

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

# Building Science

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## Adventures In Building Science

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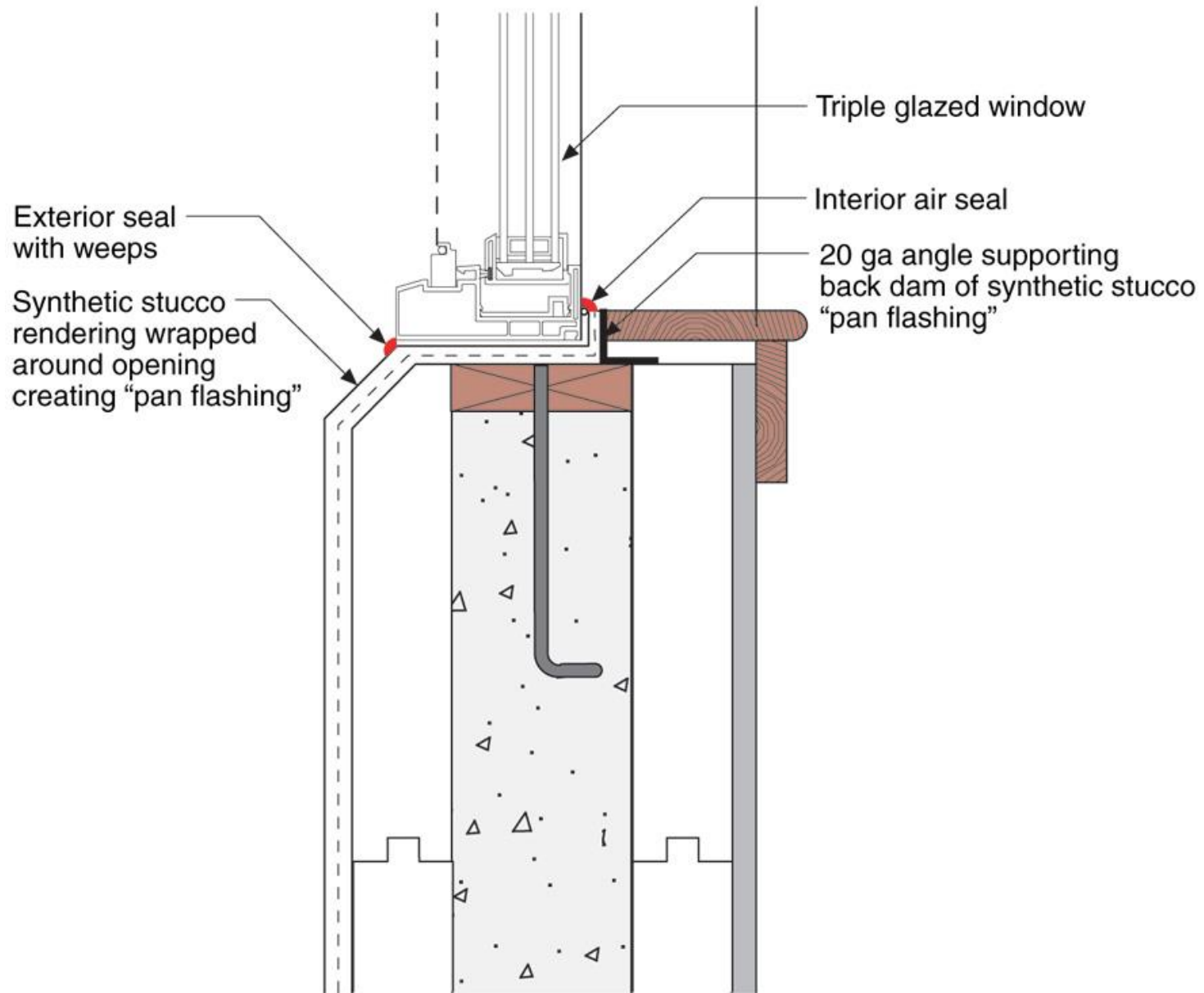


# Back to Barrier and Face Seal....

# Can Barrier or Face Seal Work?













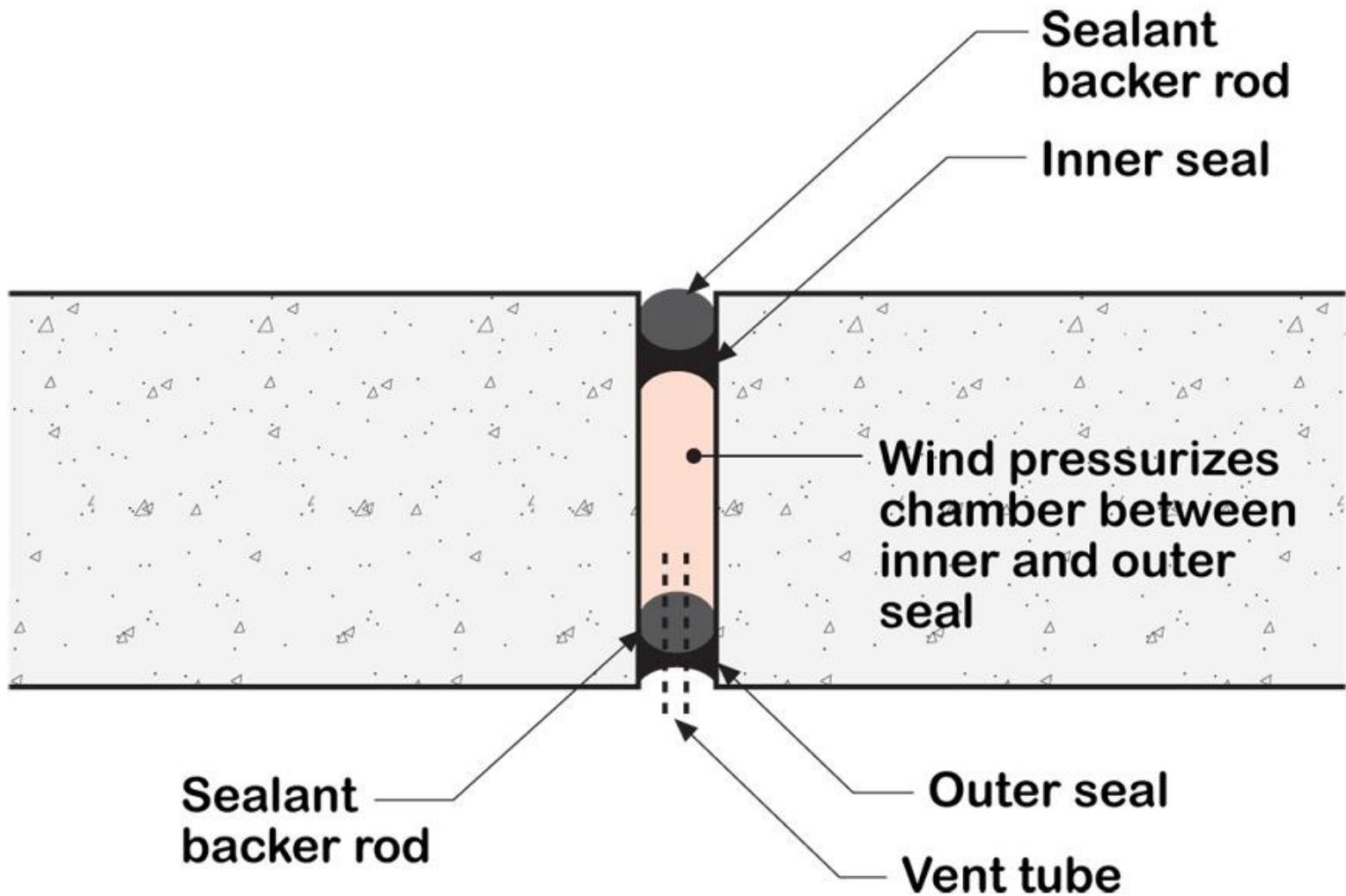


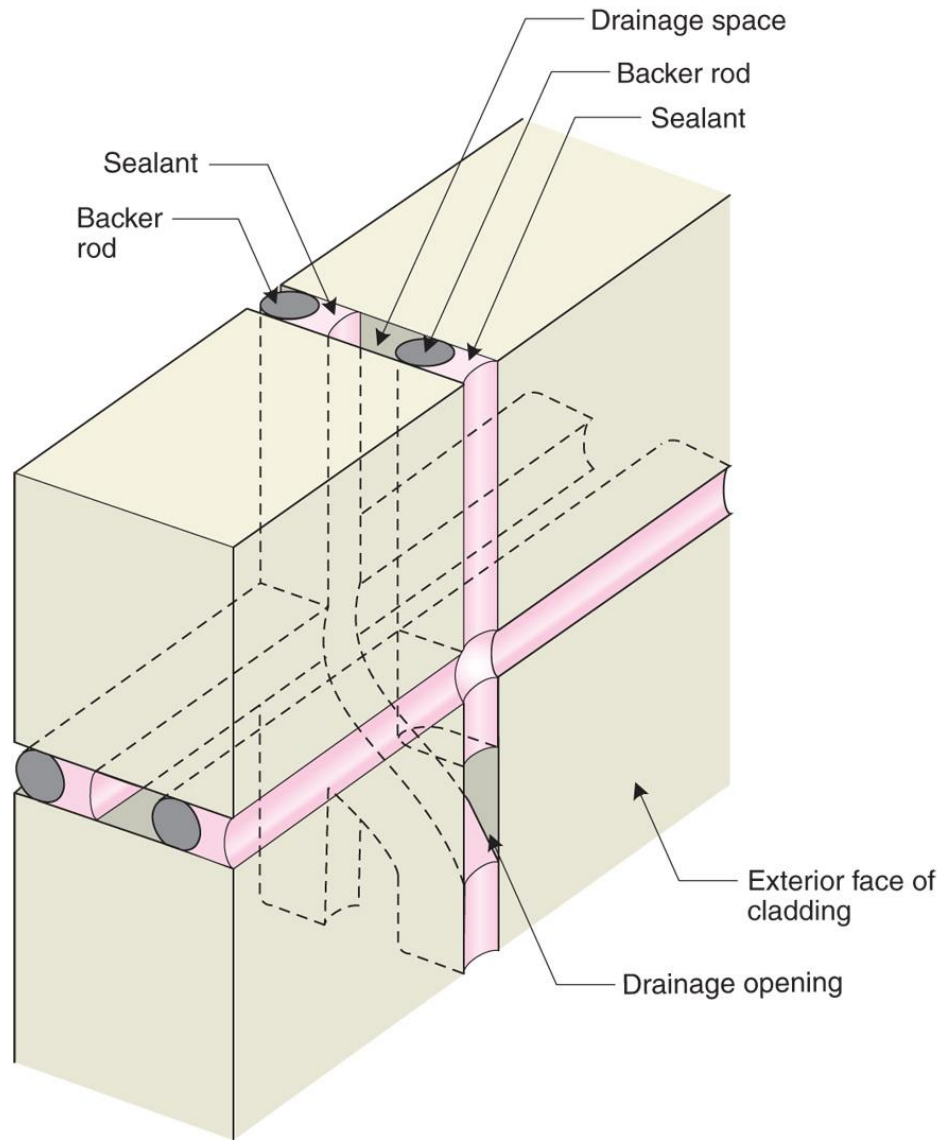










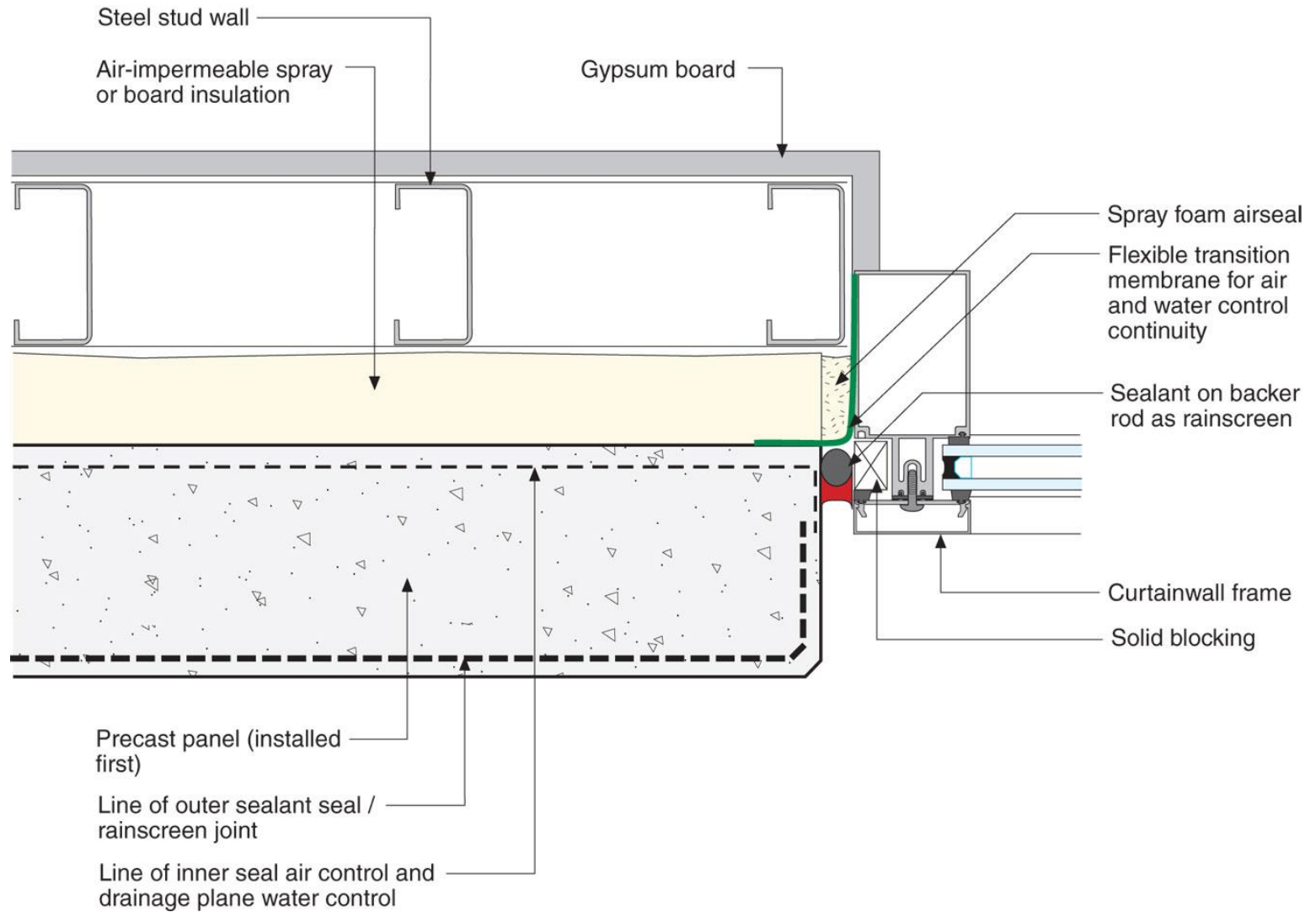


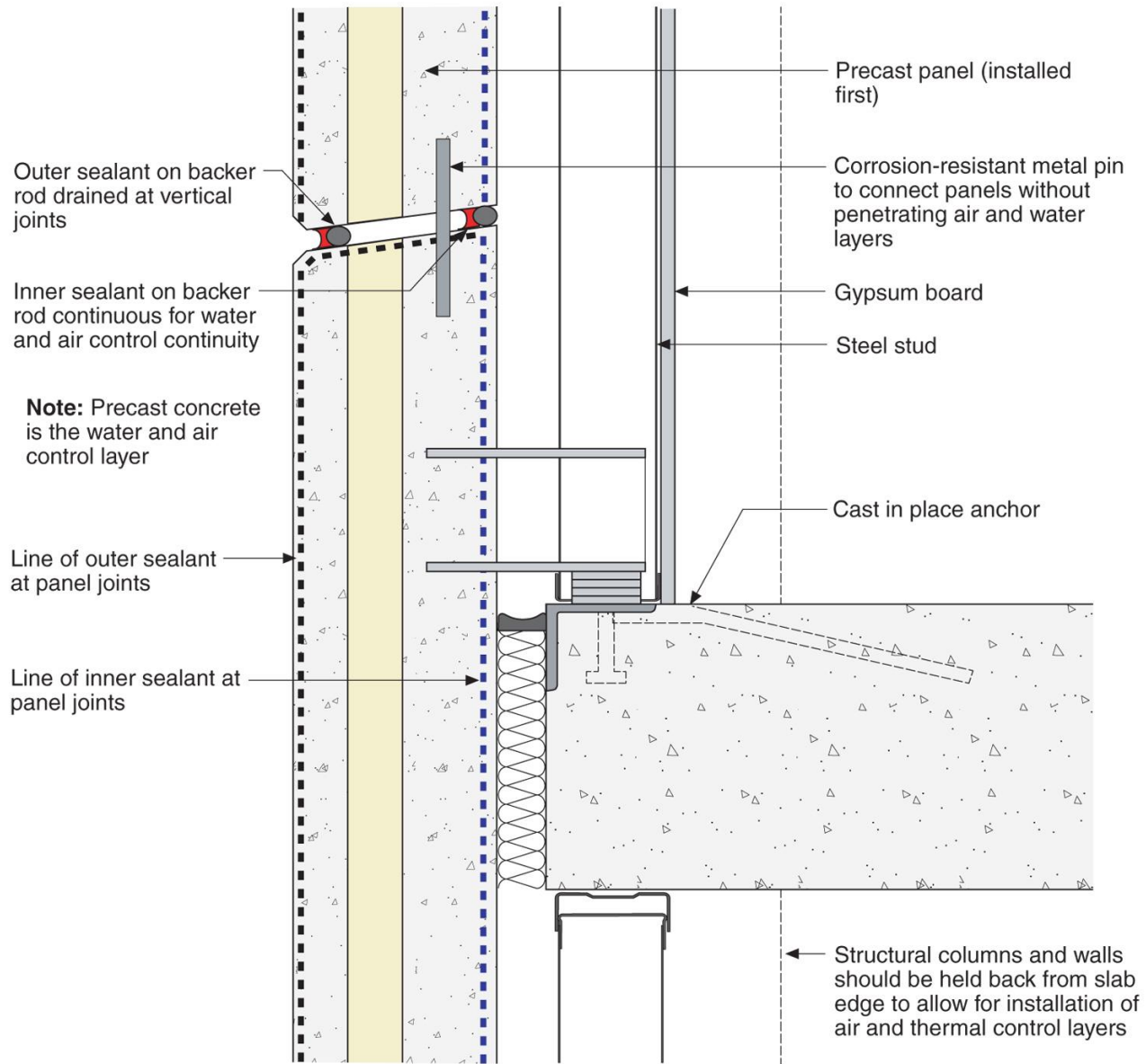






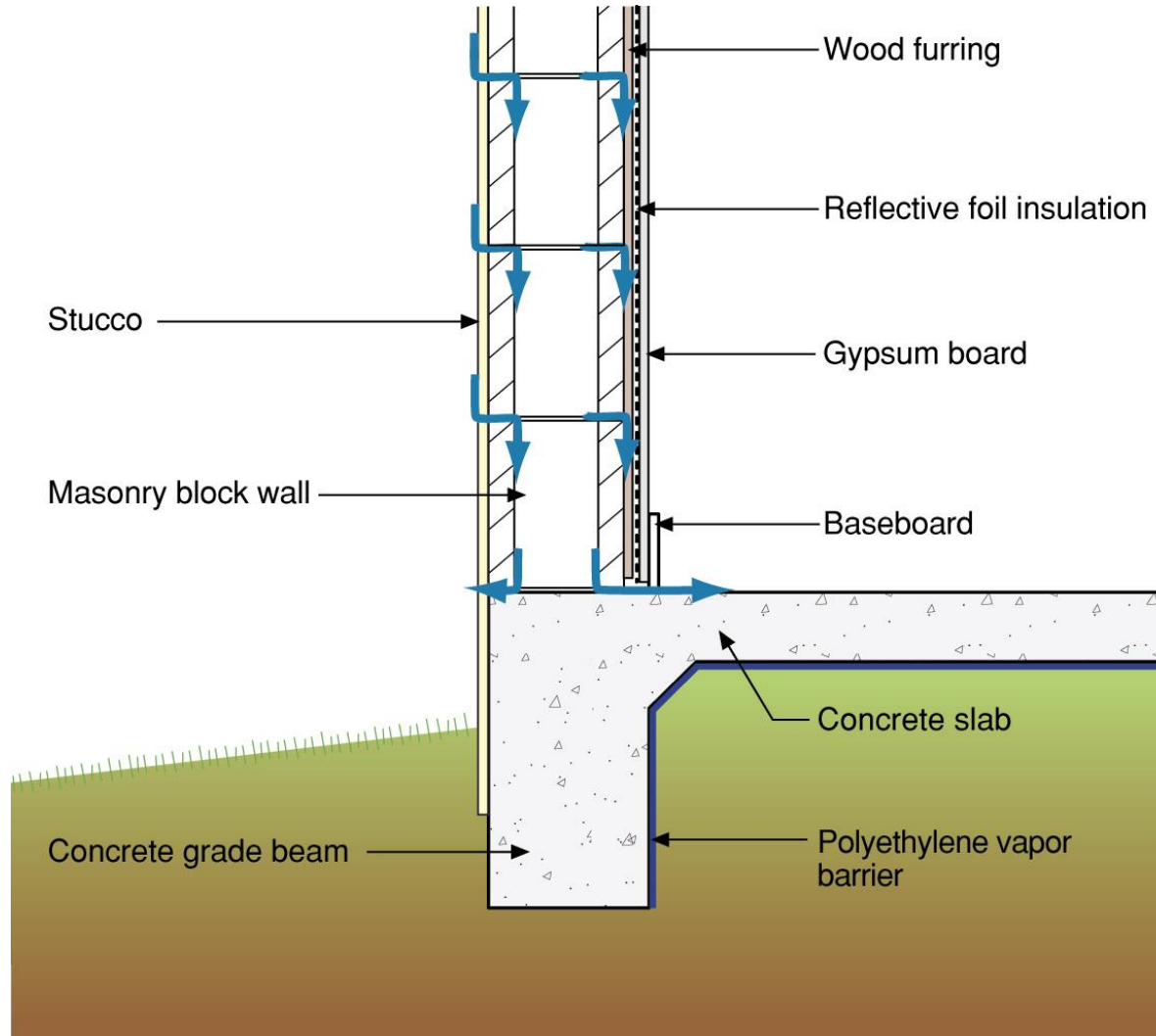


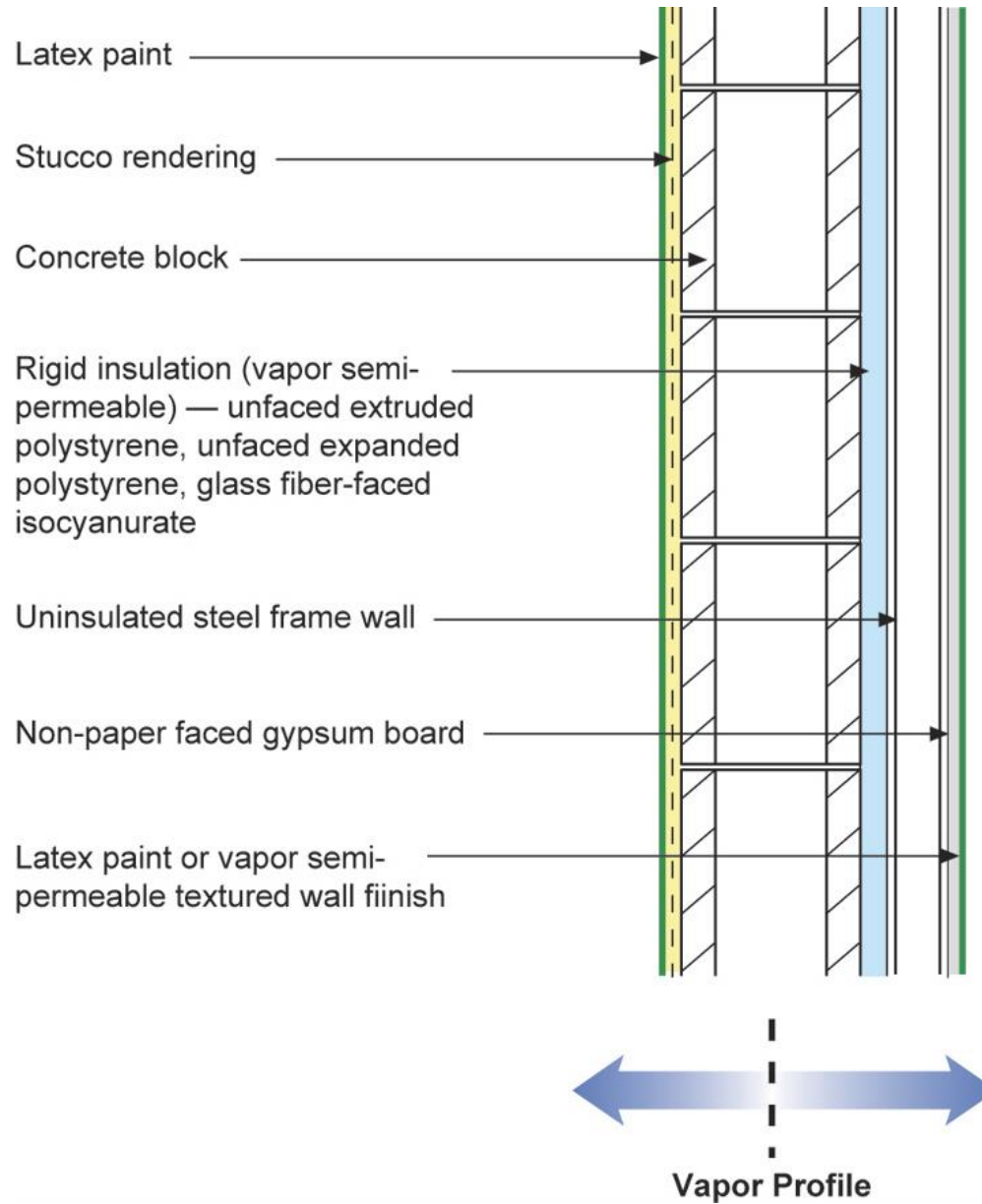


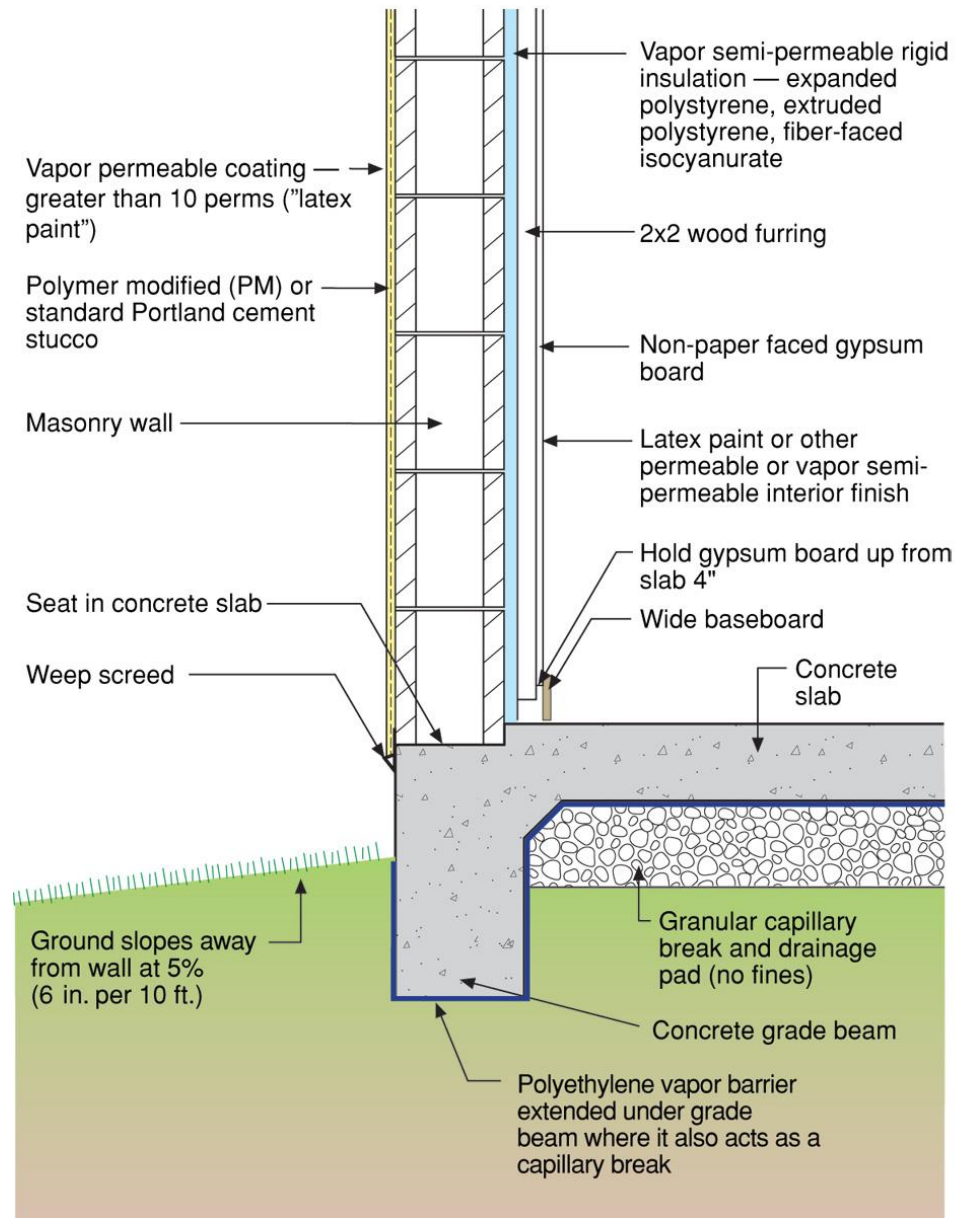


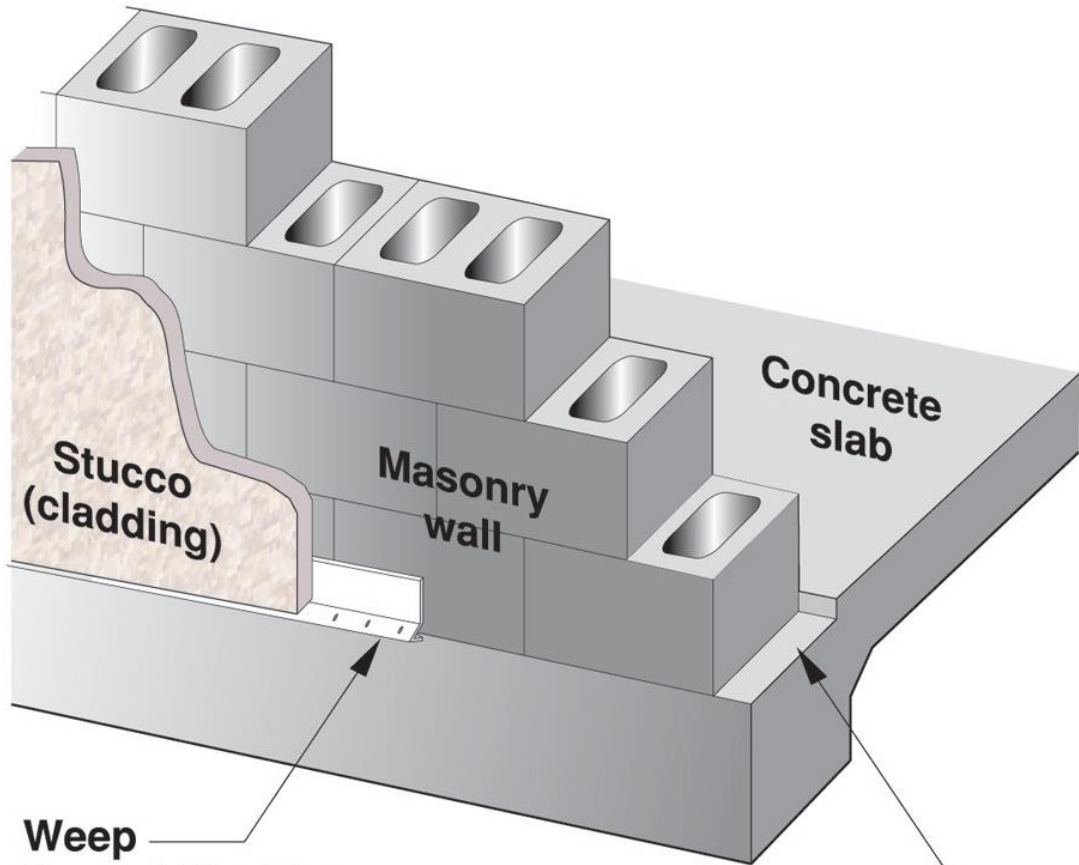


# Rainwater Entry Mass Assembly









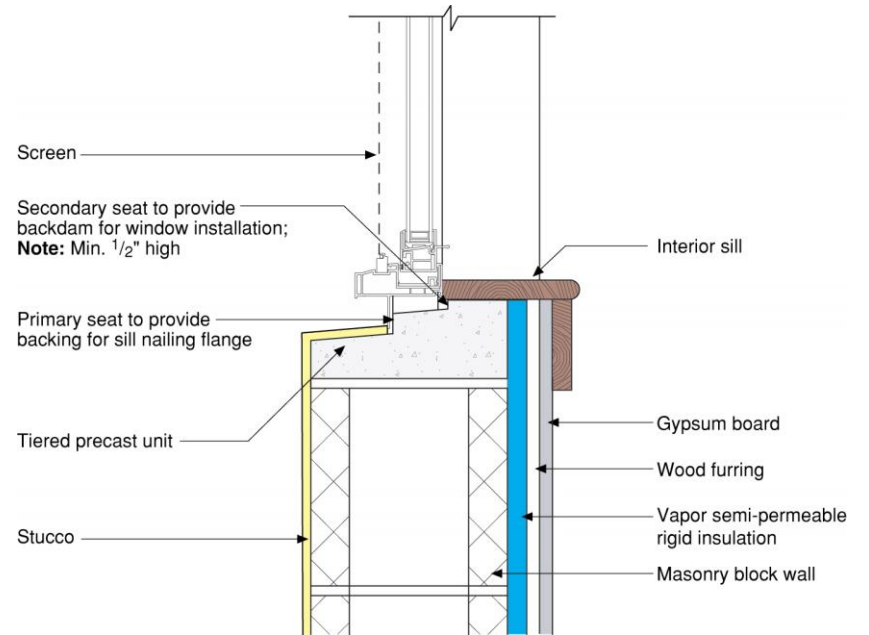
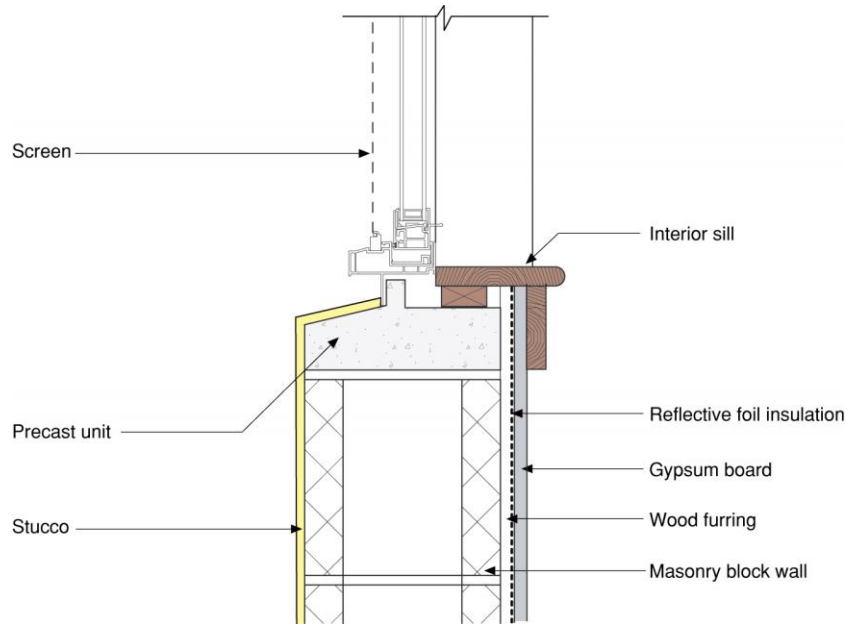
**Weep  
Screed Flashing**  
(provides drainage at  
stucco - masonry connection)

"Seat" in slab acting  
as a flashing for masonry -  
slab connection











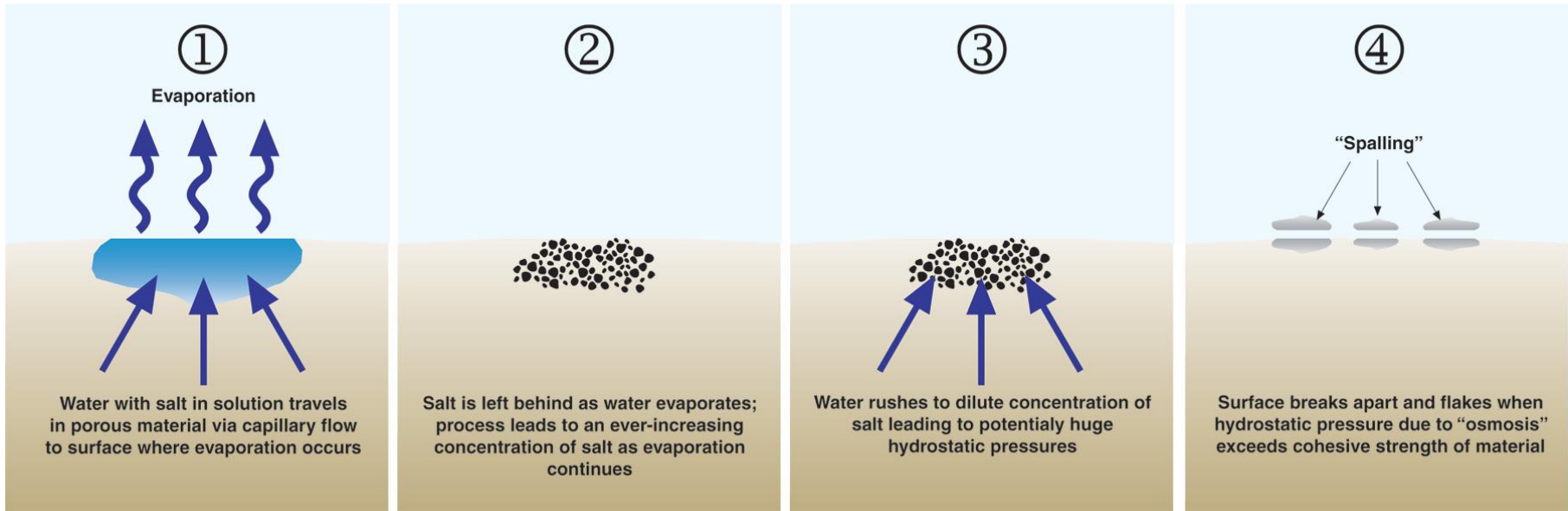
Reminder...  
Don't Do Stupid Things











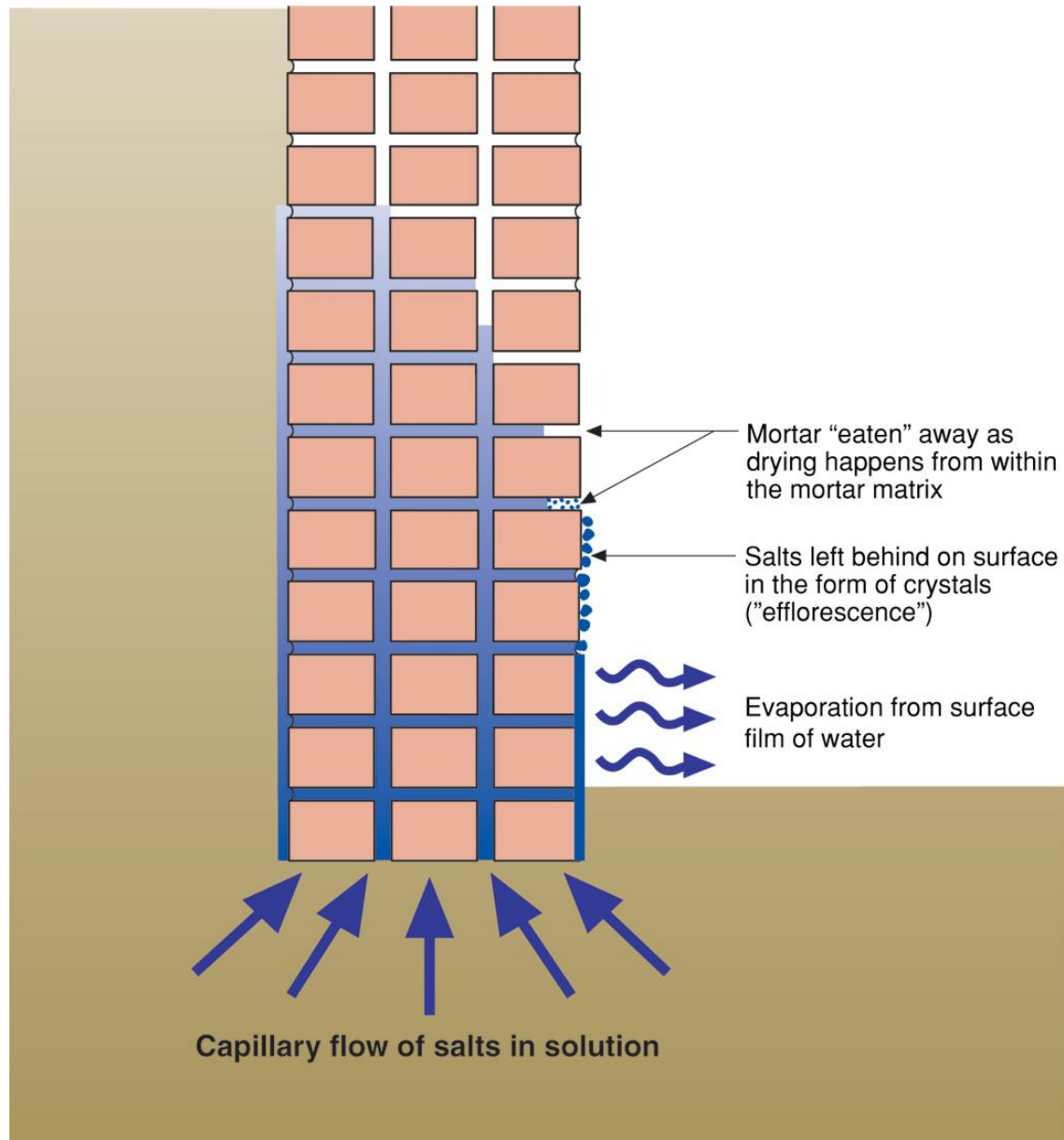
# Diffusion + Capillarity + Osmosis = Problem

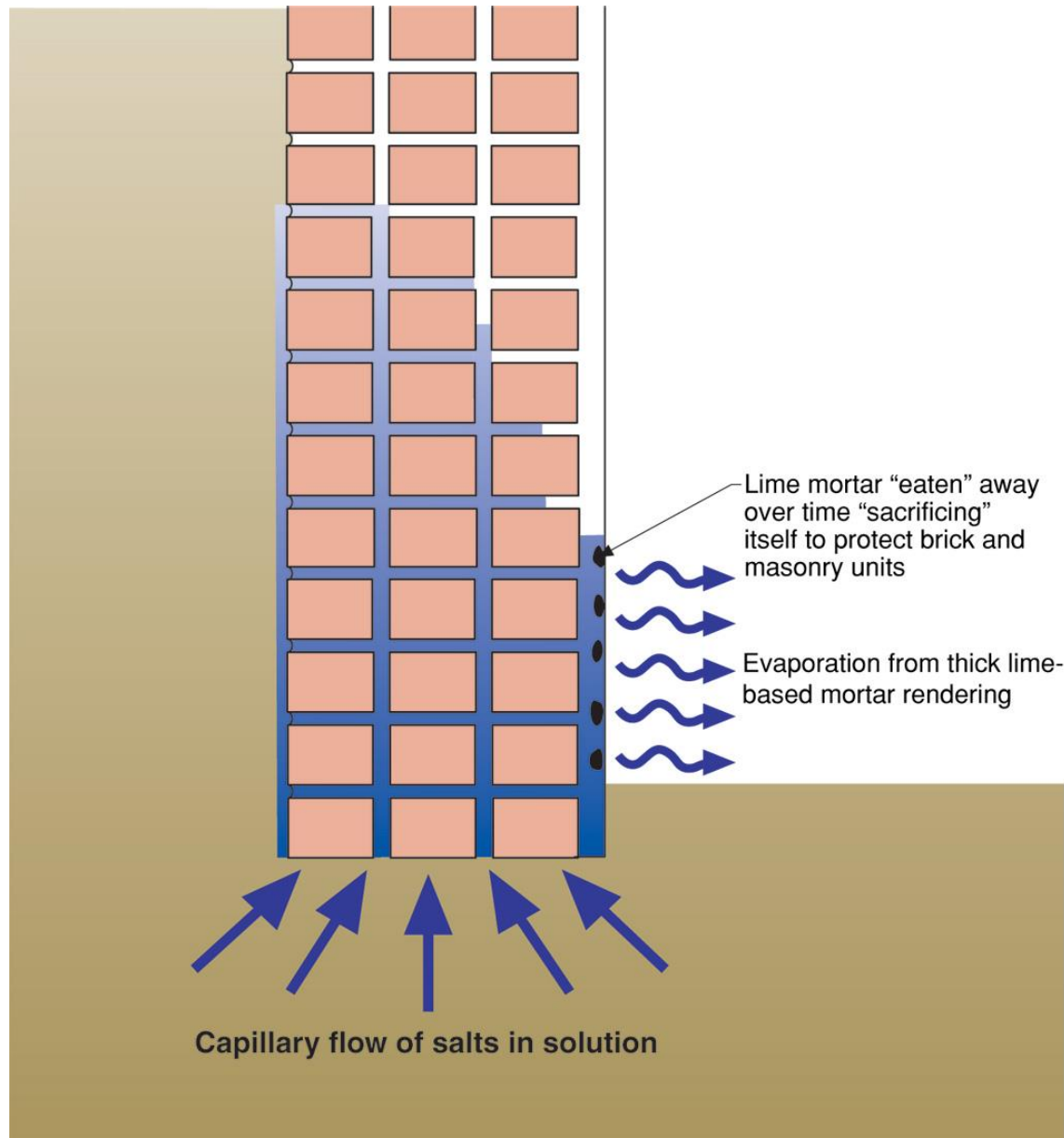
- Diffusion Vapor Pressure 3 to 5 psi
- Capillary Pressure 300 to 500 psi
- Osmosis Pressure 3,000 to 5,000 psi

















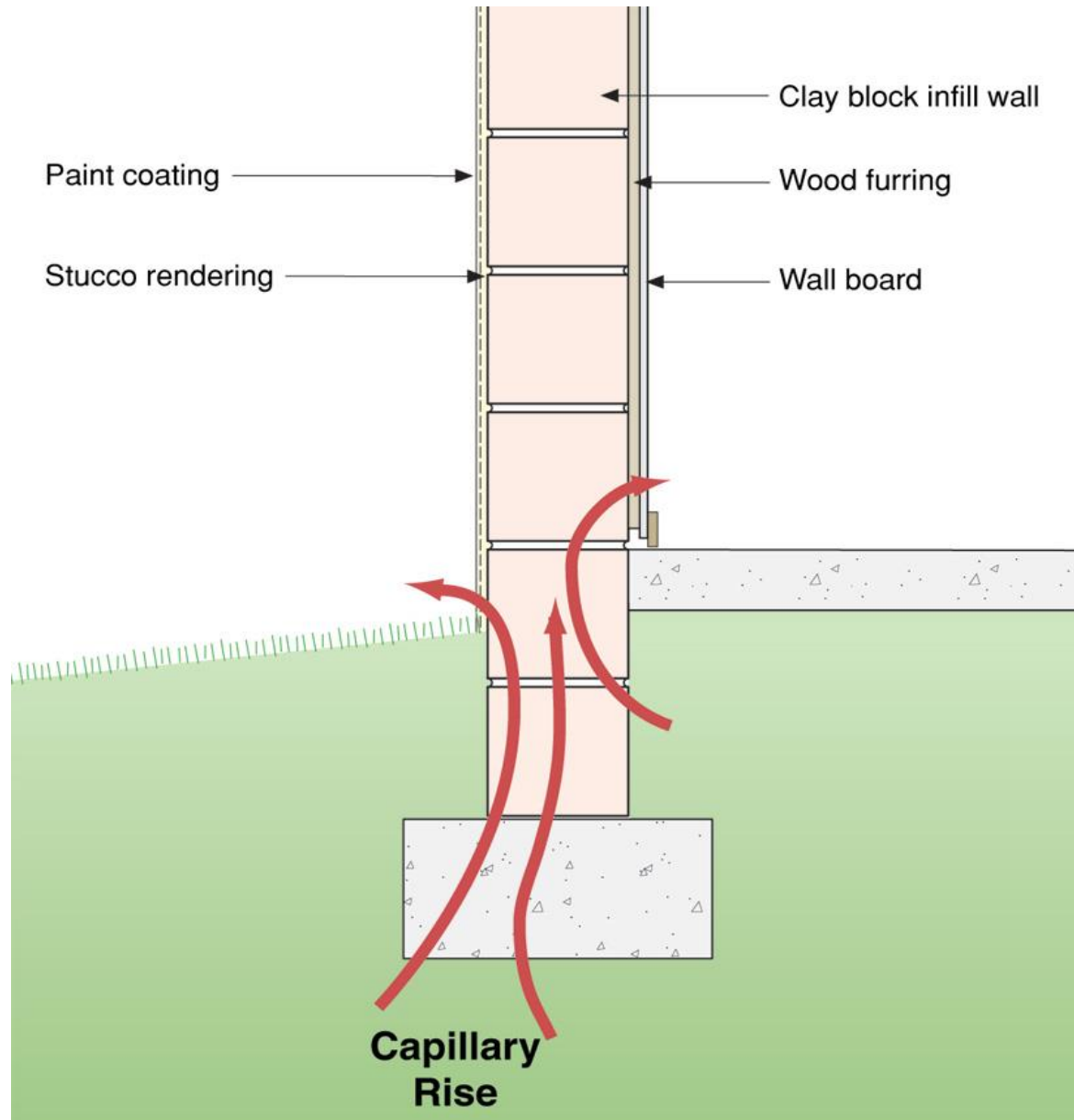








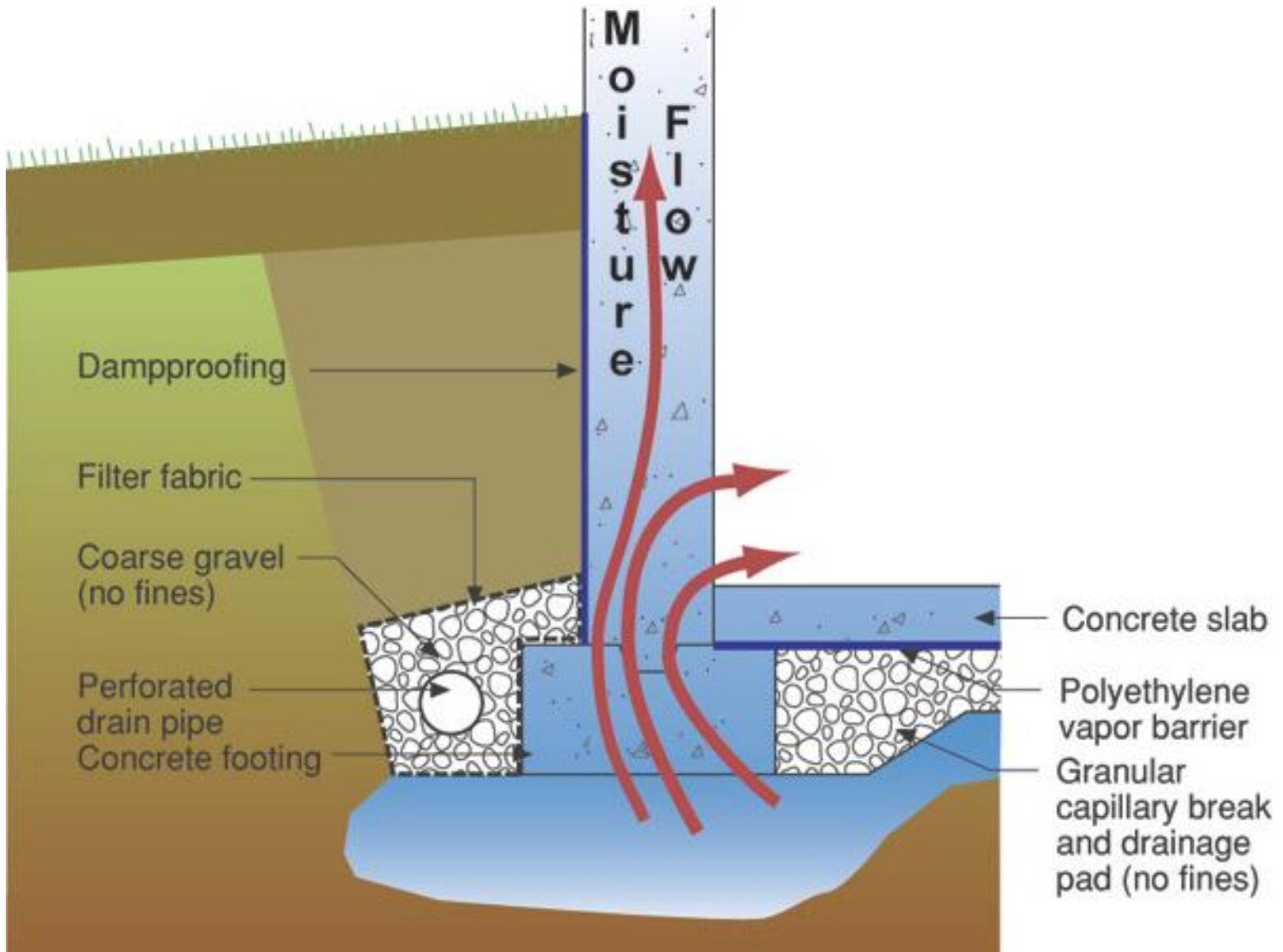


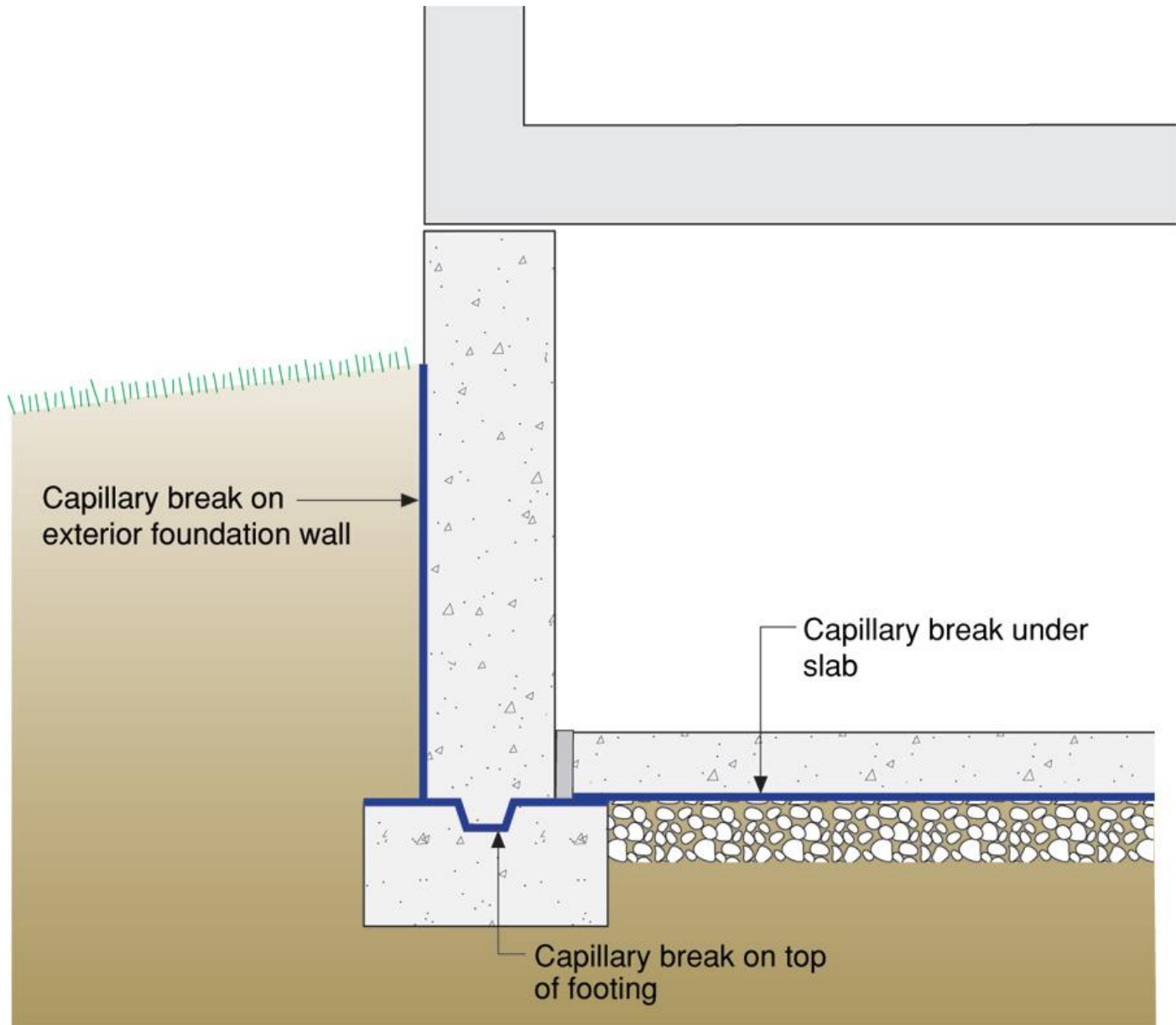




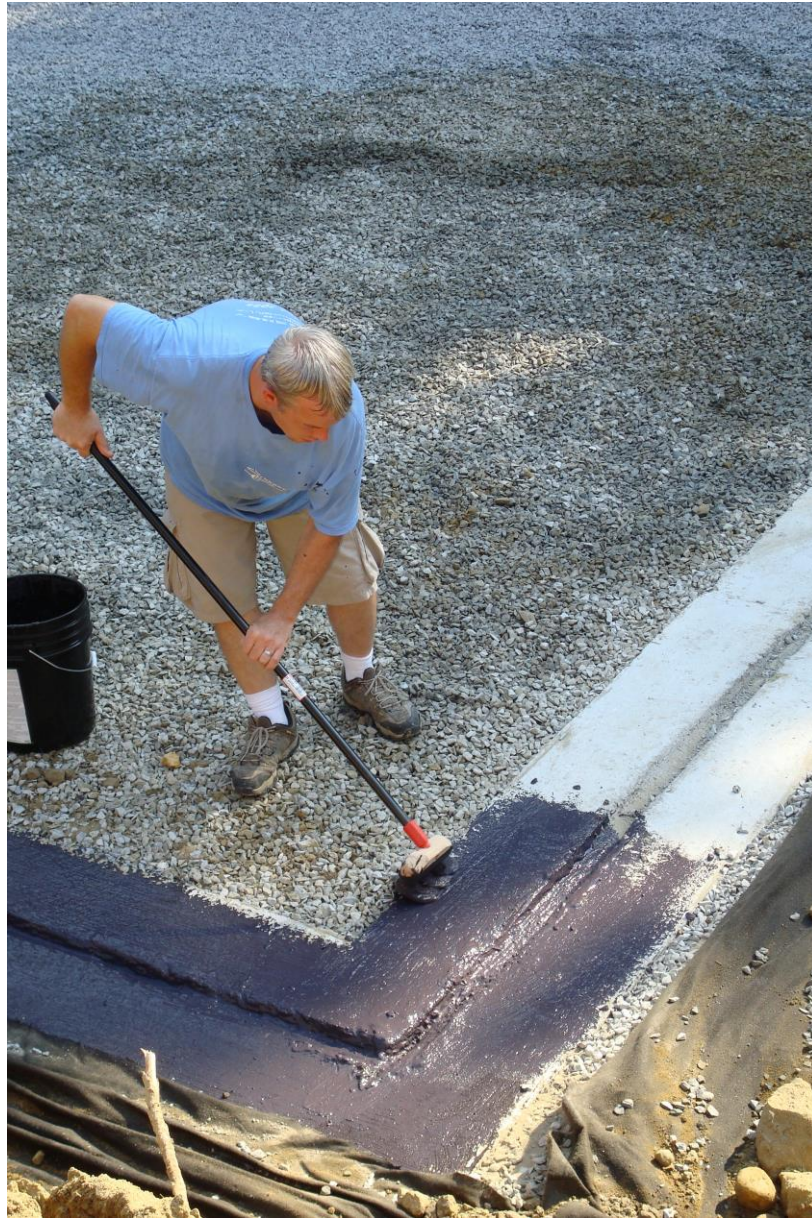
























































































Vapor semi-permeable rigid insulation —  
extruded polystyrene

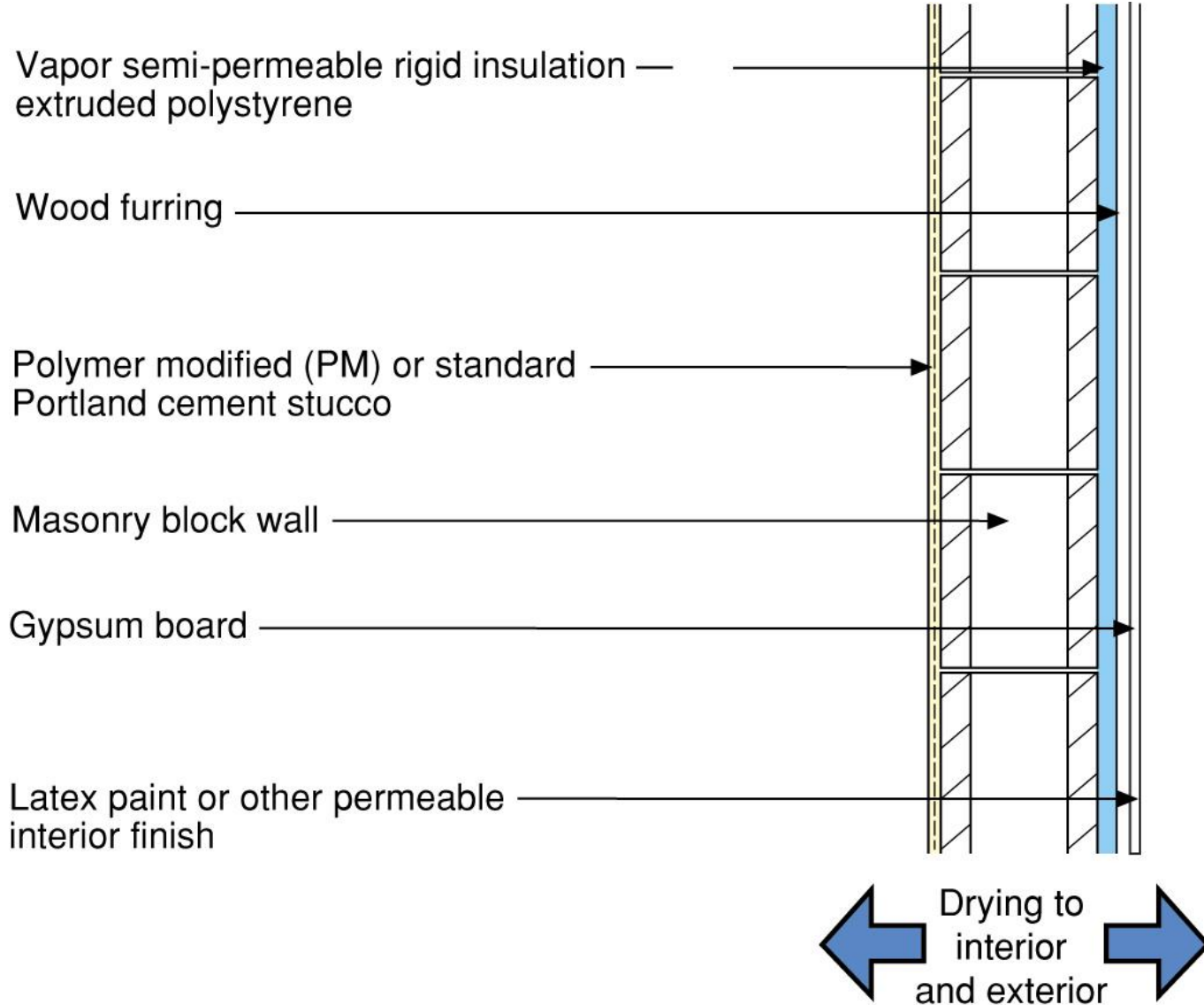
Wood furring

Polymer modified (PM) or standard  
Portland cement stucco

Masonry block wall

Gypsum board

Latex paint or other permeable  
interior finish



The diagram shows a vertical cross-section of a wall assembly. From left to right, the layers are: a thin interior finish (indicated by a dashed line), a thick masonry block wall, a layer of polymer modified or standard Portland cement stucco, a layer of wood furring, a layer of vapor semi-permeable rigid insulation (extruded polystyrene), another layer of wood furring, another layer of polymer modified or standard Portland cement stucco, a layer of gypsum board, and a thin exterior finish. Arrows point from each label to its corresponding layer. At the bottom, two blue arrows point outwards from the center, with the text 'Drying to interior and exterior' between them.

Drying to  
interior  
and exterior



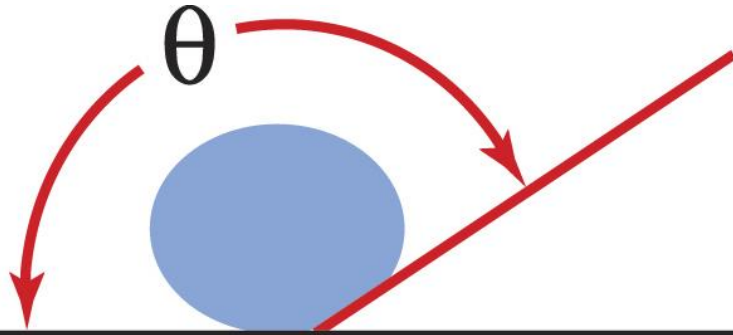




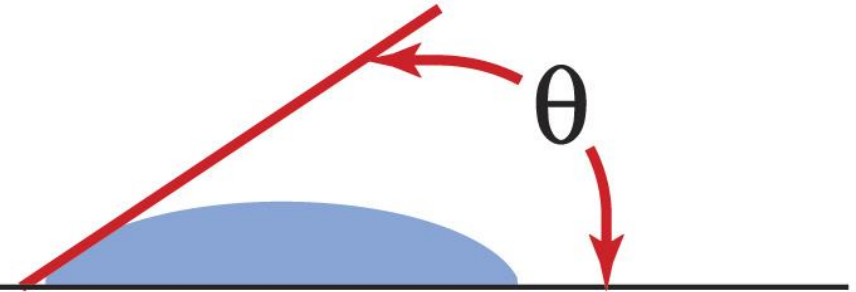




# Surface Tension



- "non-wetable" surface
- water repellent surface
- hydrophobic surface
- water more attracted to itself than to surface
- surface energy of water greater than surface energy of surface
- water "beads up"
- "greasy" surface
- high contact angle " $\theta$ "

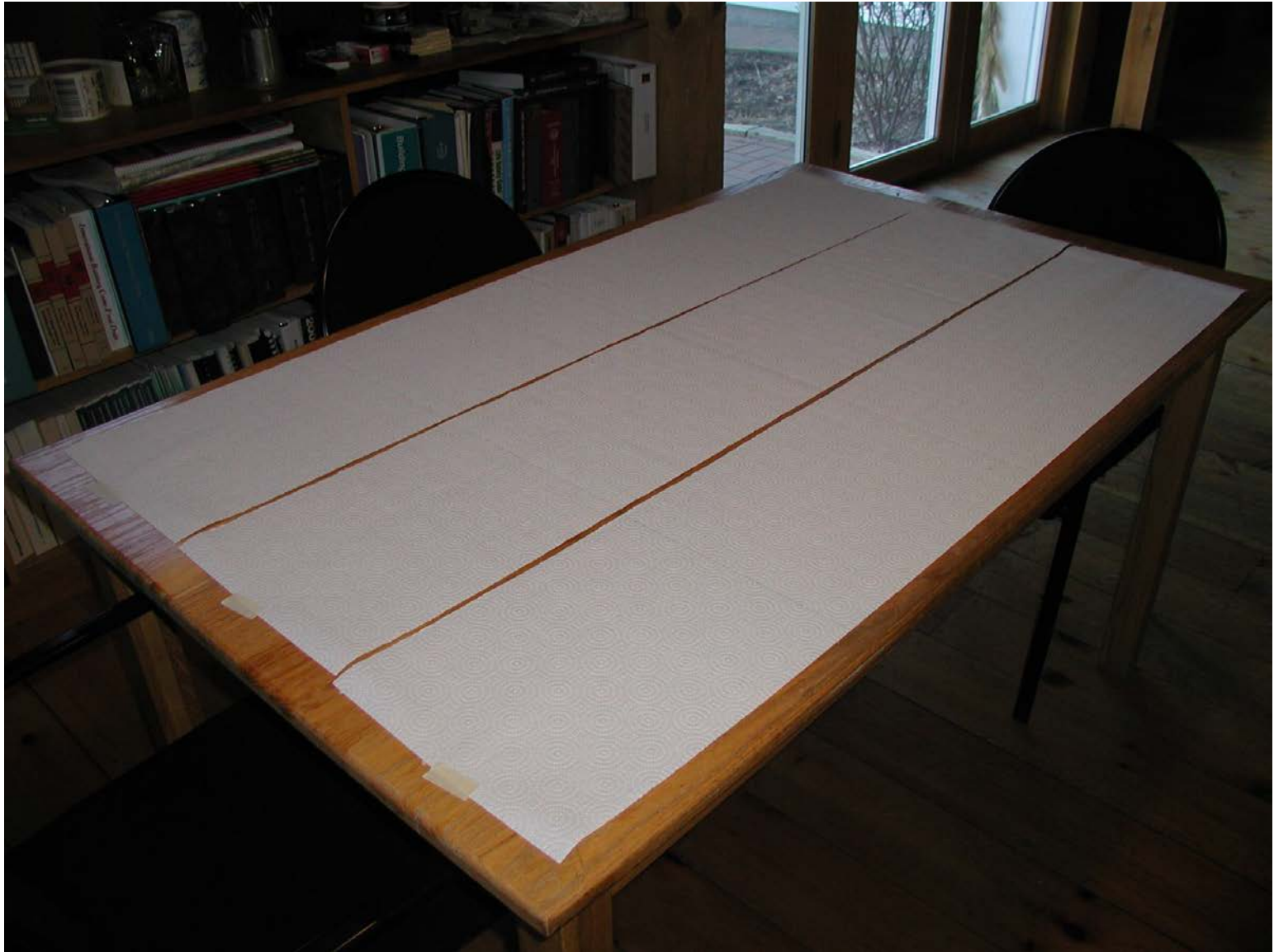


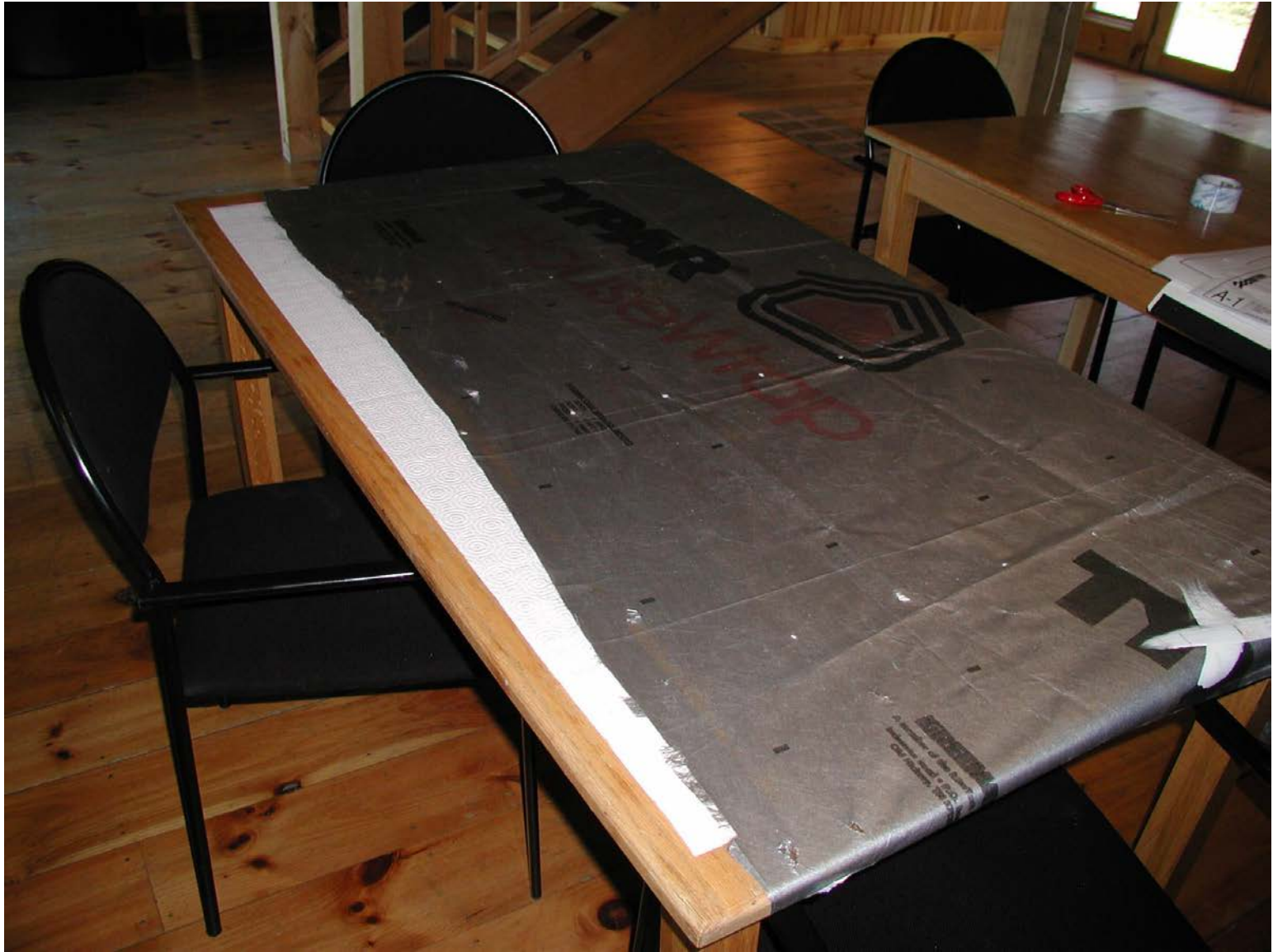
- "wetable" surface
- non-water repellent surface
- hygroscopic surface
- water more attracted to surface than itself
- surface energy of surface greater than surface energy of water
- water "spreads out"
- "non-greasy" surface
- low contact angle " $\theta$ "

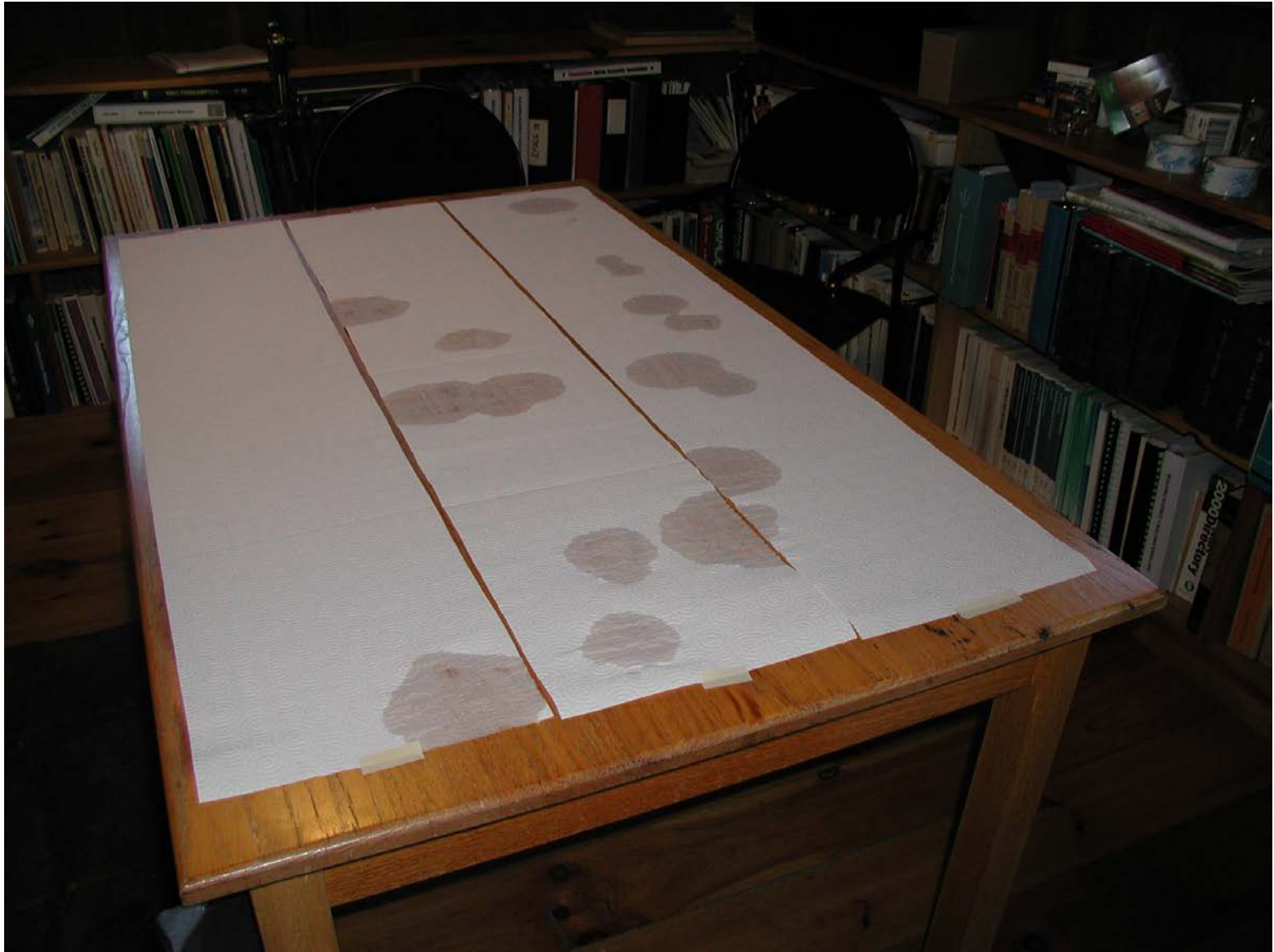


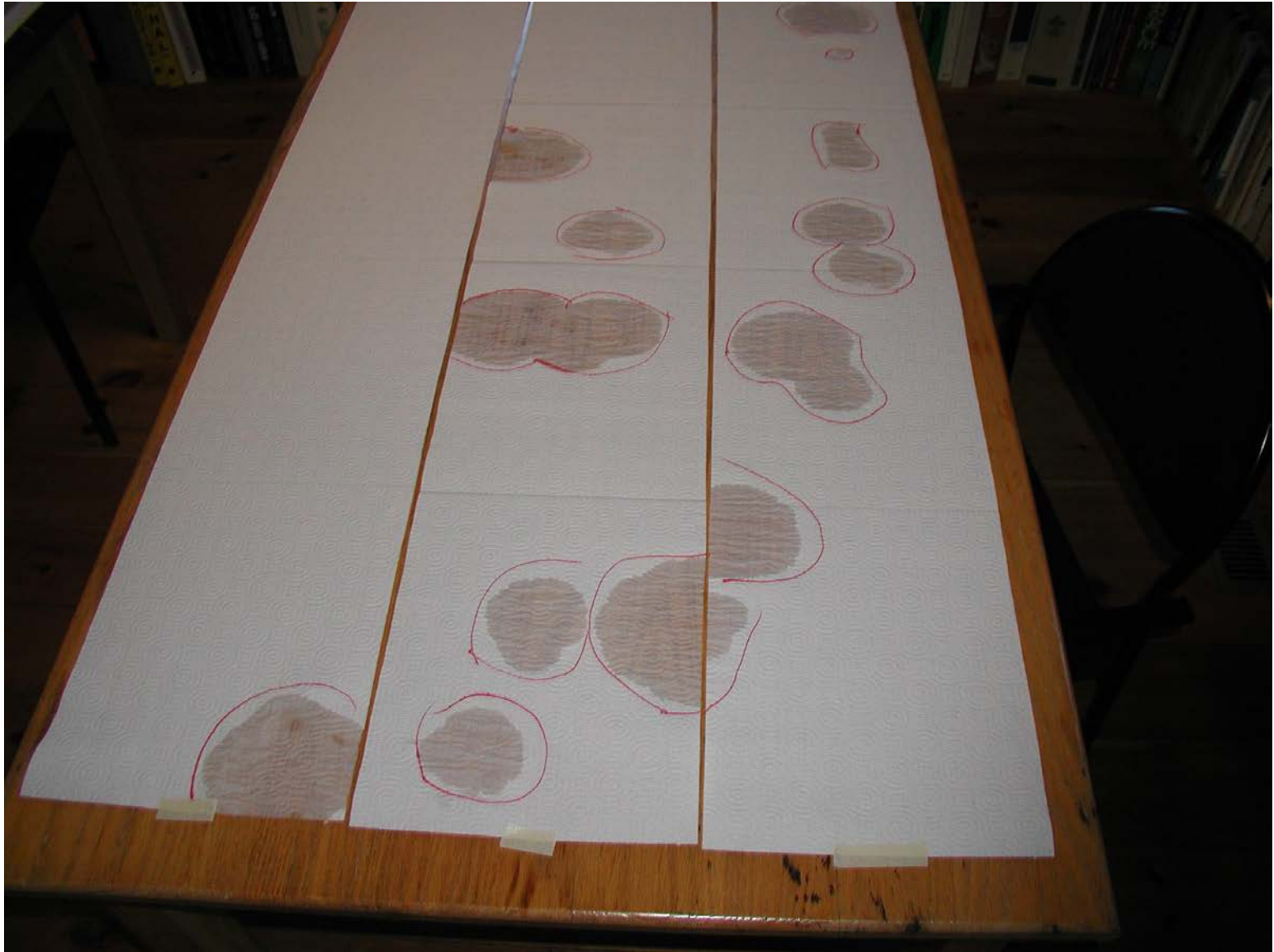








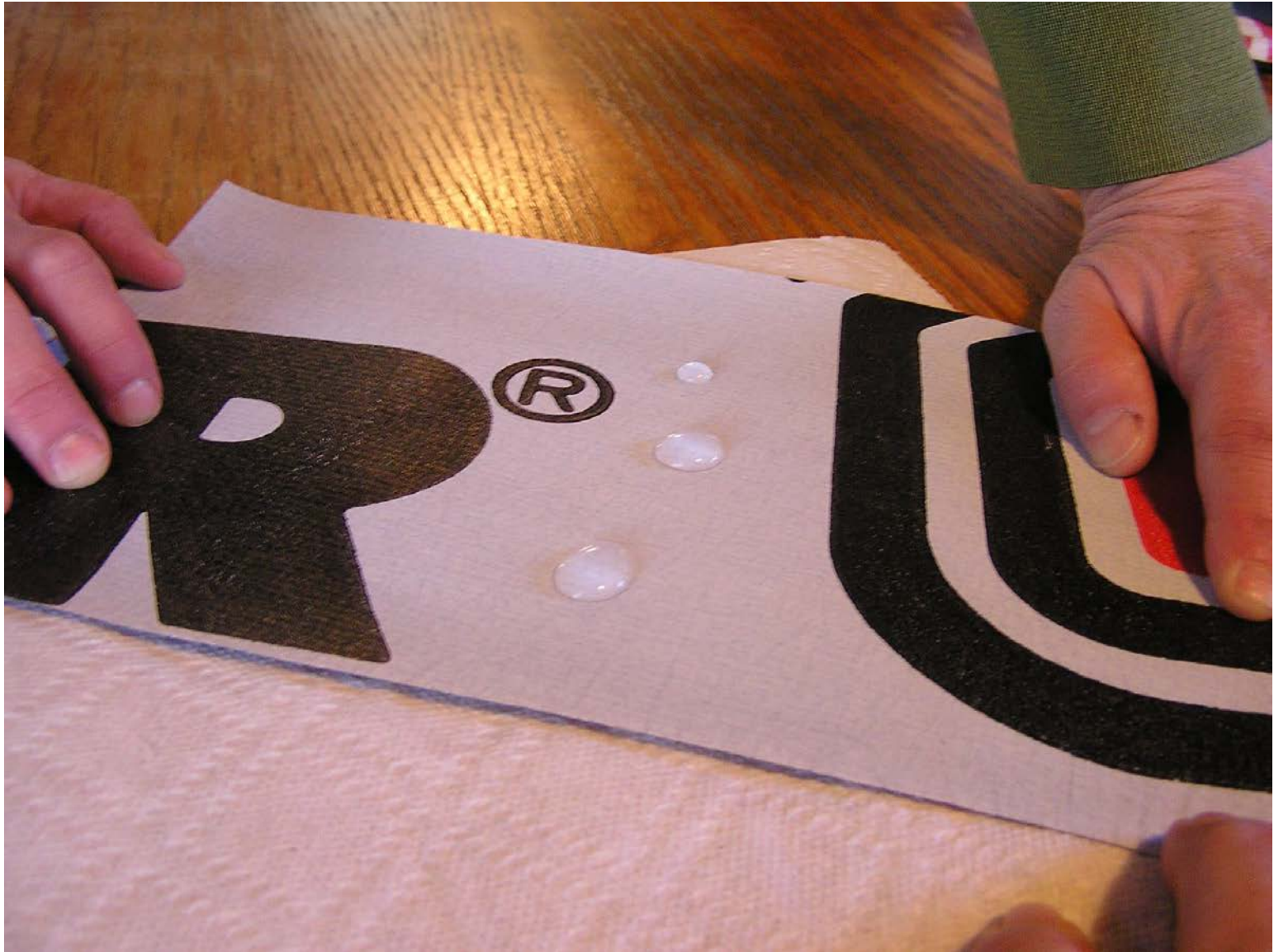




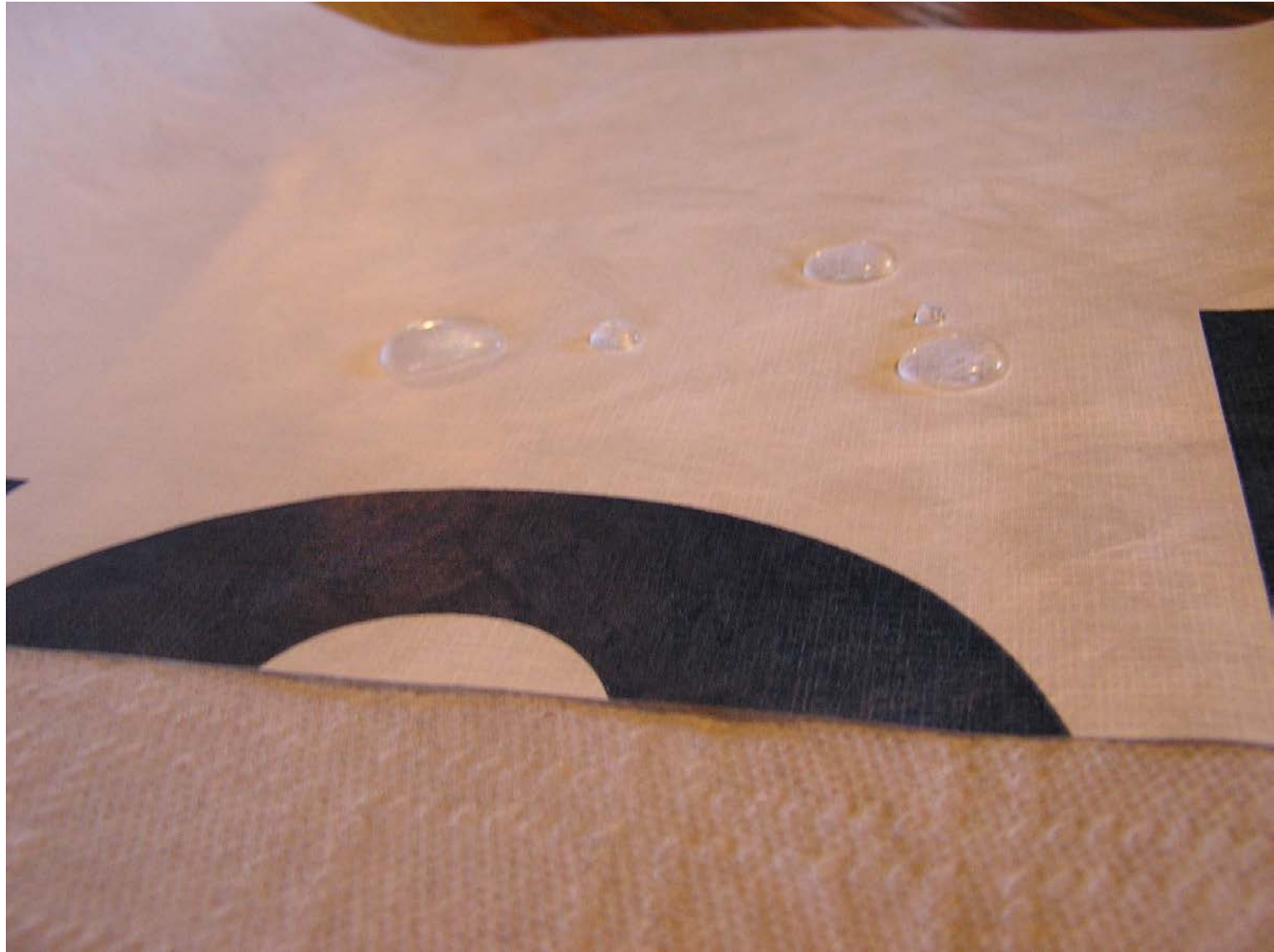


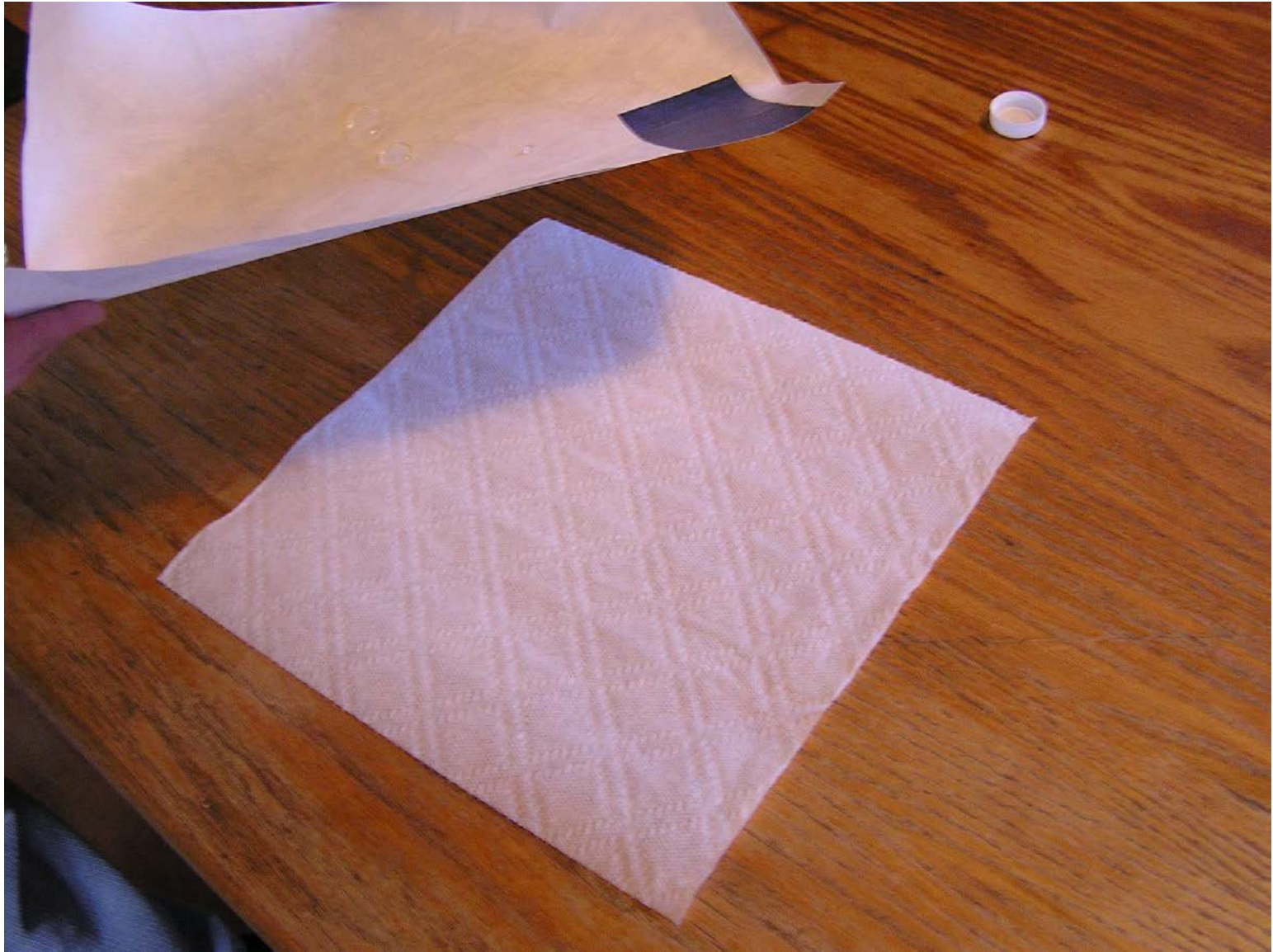








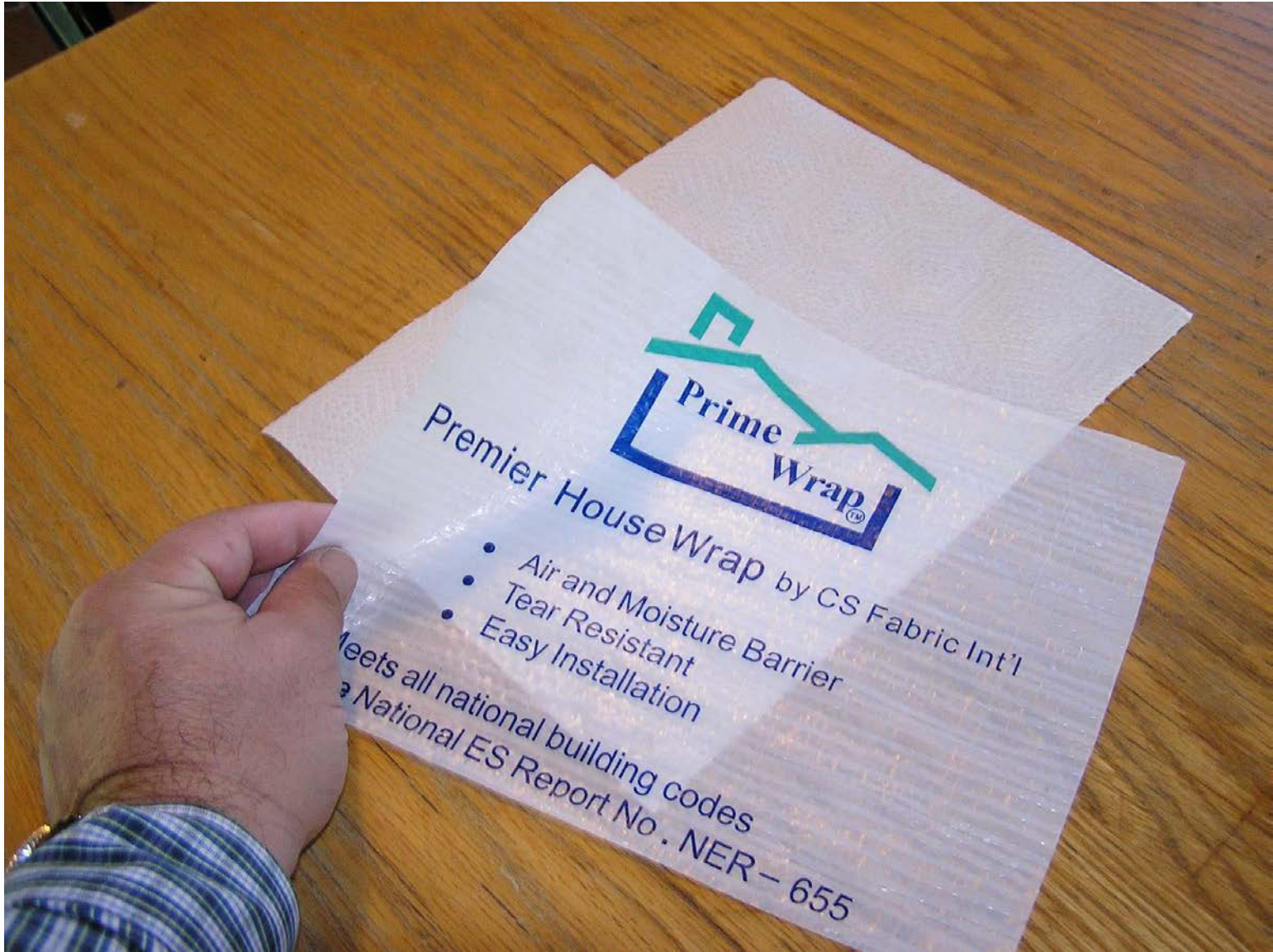












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...ing codes  
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