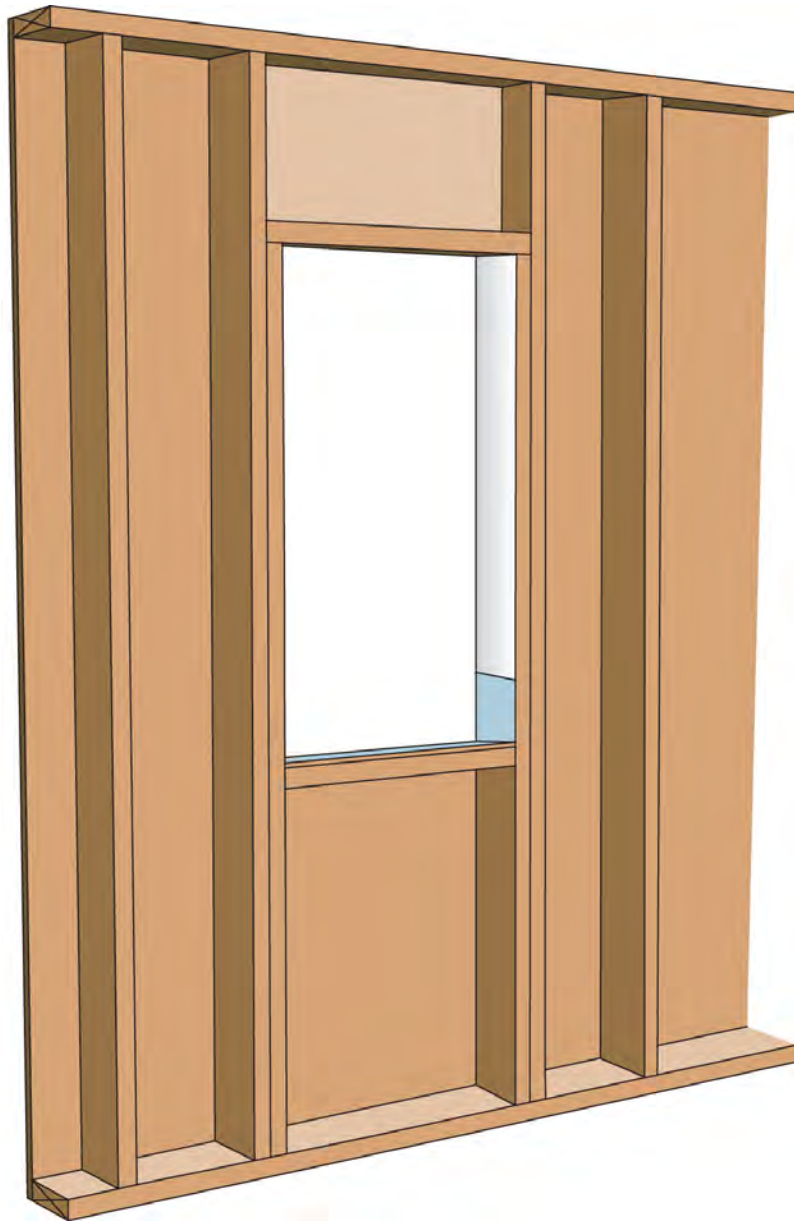


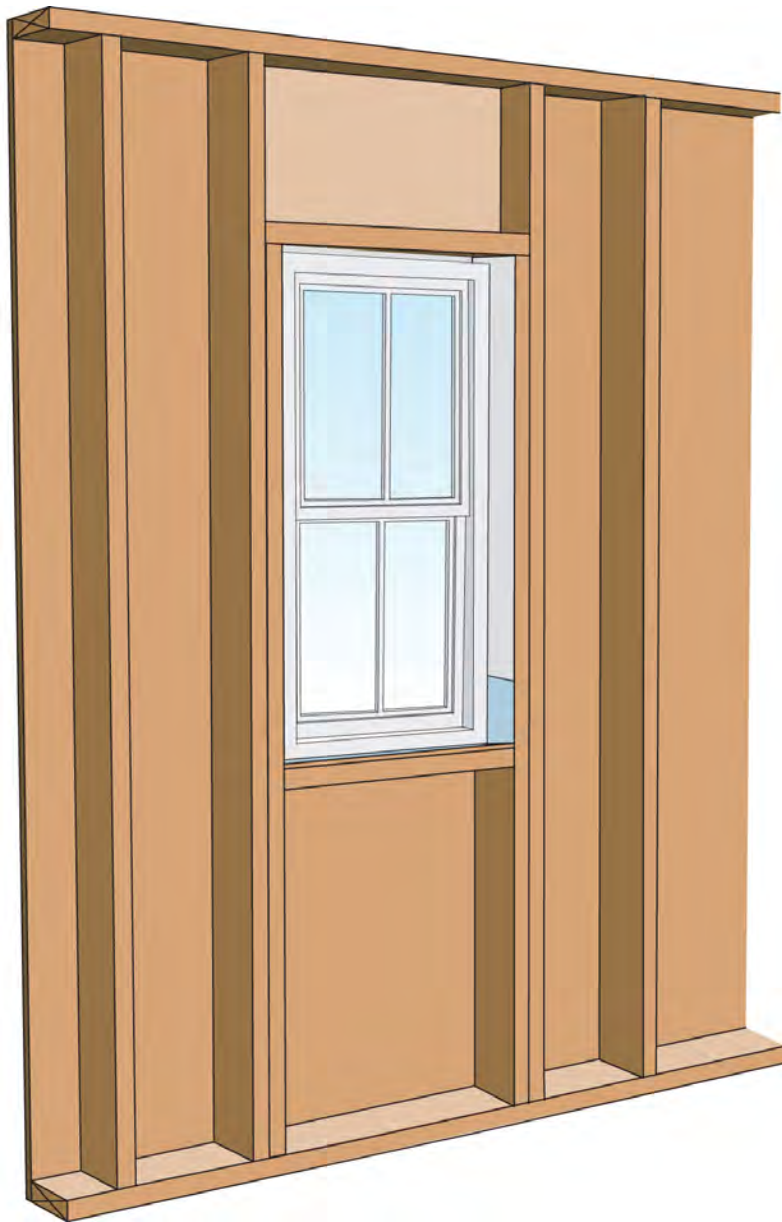


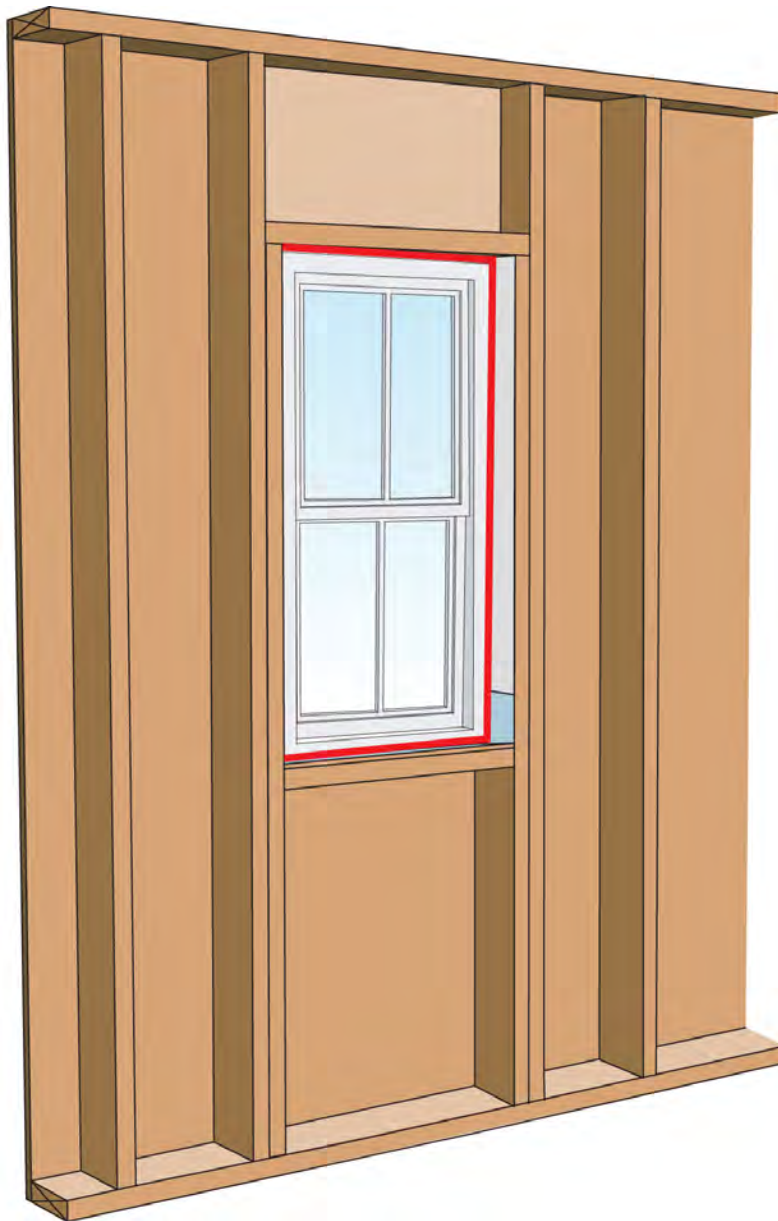




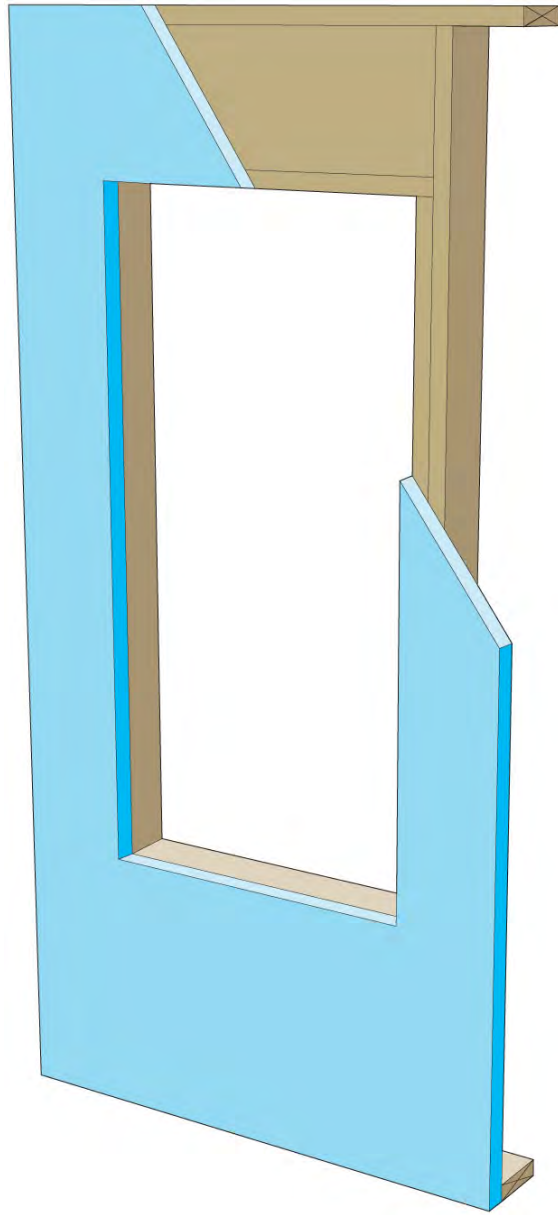


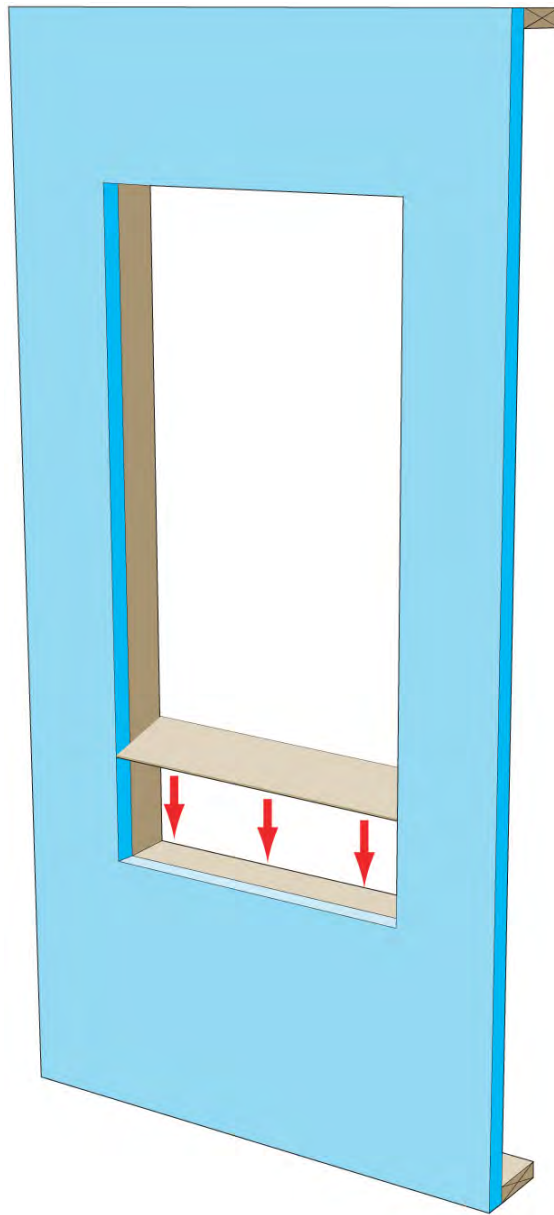


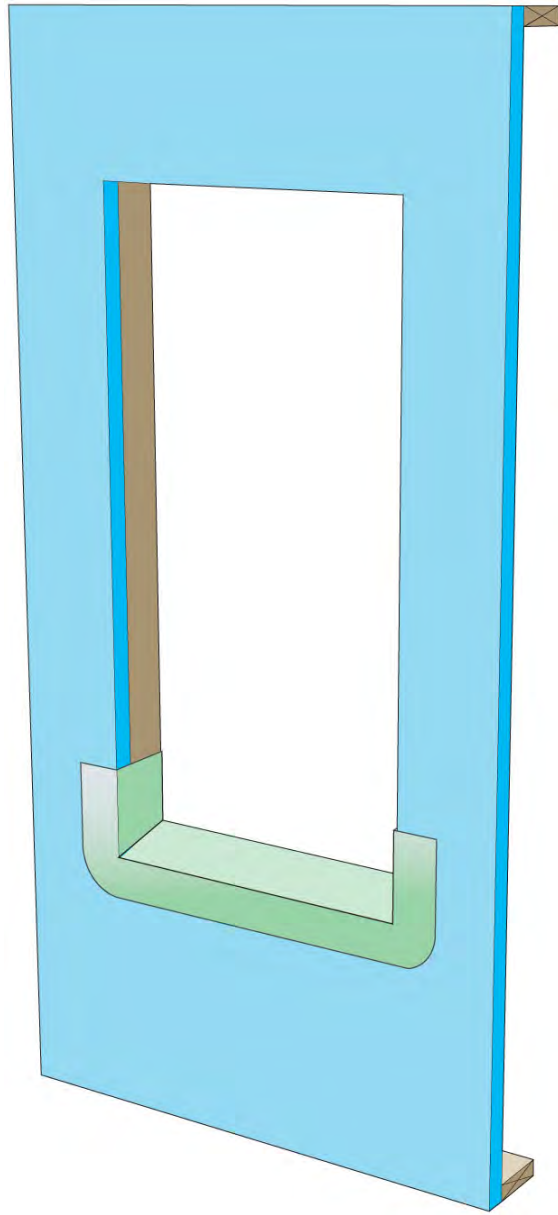


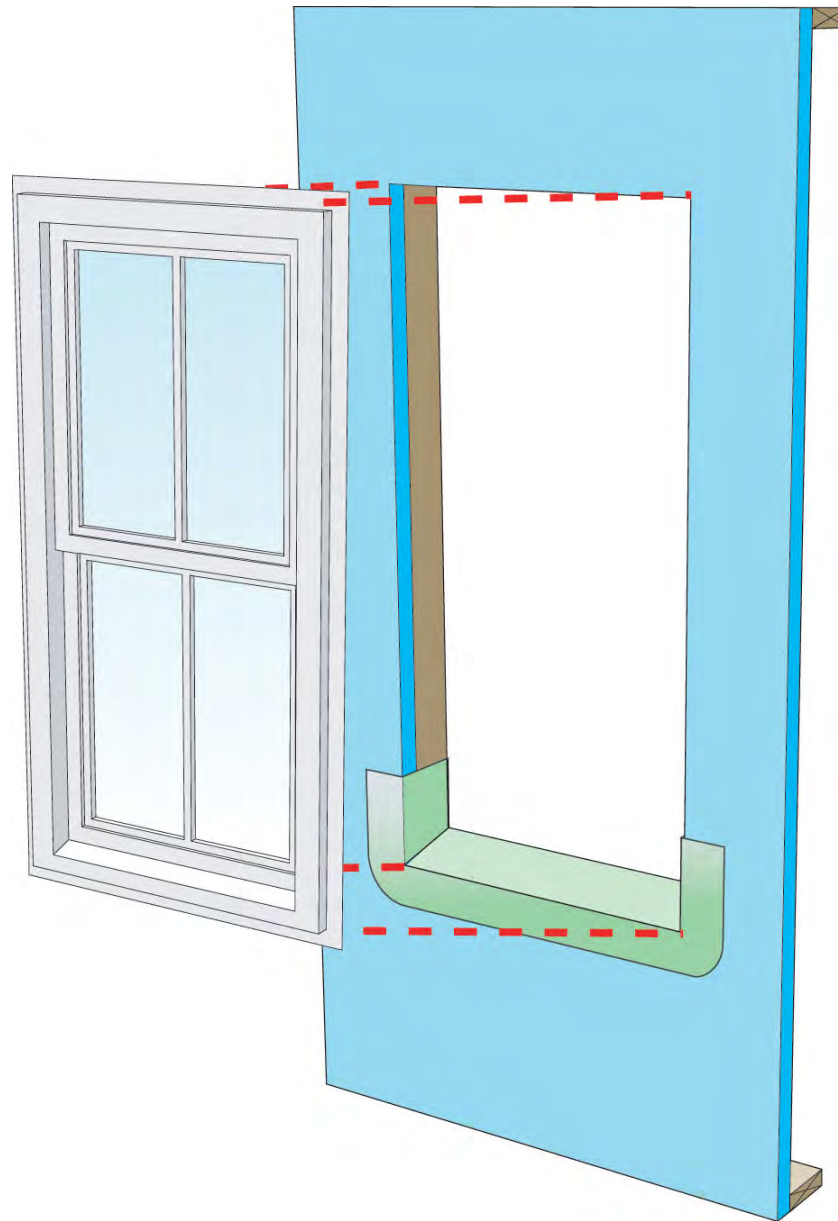


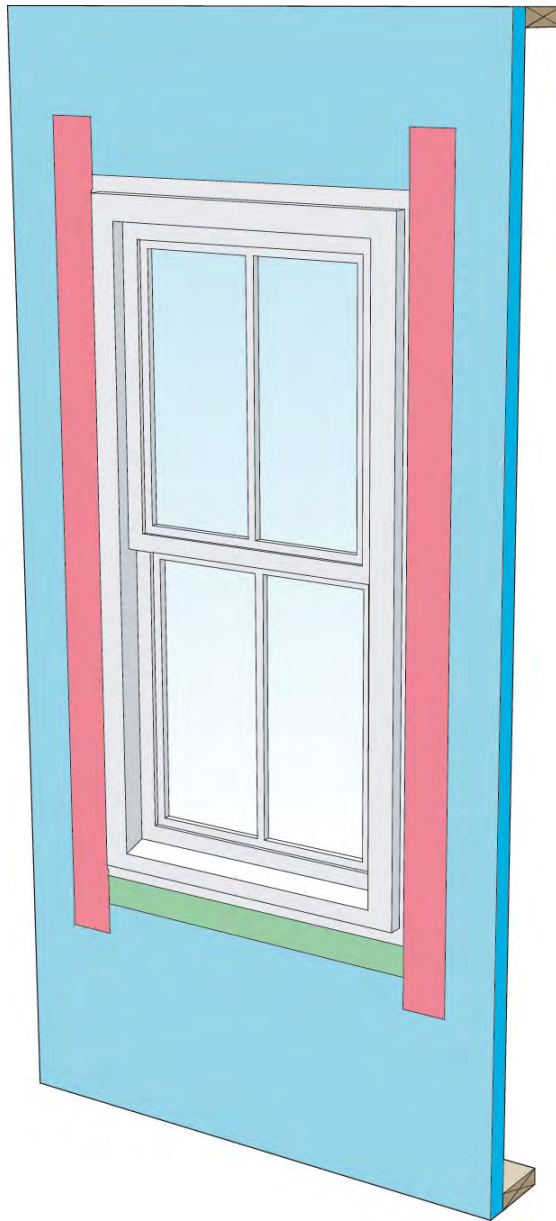


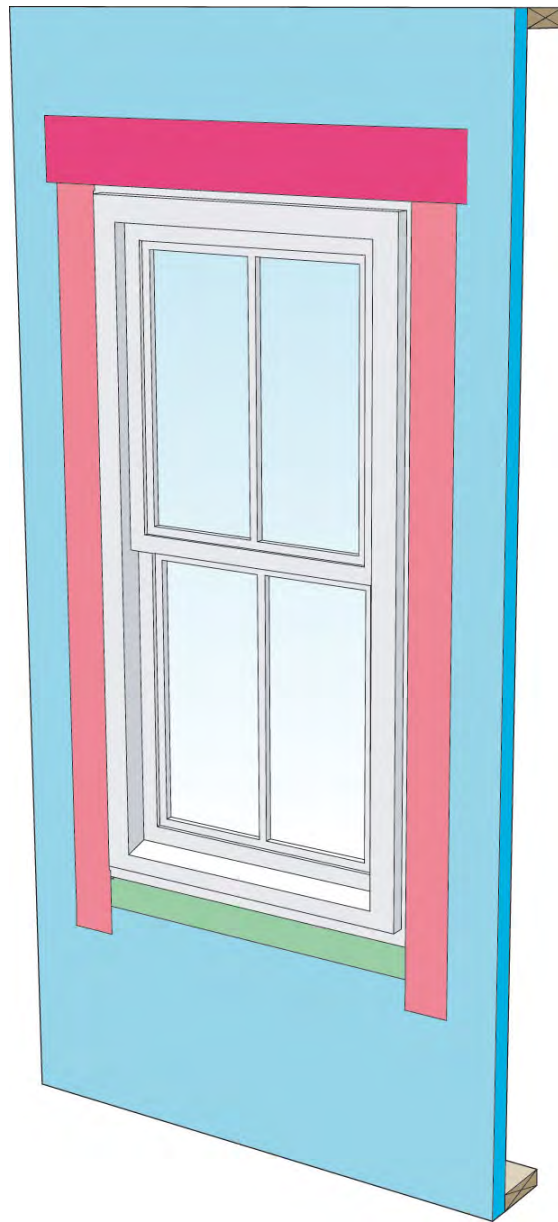


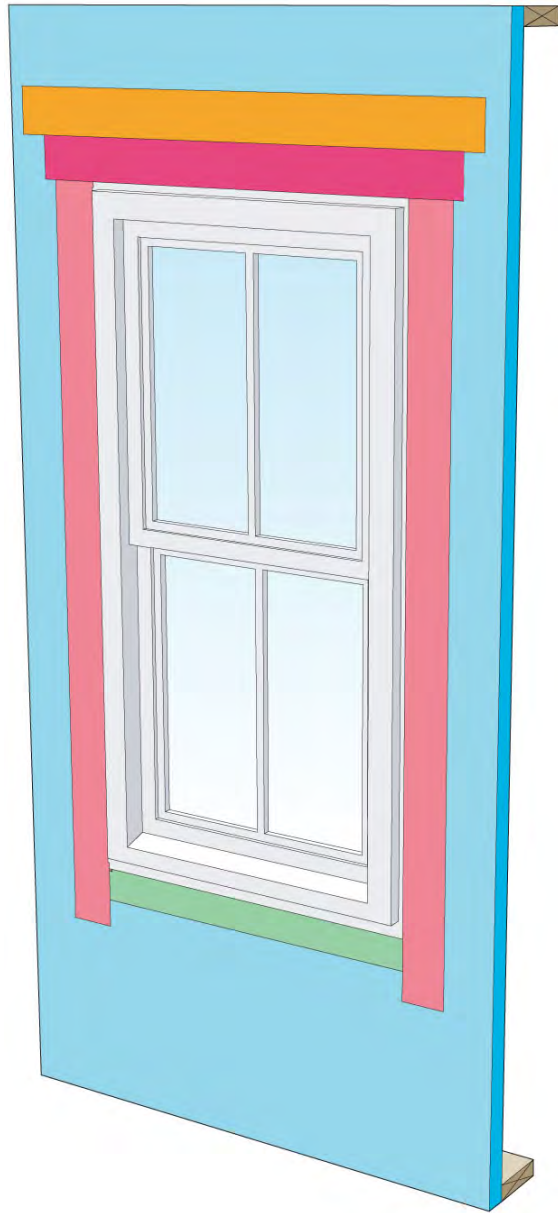


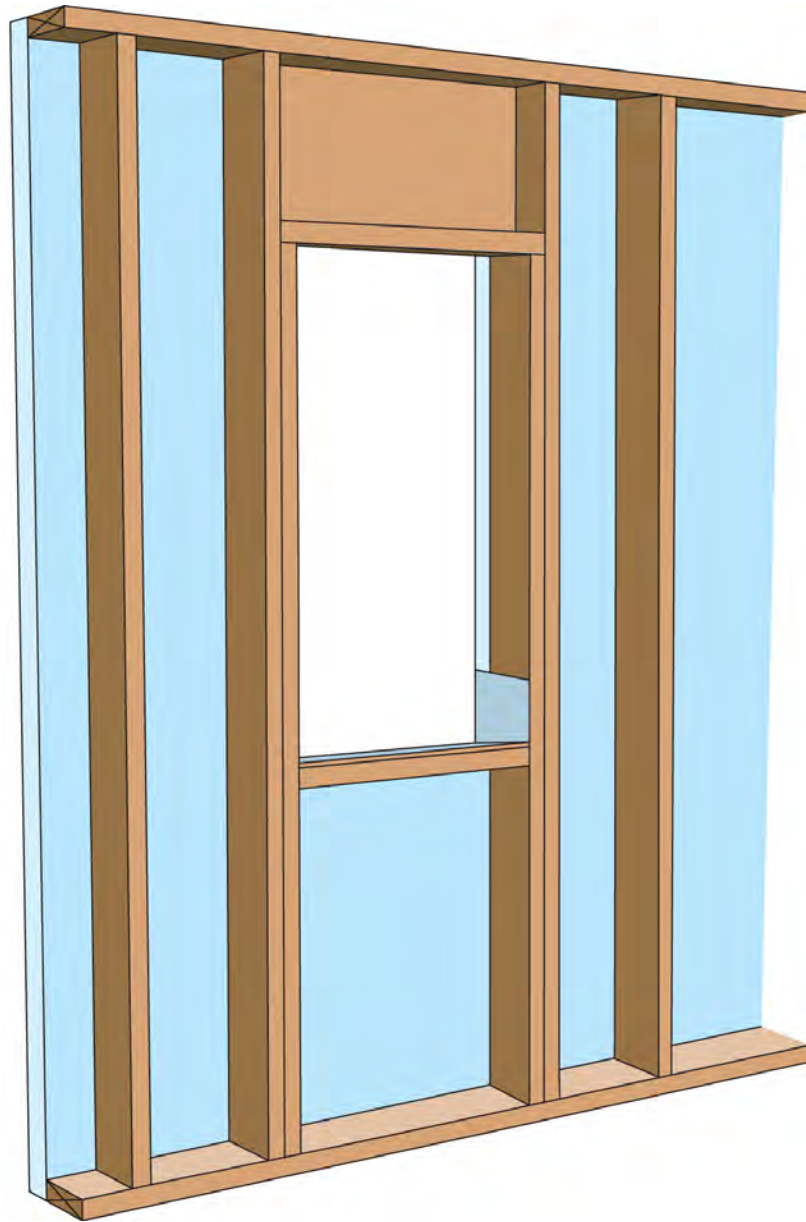


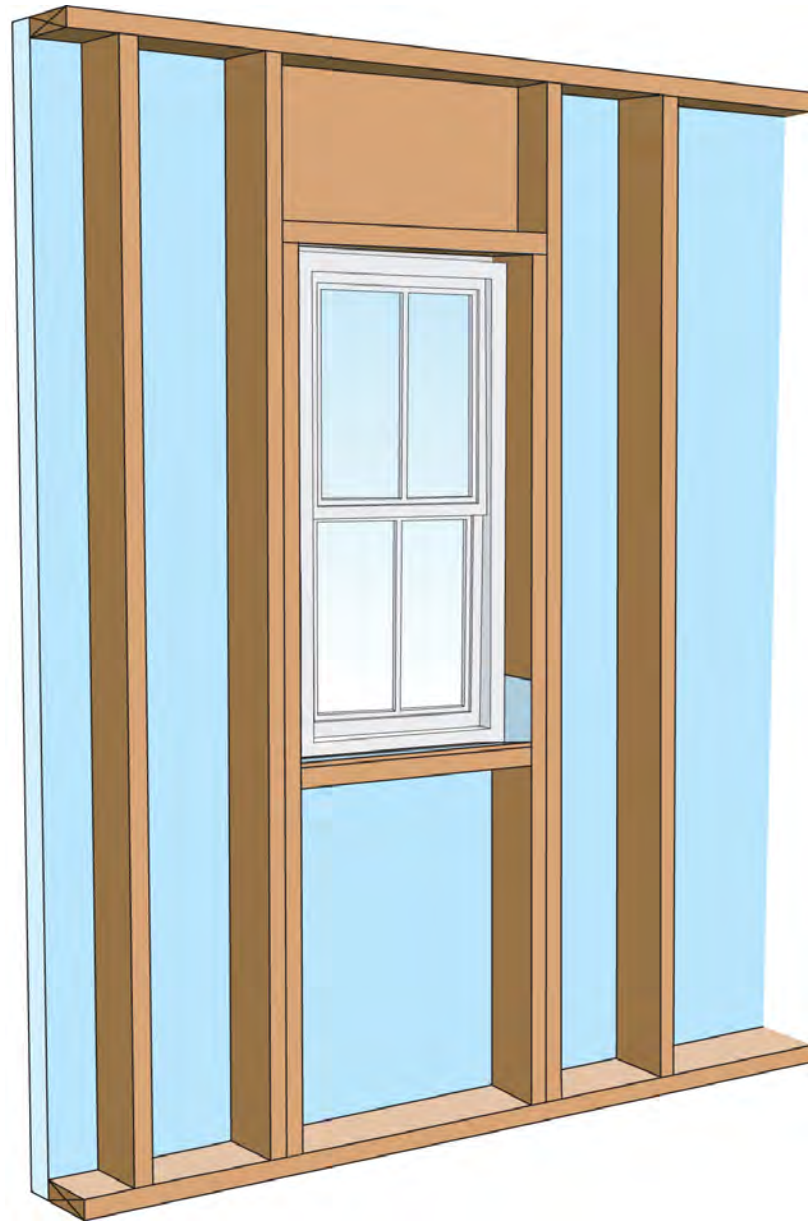


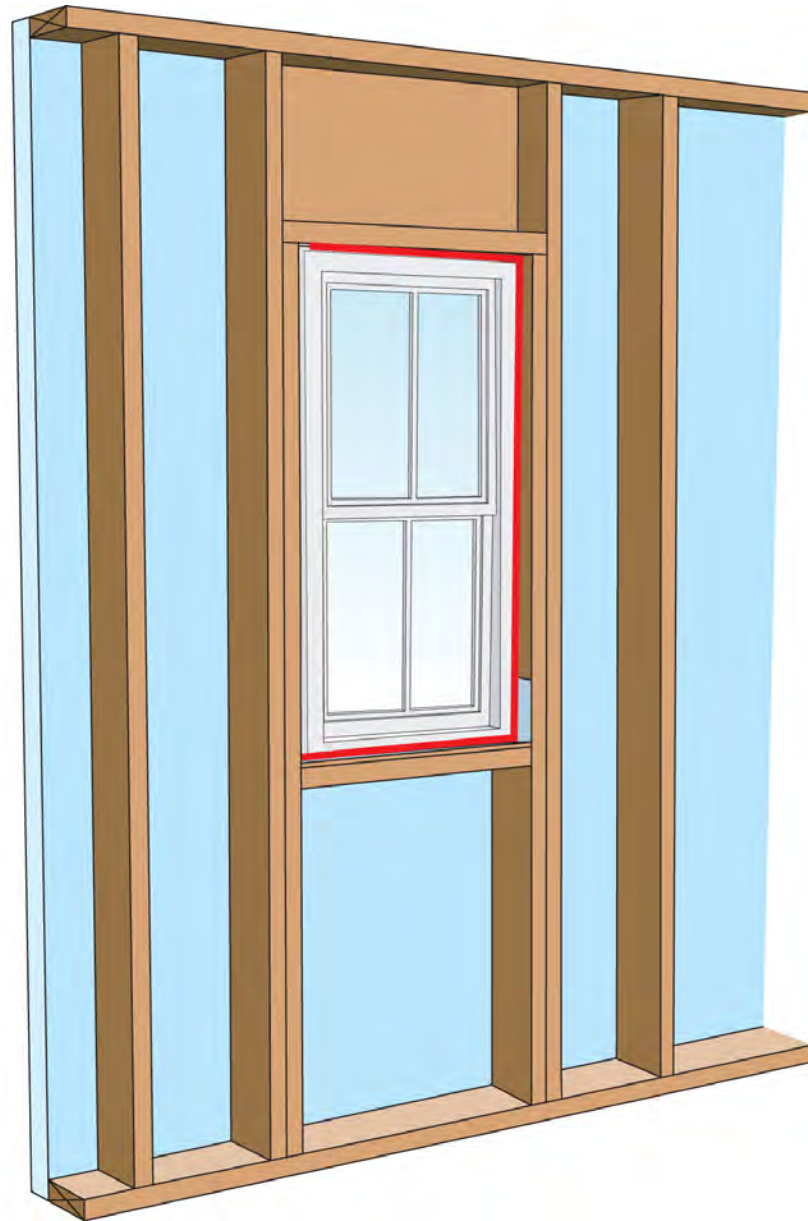








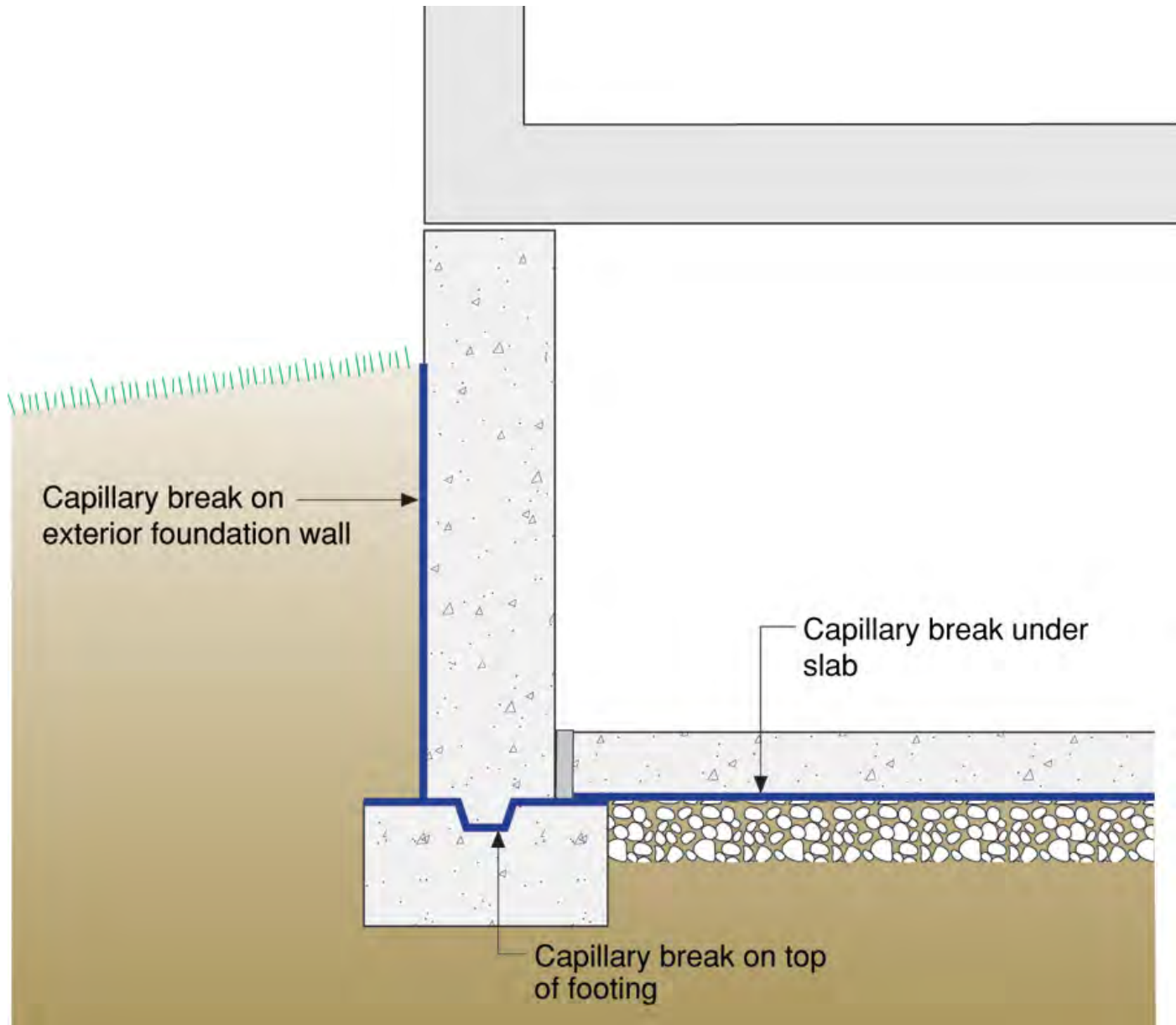








Capillarity





Siding Laps



