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# Building Science

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Adventures In Building Science

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# Arrhenius Equation

For Every 10 Degree K Rise  
Activation Energy Doubles

$$k = Ae^{-E_a/(RT)}$$

# Damage Functions

Water

Heat

Ultra-violet Radiation

# 2<sup>nd</sup> Law of Thermodynamics

Heat Flow Is From Warm To Cold

Moisture Flow Is From Warm To Cold

Moisture Flow Is From More To Less

Air Flow Is From A Higher Pressure to a  
Lower Pressure

Gravity Acts Down





**Exposure**

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

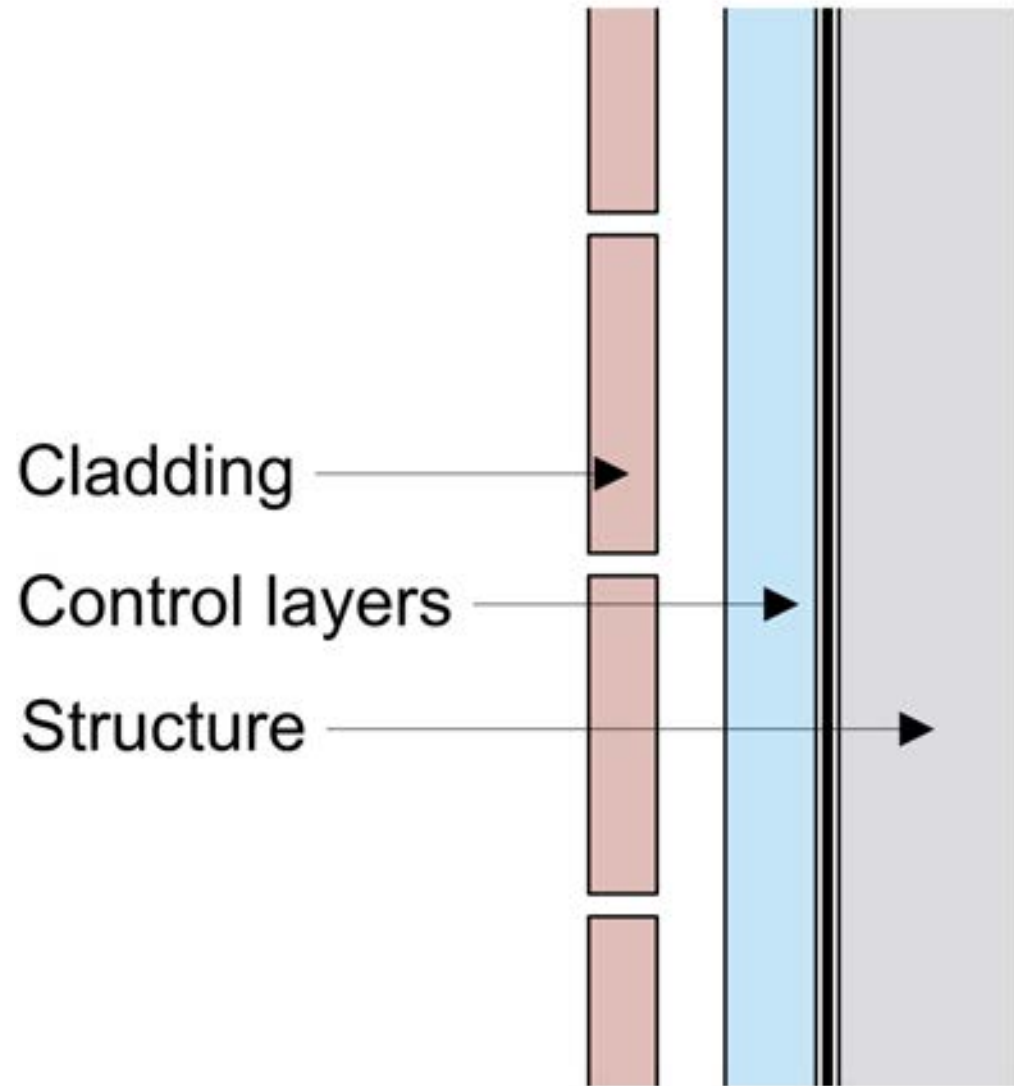


Water Control Layer

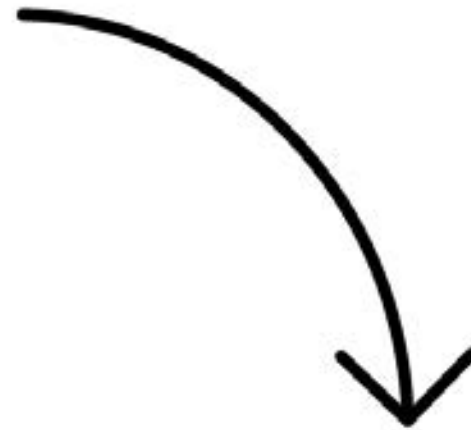
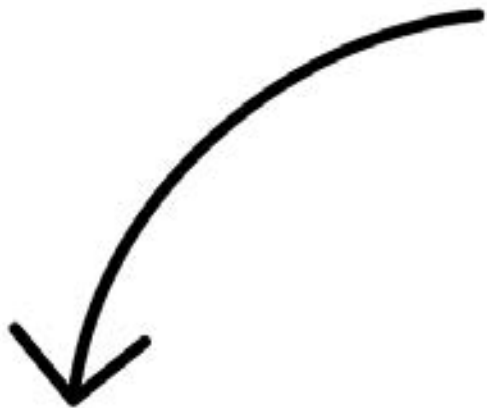
Air Control Layer

Vapor Control Layer

Thermal Control Layer



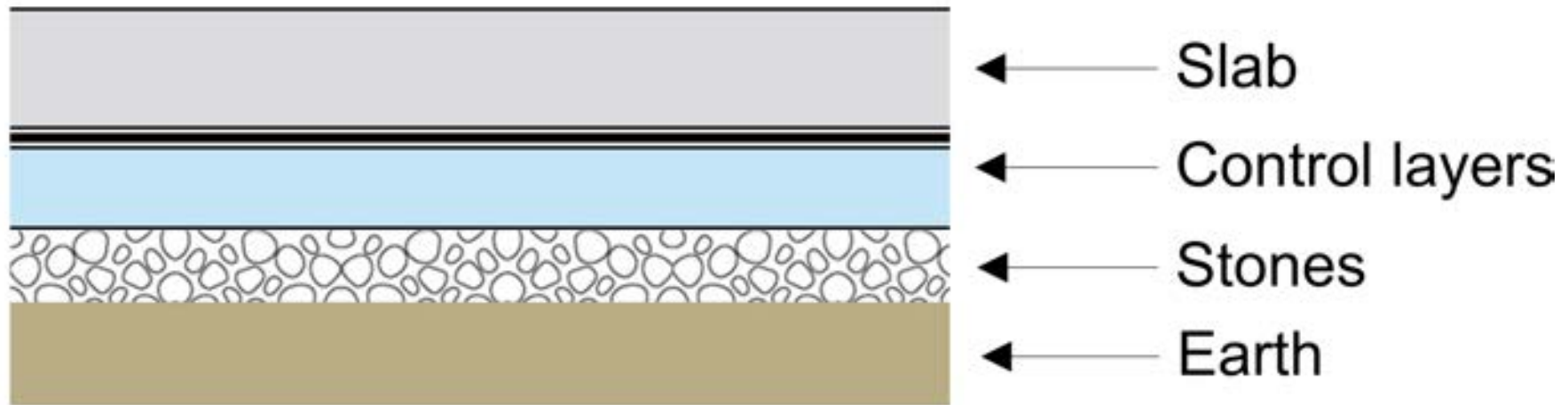
**Wall**

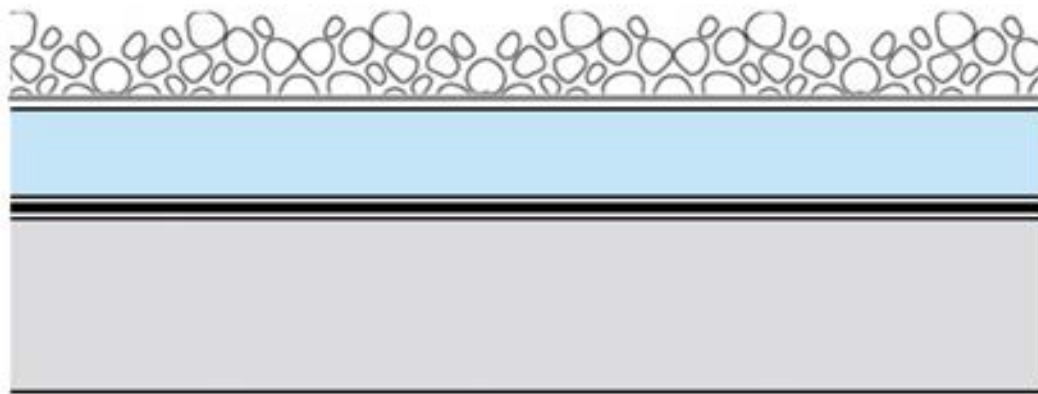


**Slab**

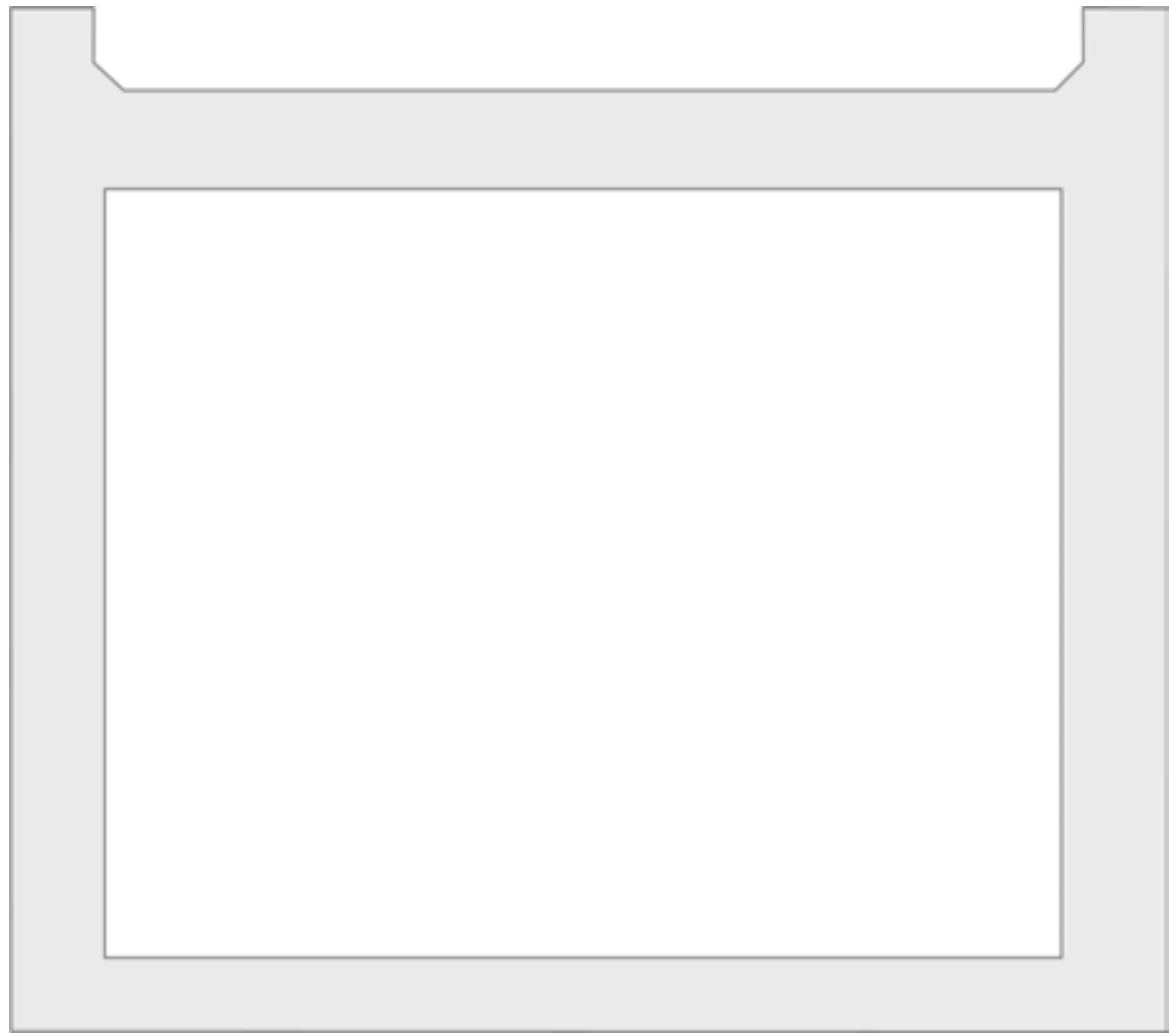


**Roof**

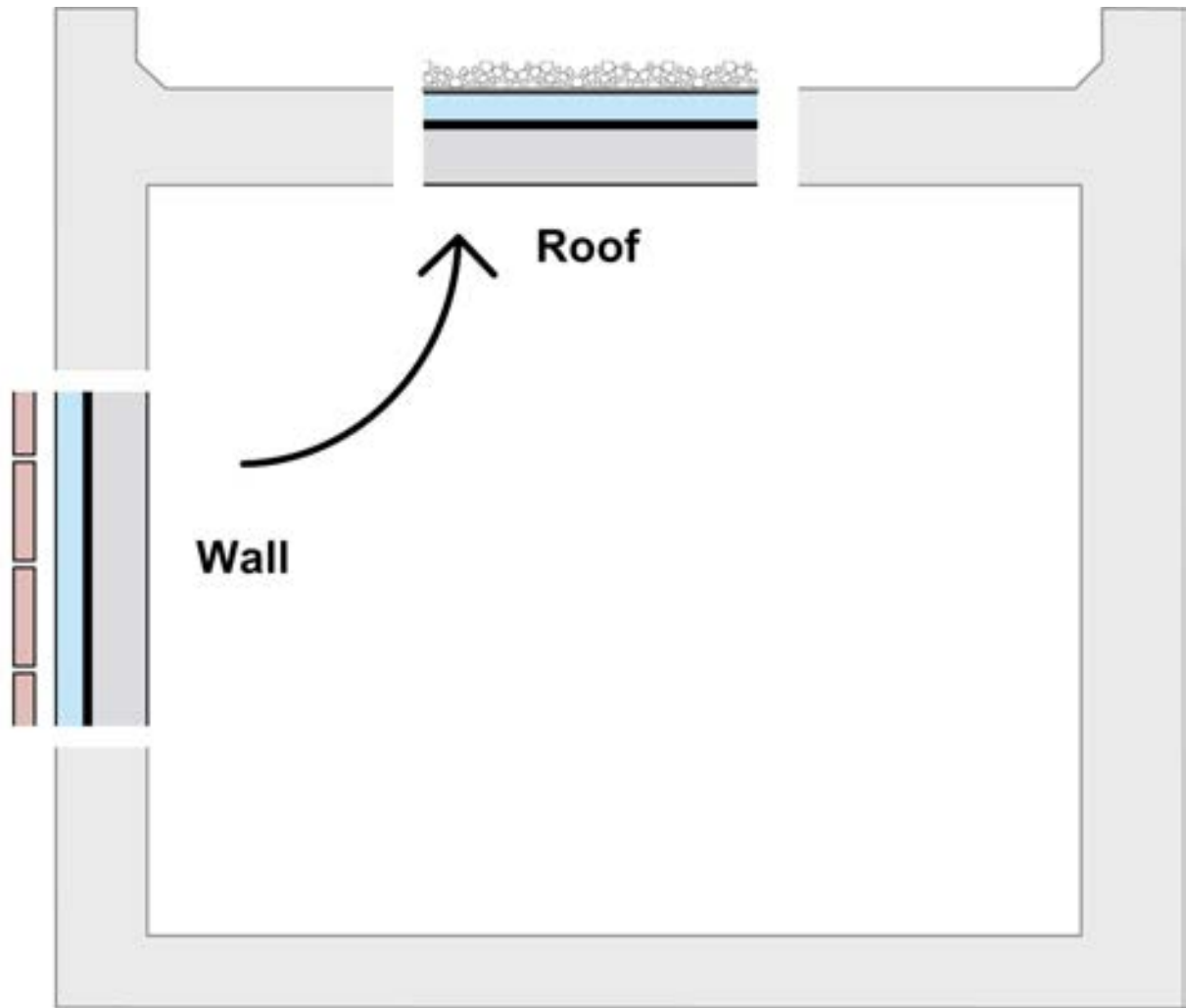




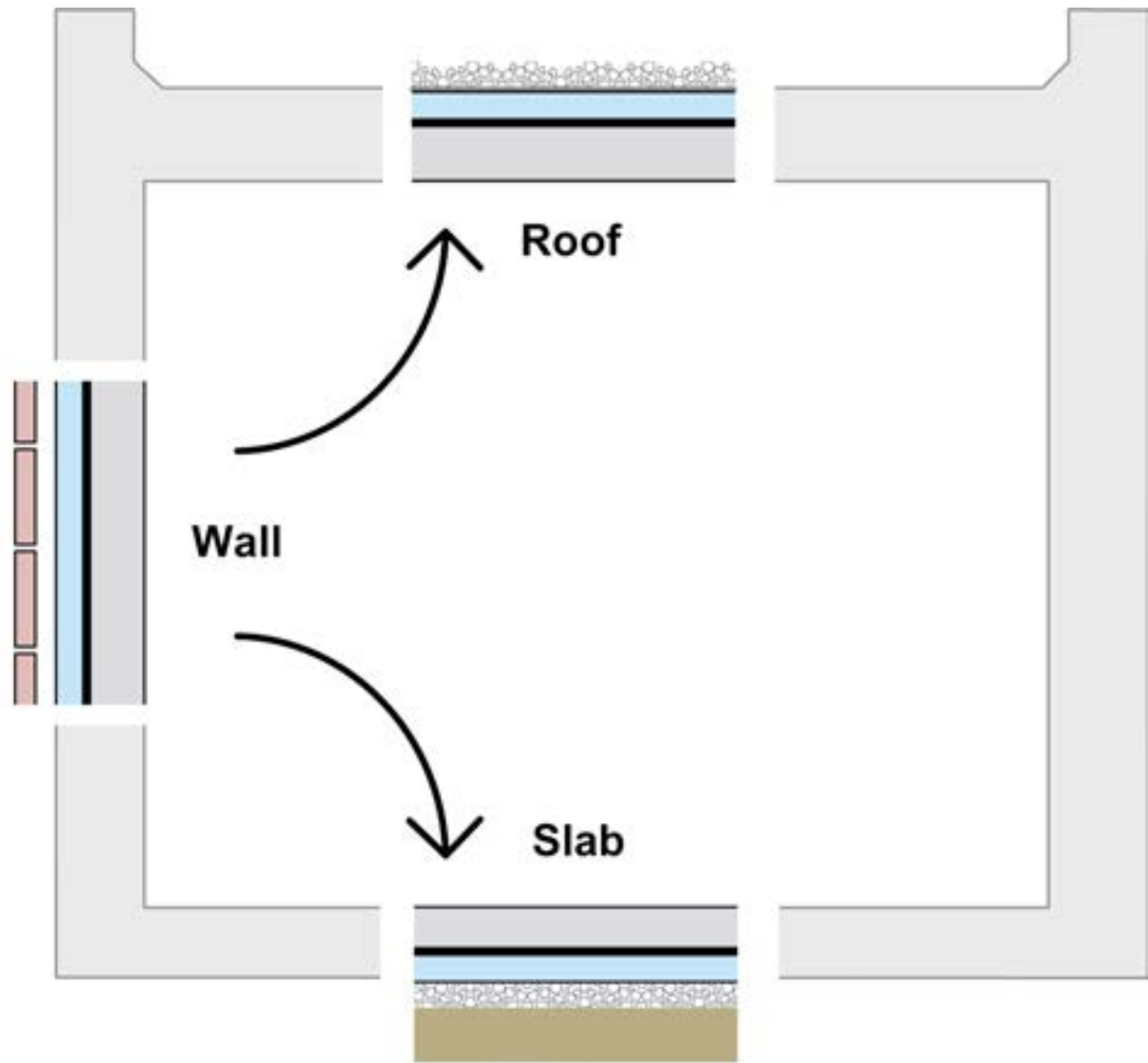
- ← Ballast
- ← Filter fabric
- ← Control layers
- ← Roof structure

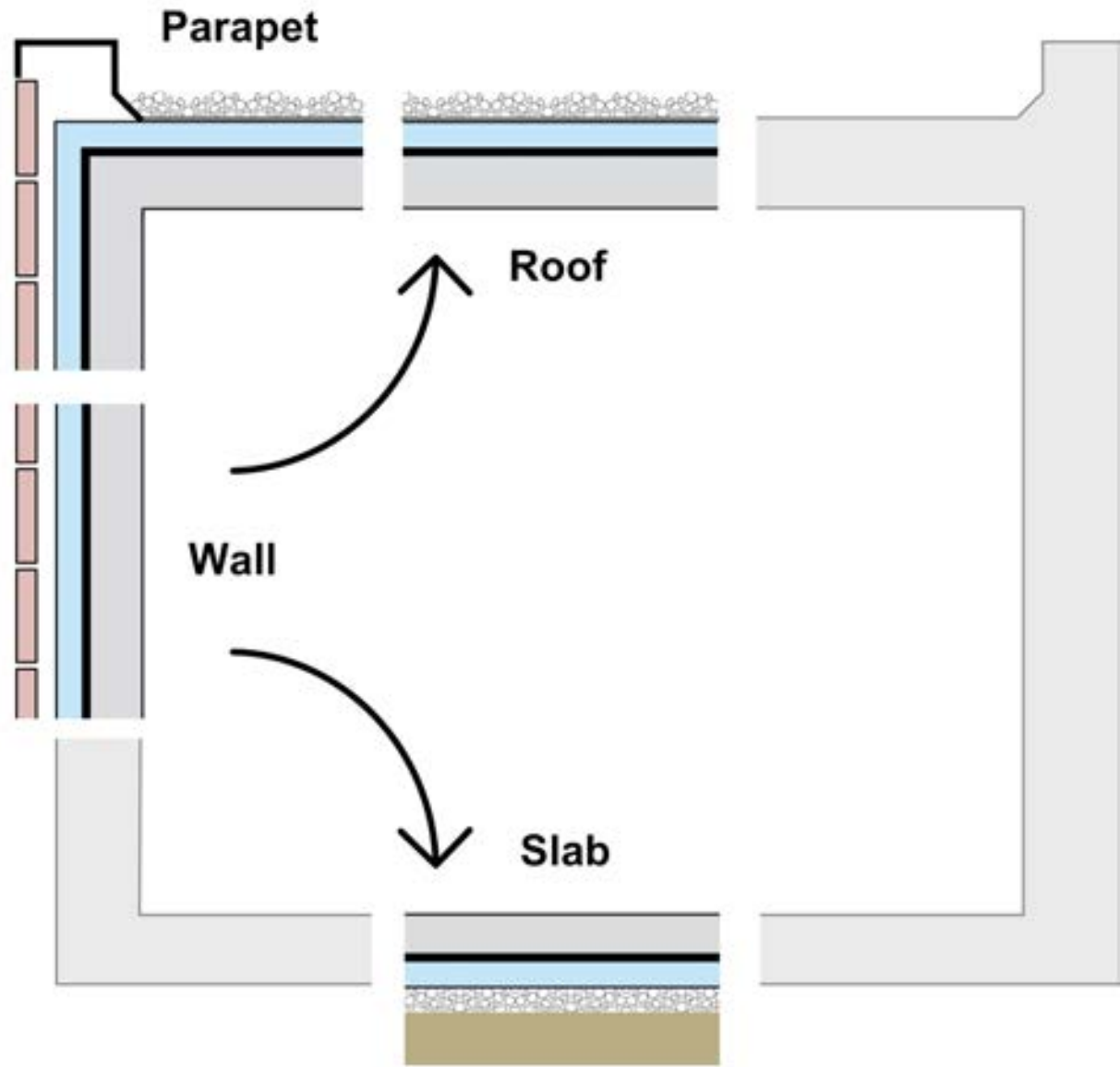


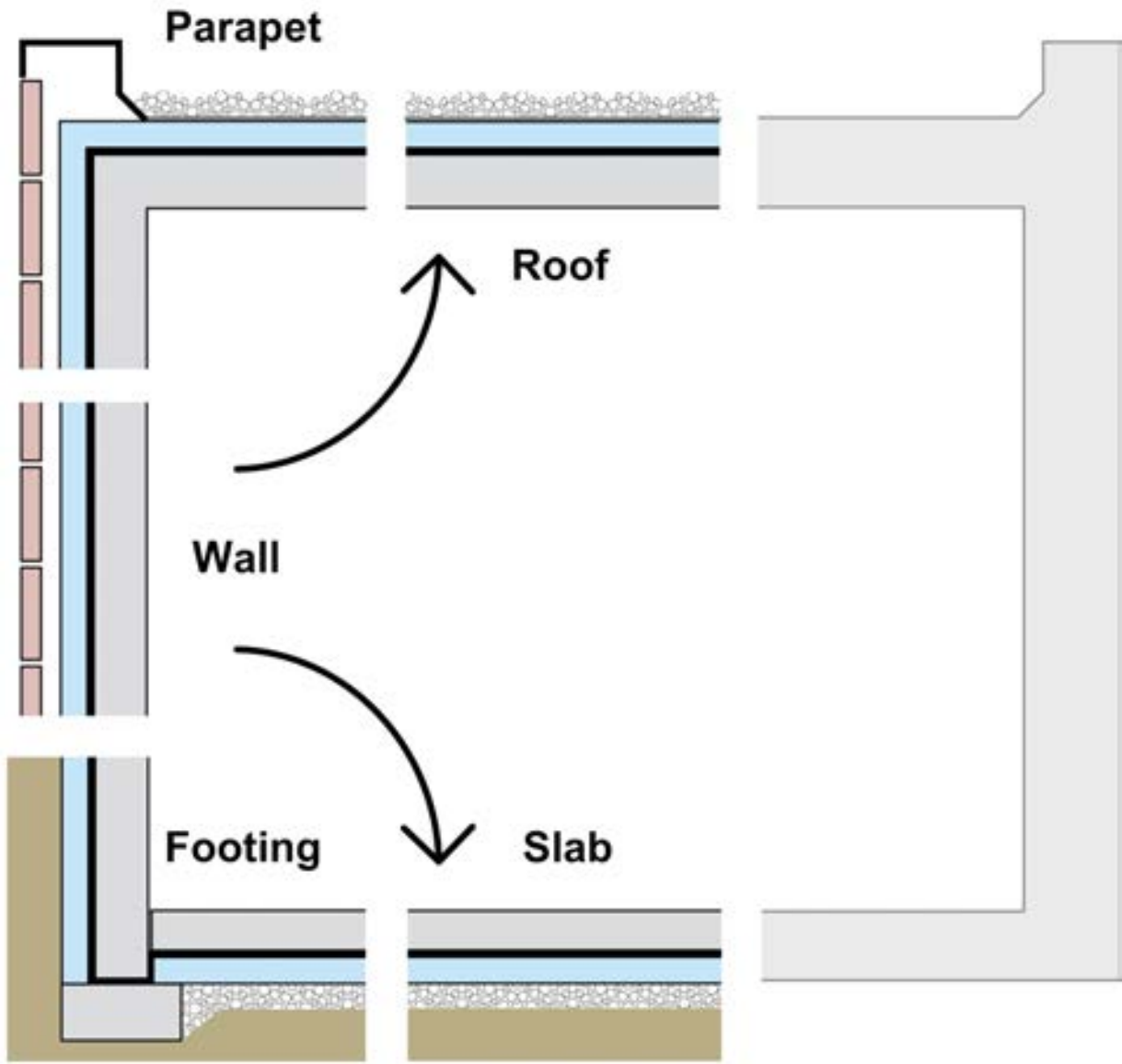




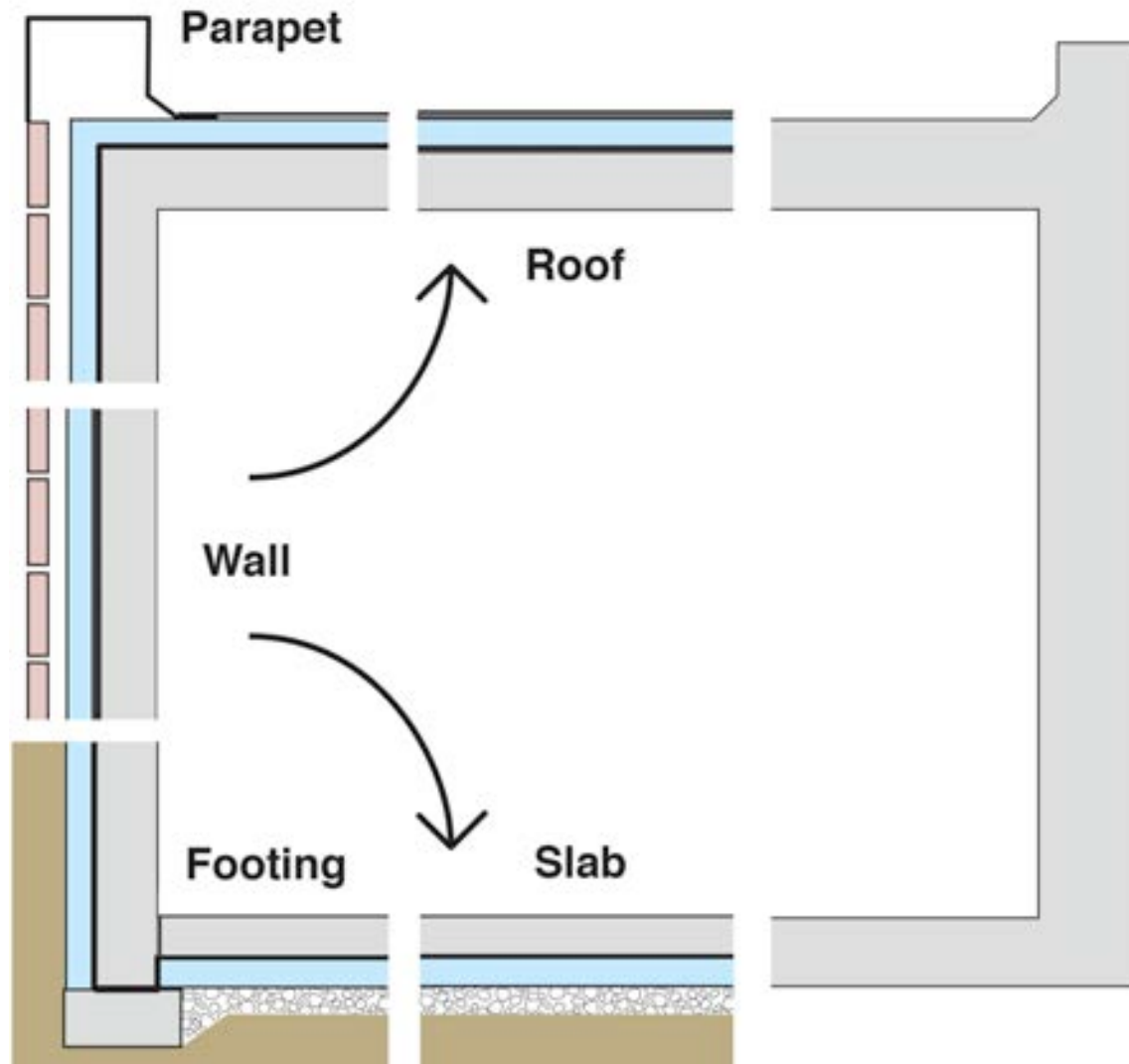


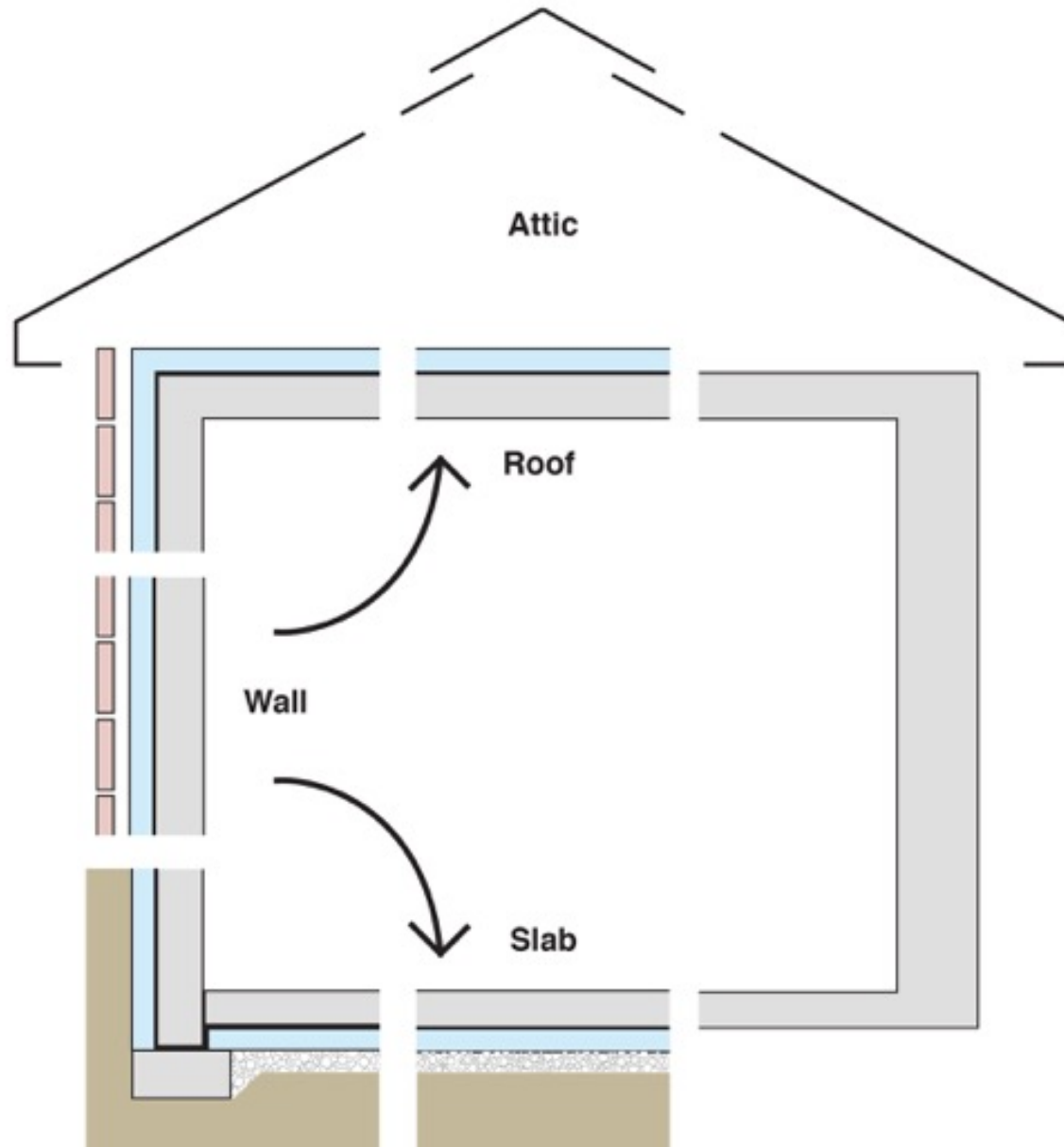


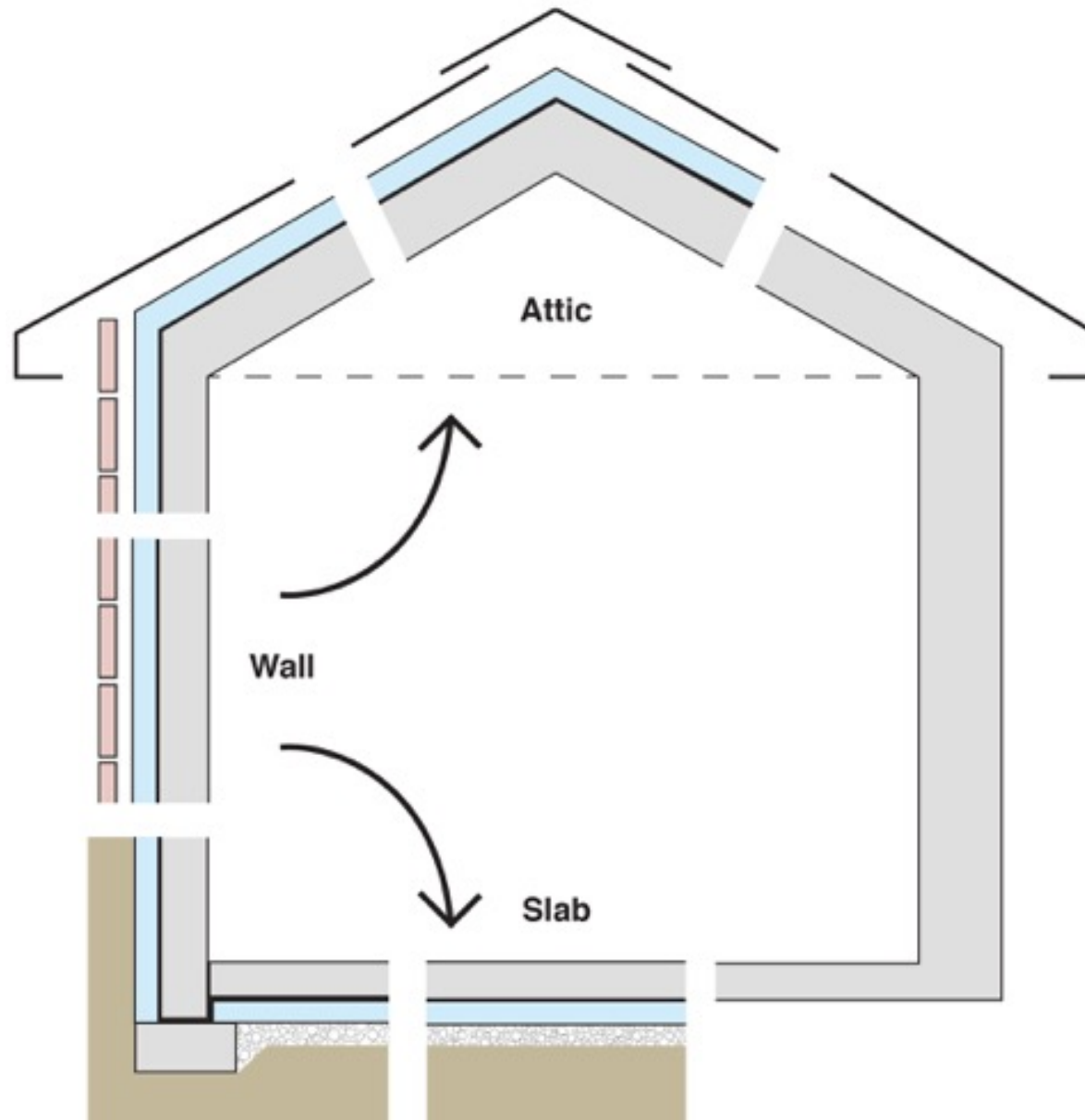


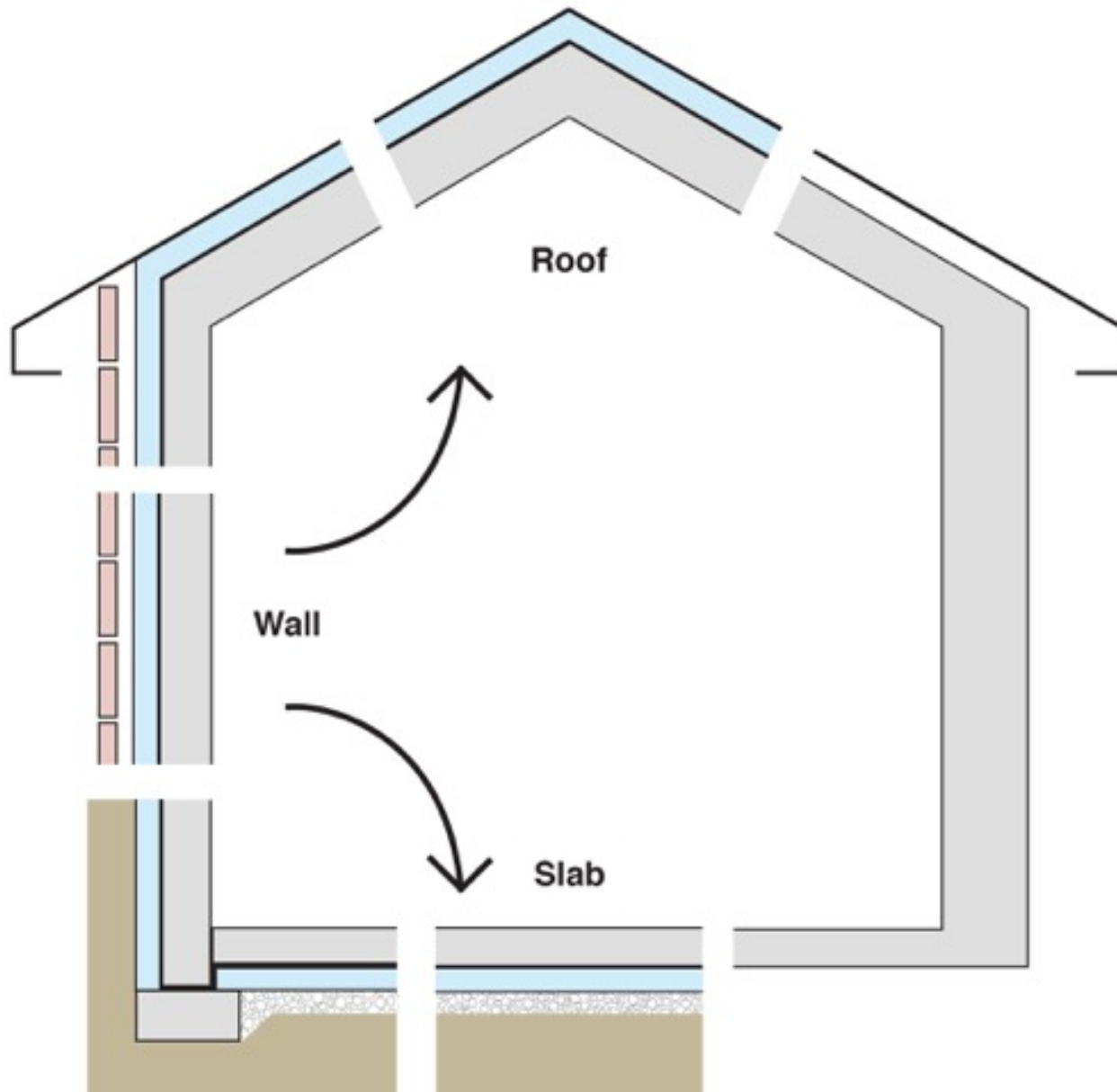




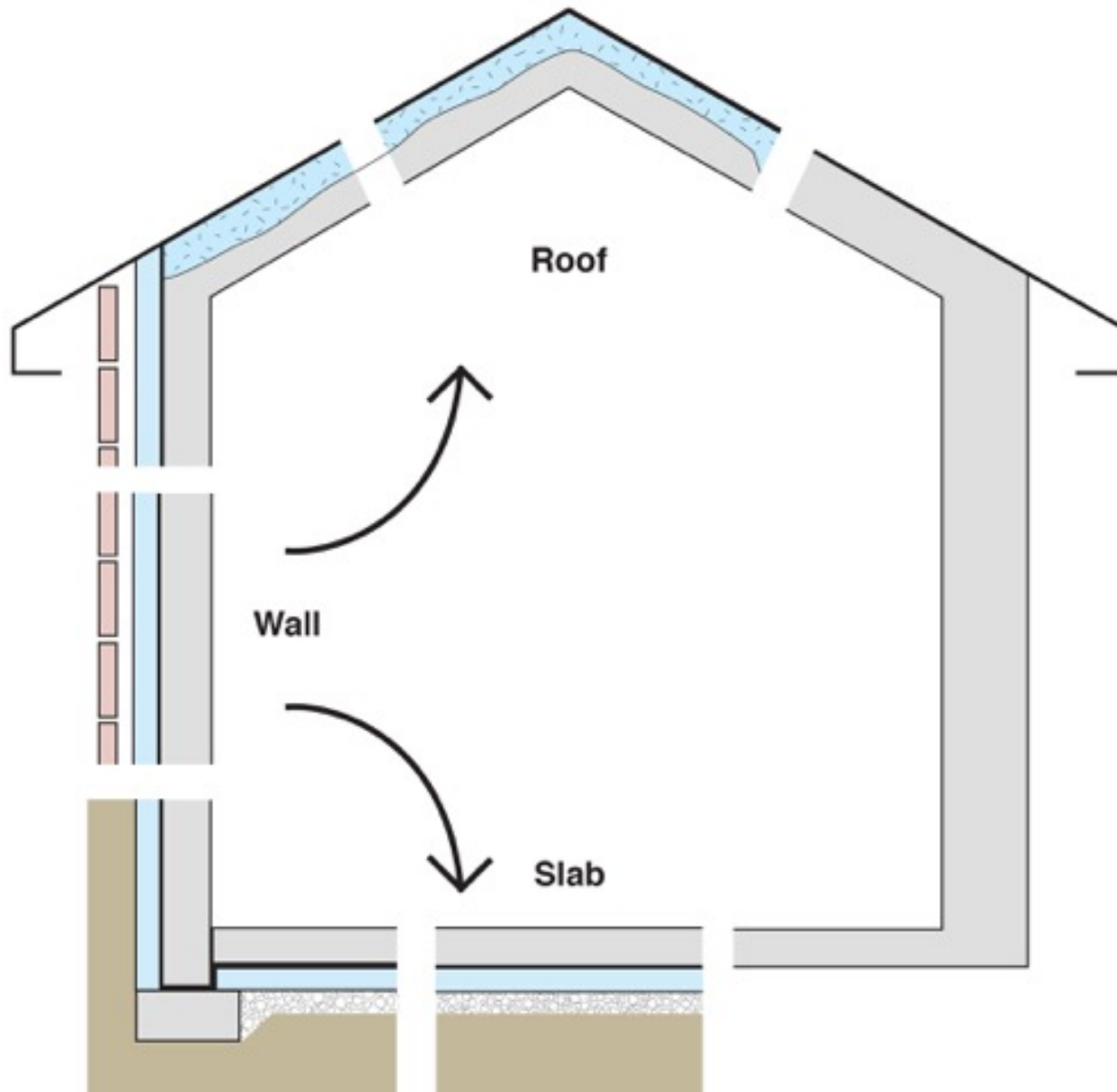


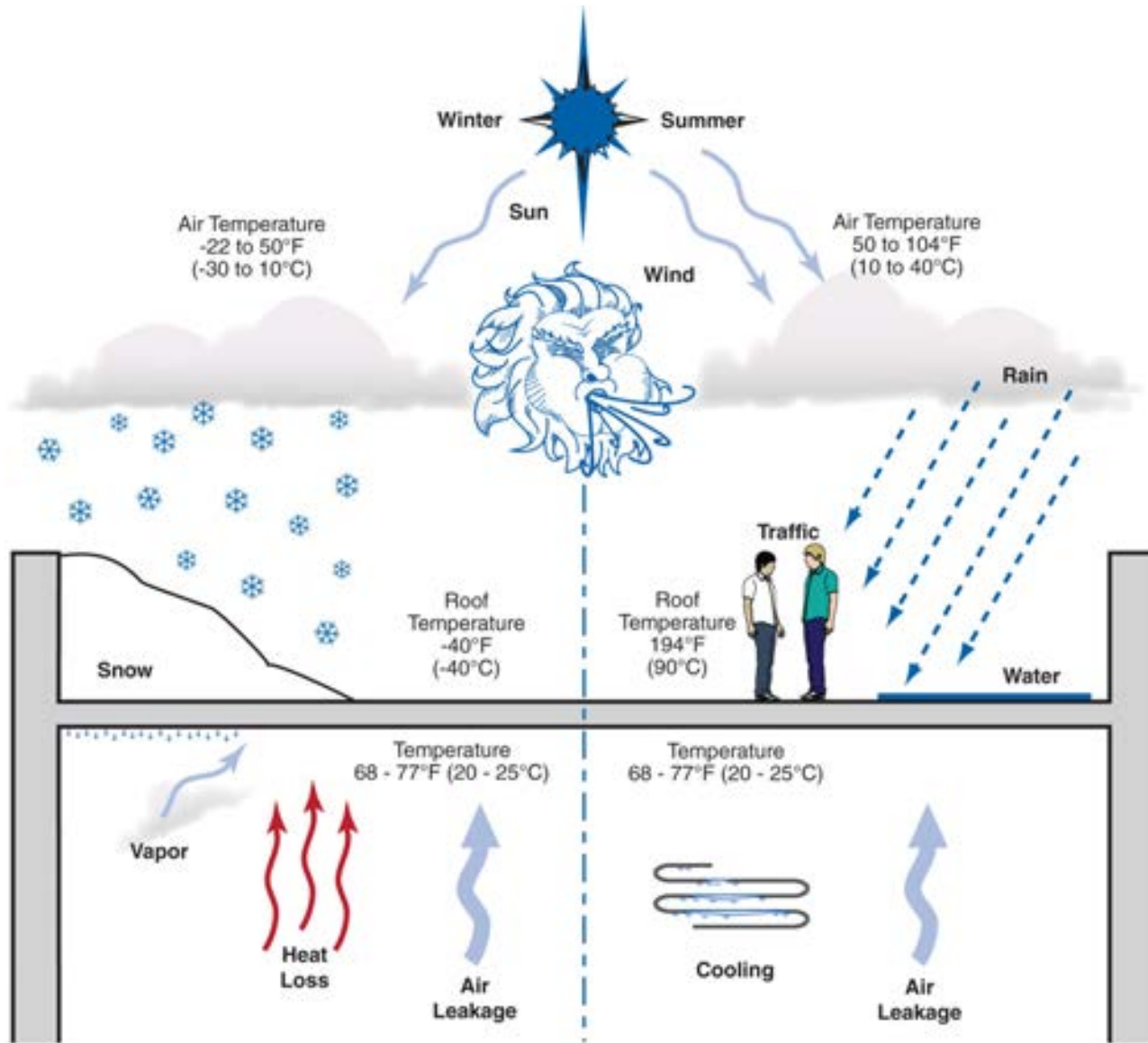




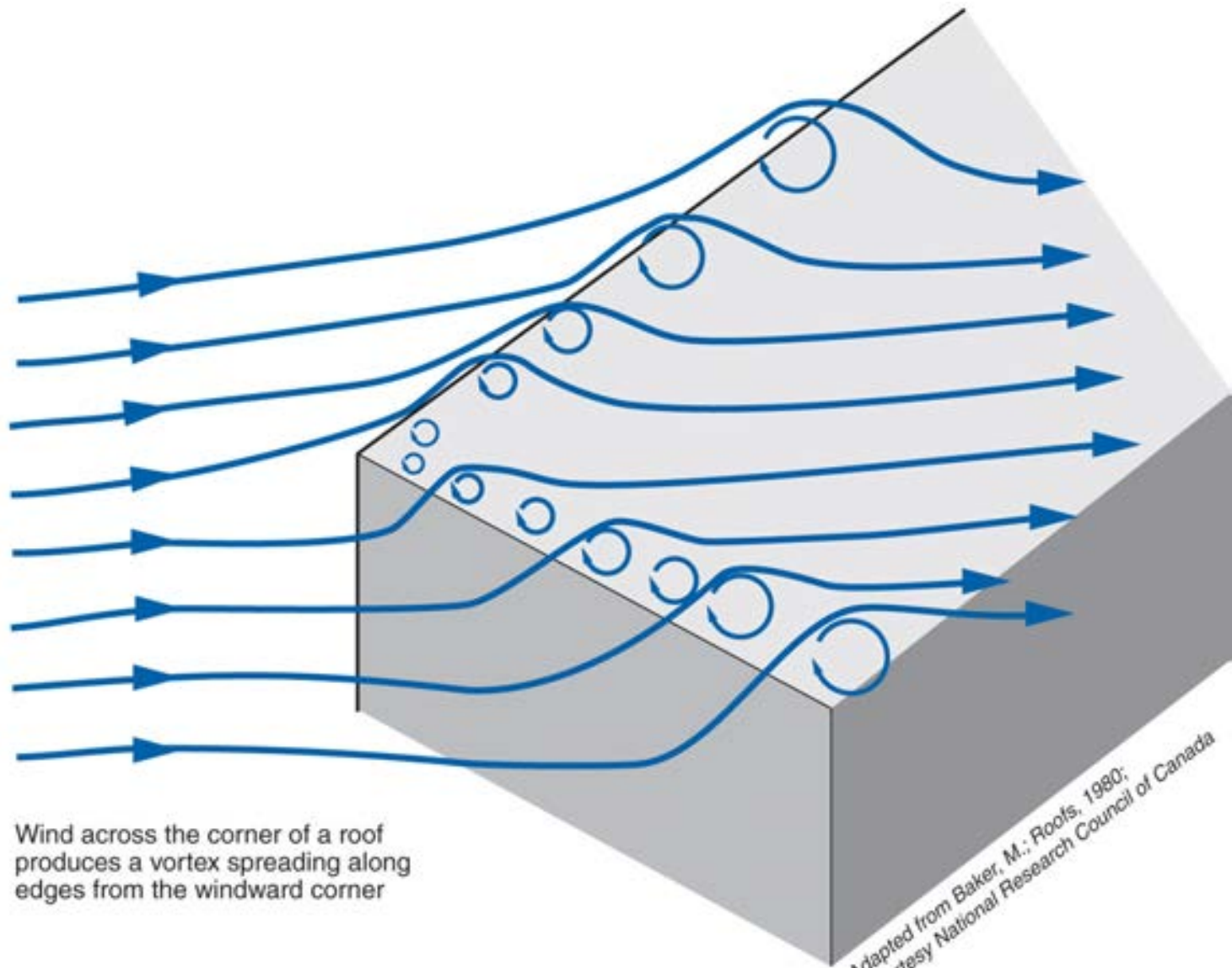






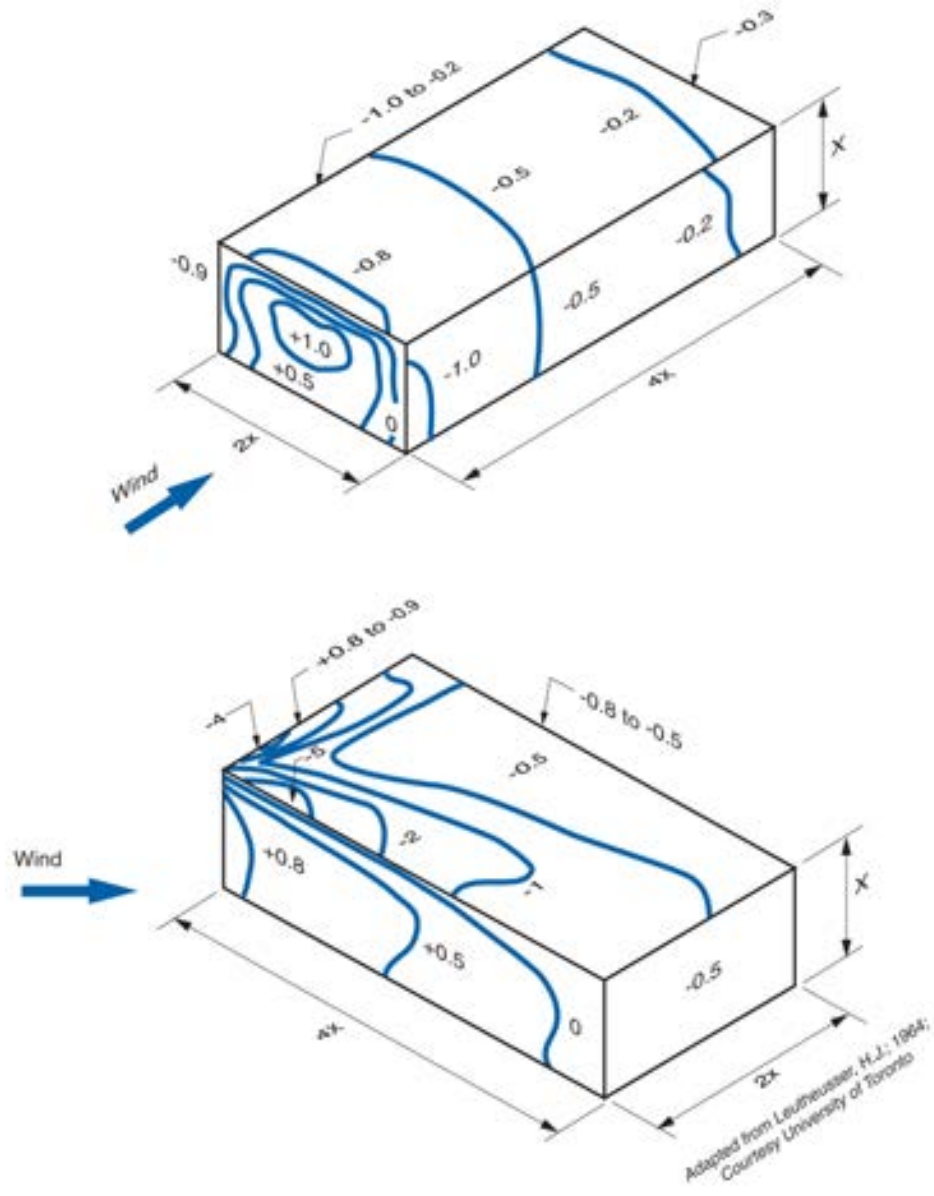


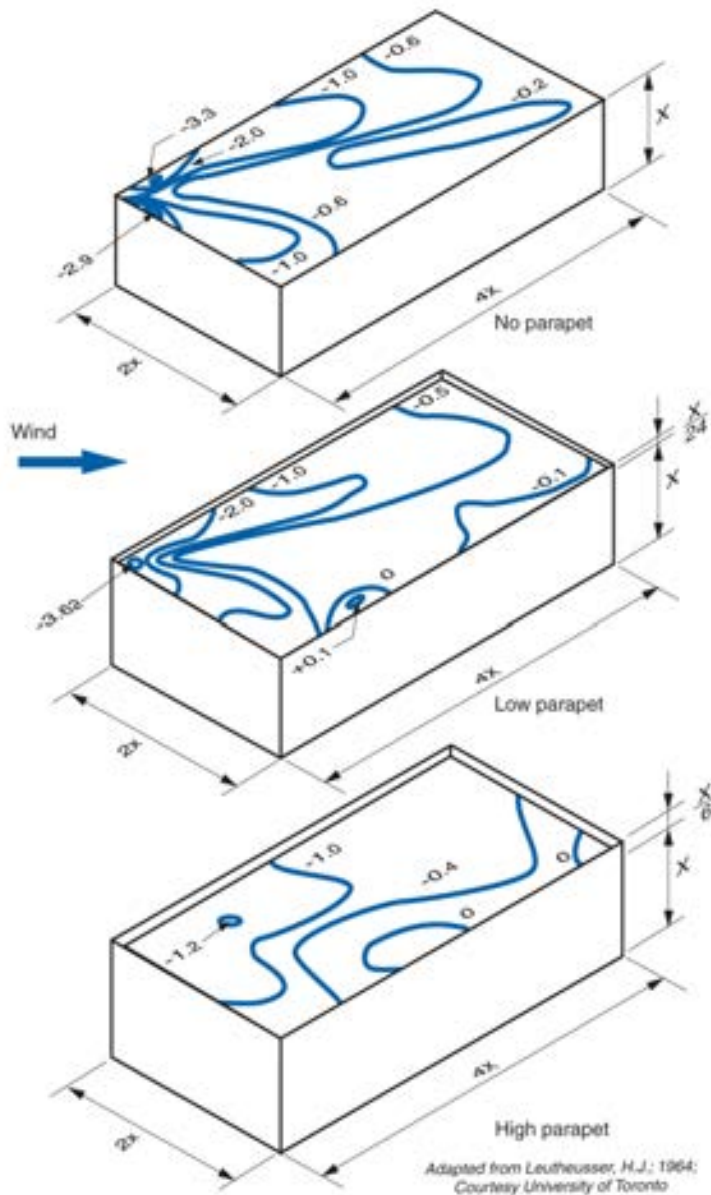
Adapted from Baker, M.: *Roofs*, 1980;  
 Courtesy National Research Council of Canada

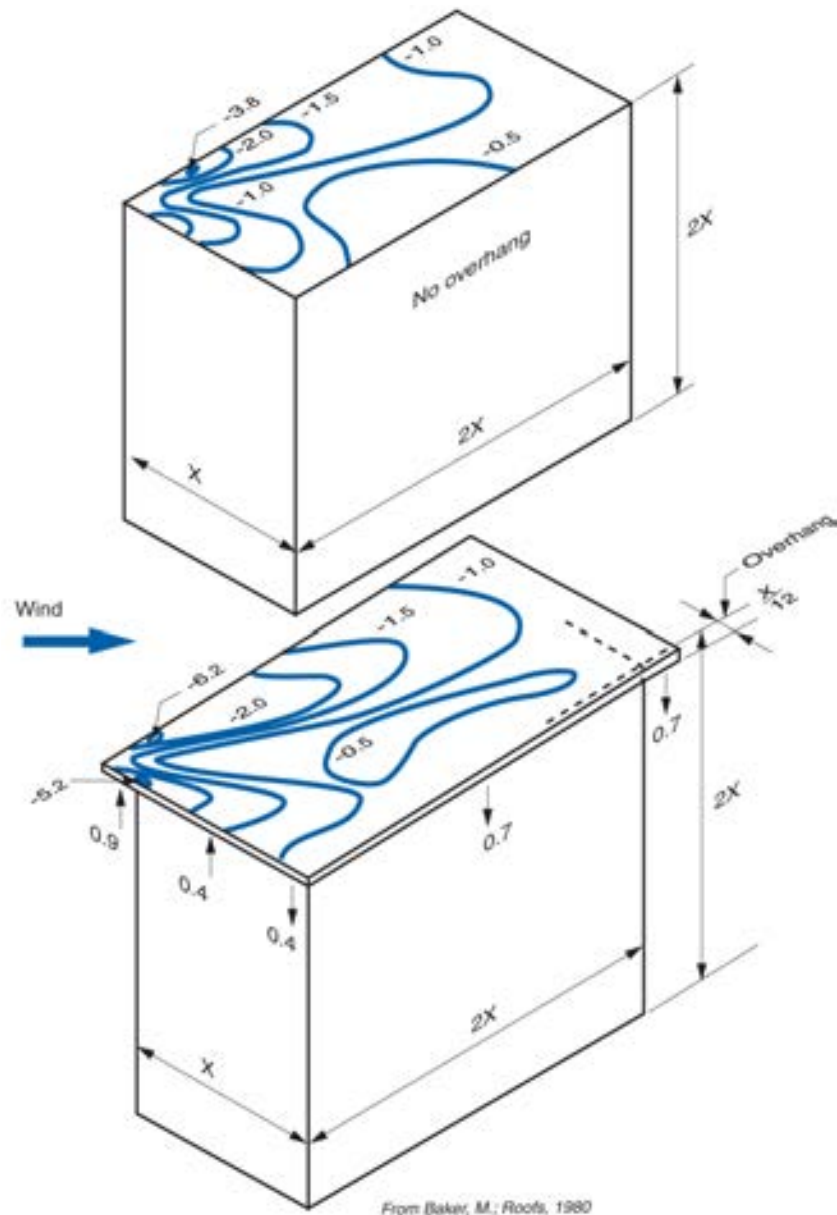


Wind across the corner of a roof produces a vortex spreading along edges from the windward corner

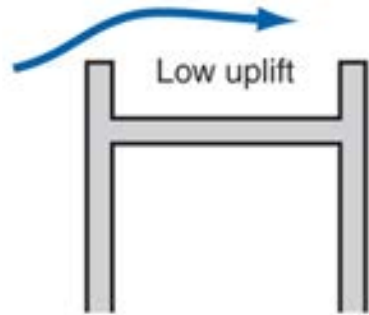
Adapted from Baker, M.: *Roofs*, 1980;  
Courtesy National Research Council of Canada



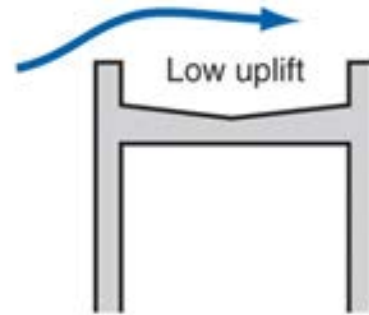




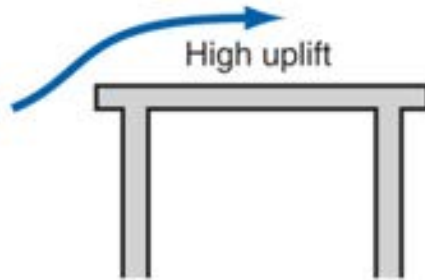
From Baker, M.; *Roofs*, 1980



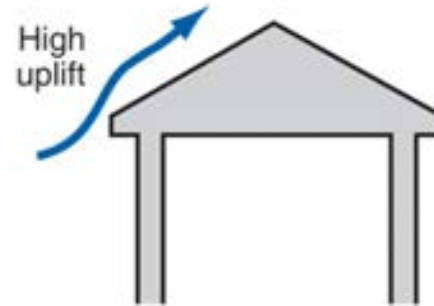
Flat roof with parapets  
blow-off hazard: low  
slippage hazard: low



Sloped roof with parapets  
blow-off hazard: low  
slippage hazard: medium

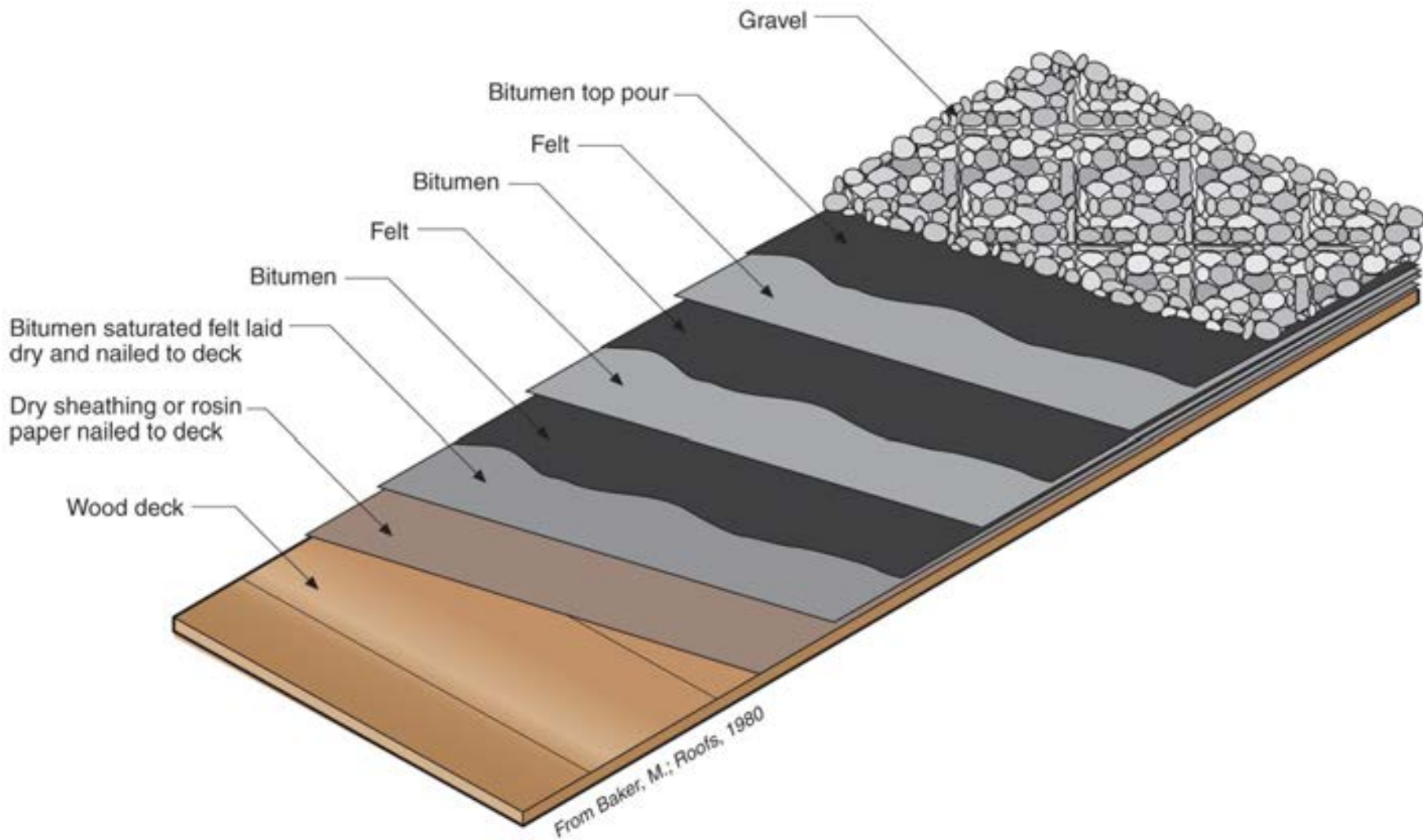


Flat roof or overhang  
blow off hazard: high  
slippage hazard: low

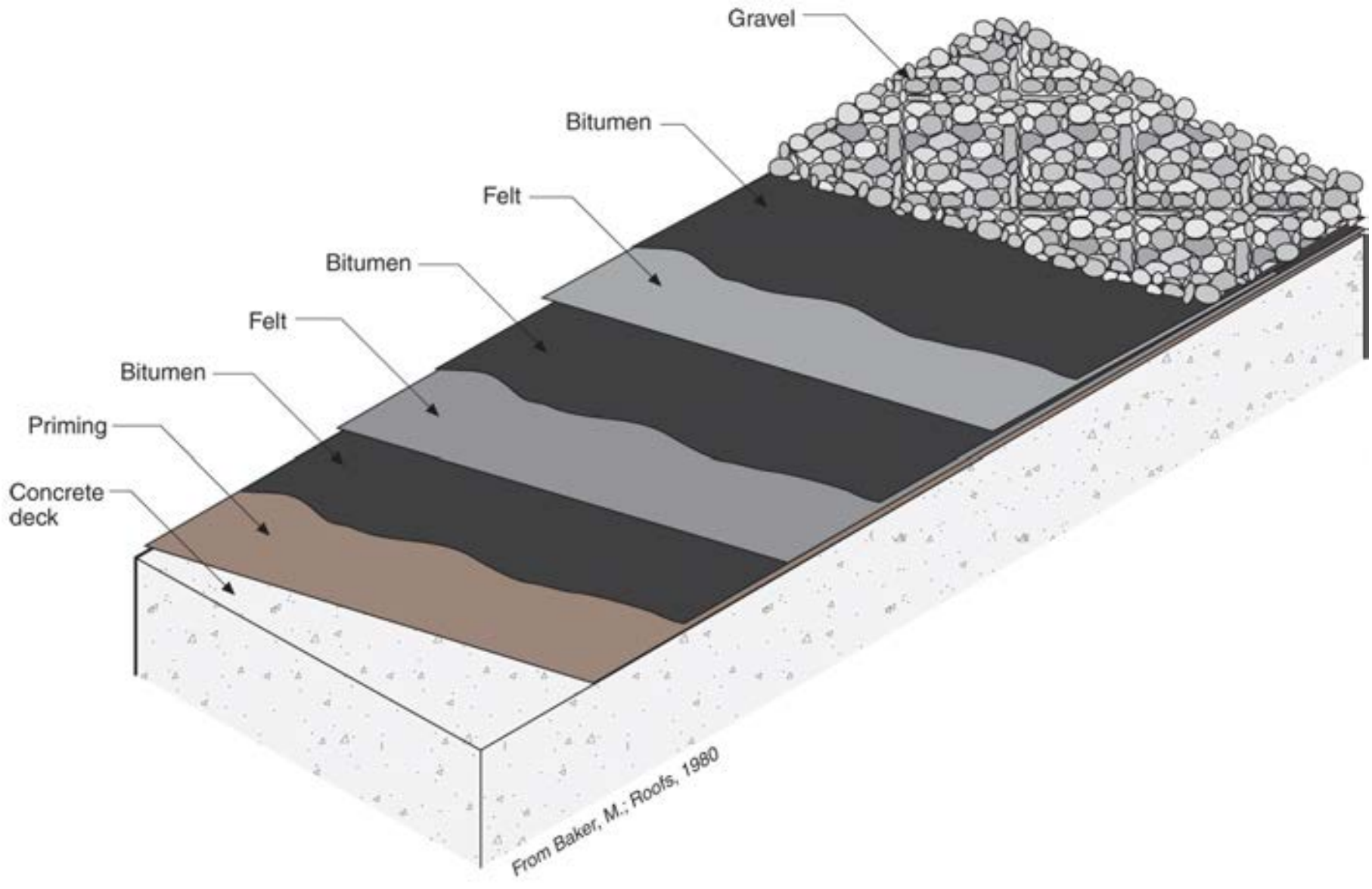


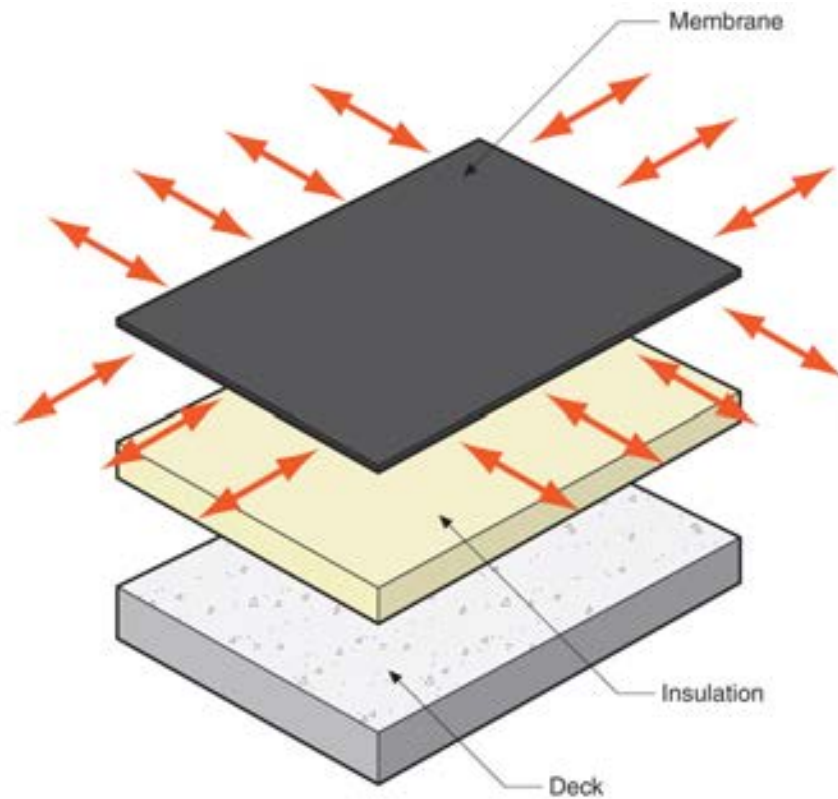
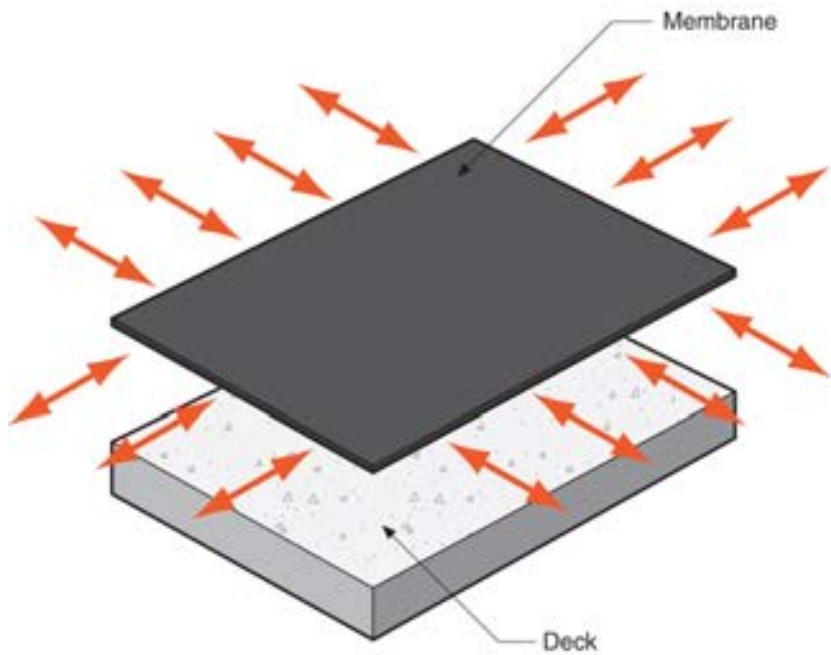
Outward sloping roof  
blow-off hazard: high  
slippage hazard: high

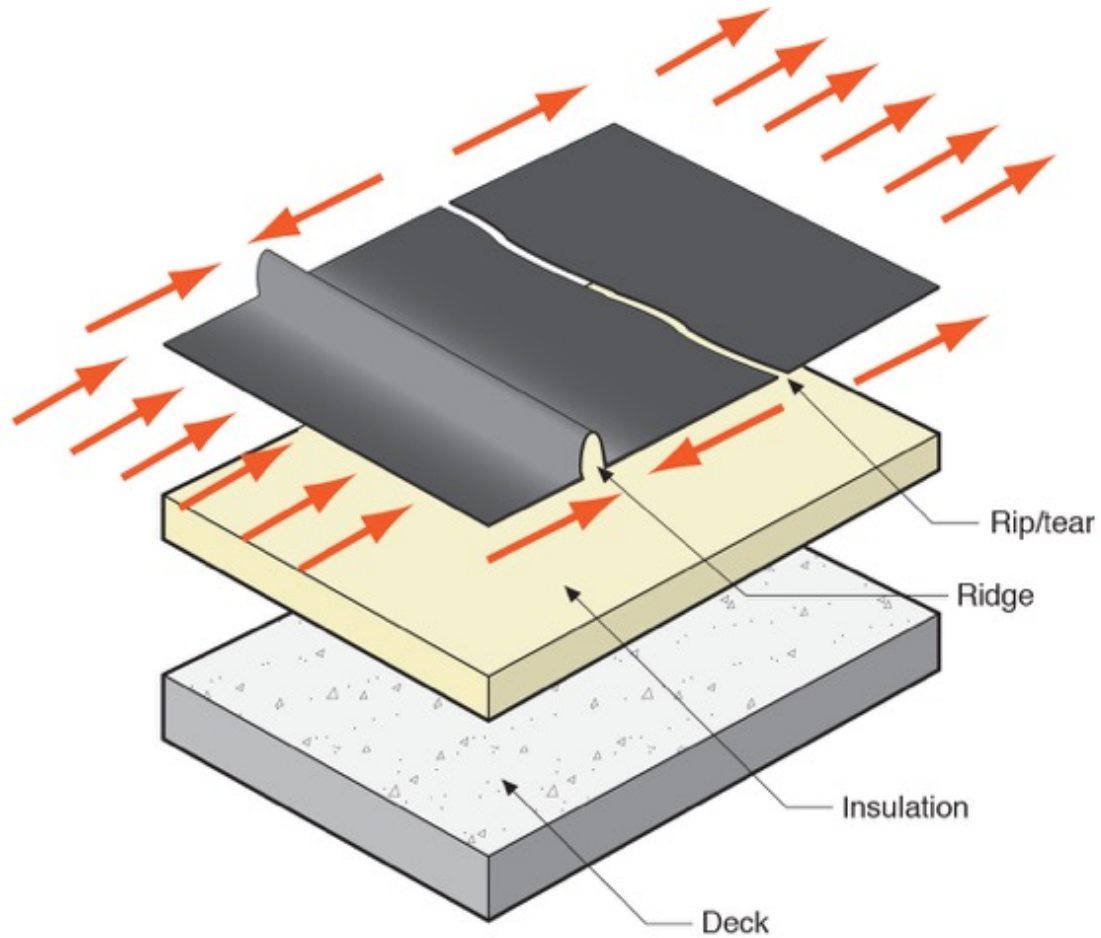
*From Baker, M.; Roofs, 1980*

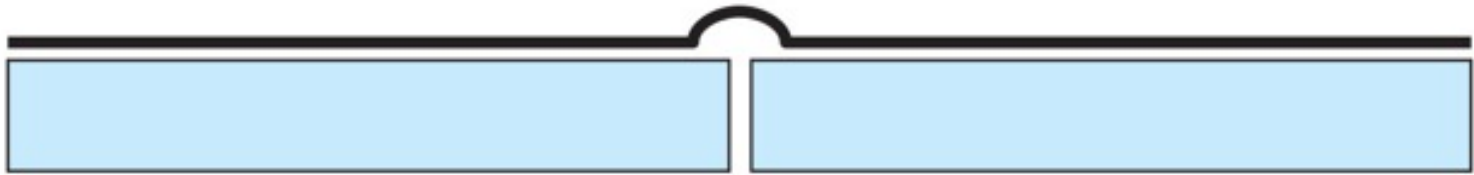
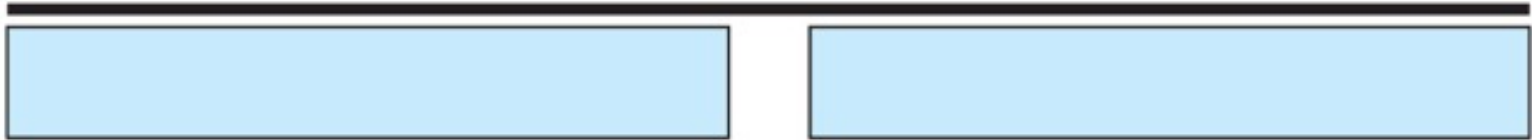


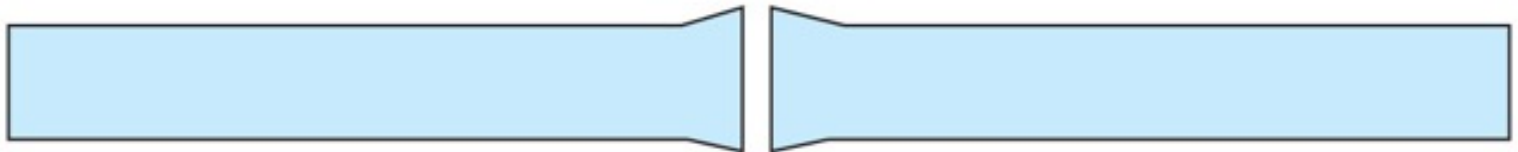
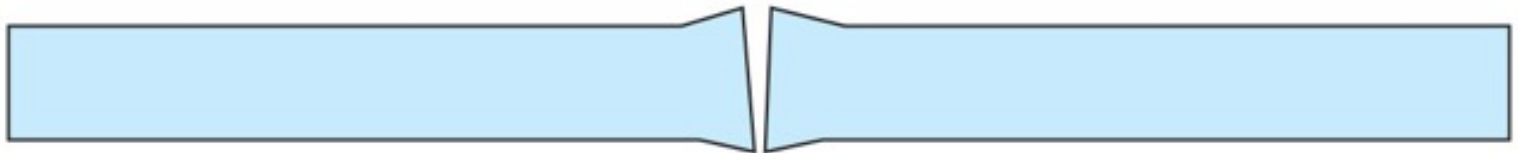
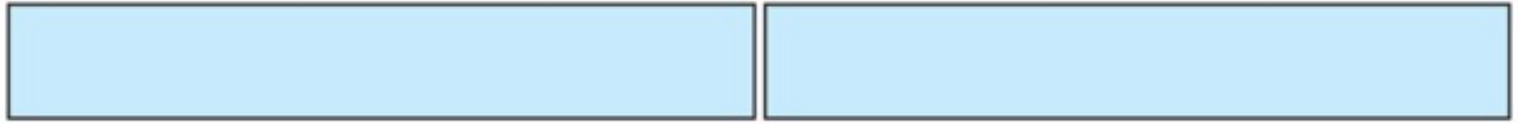


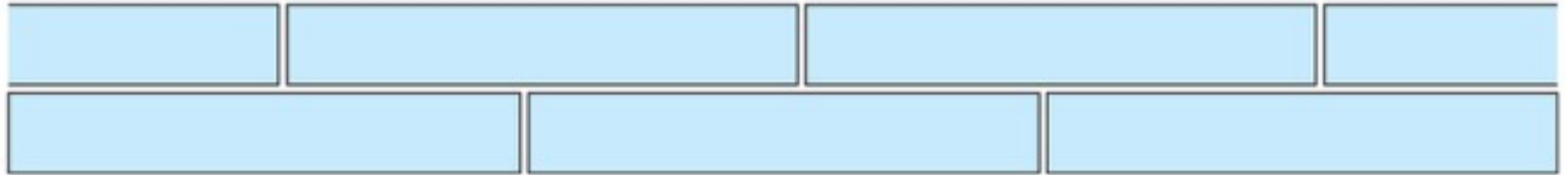


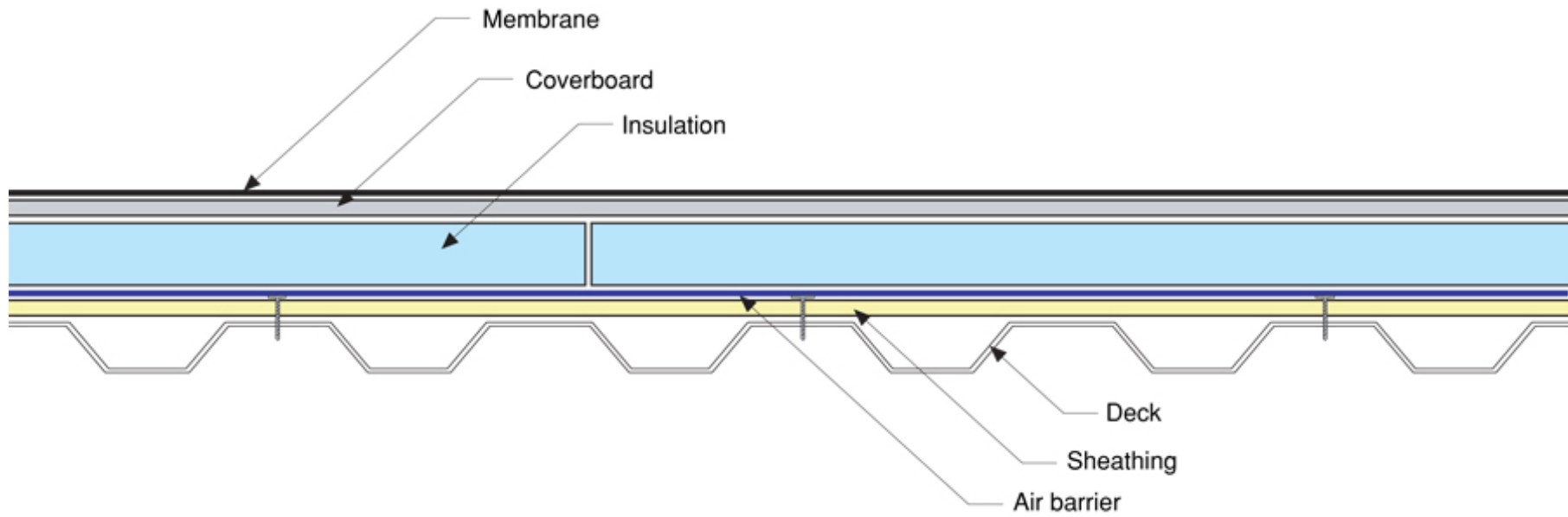








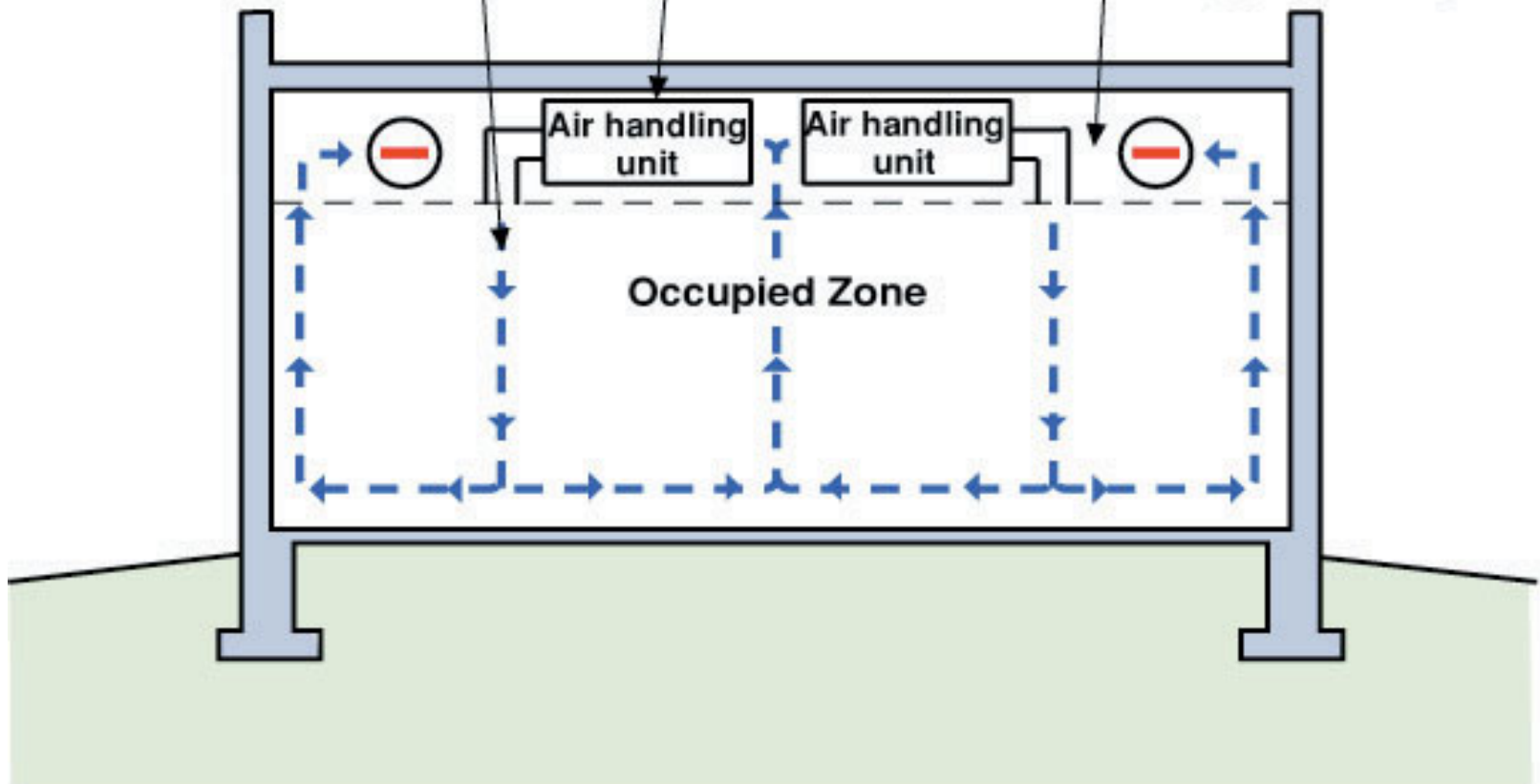




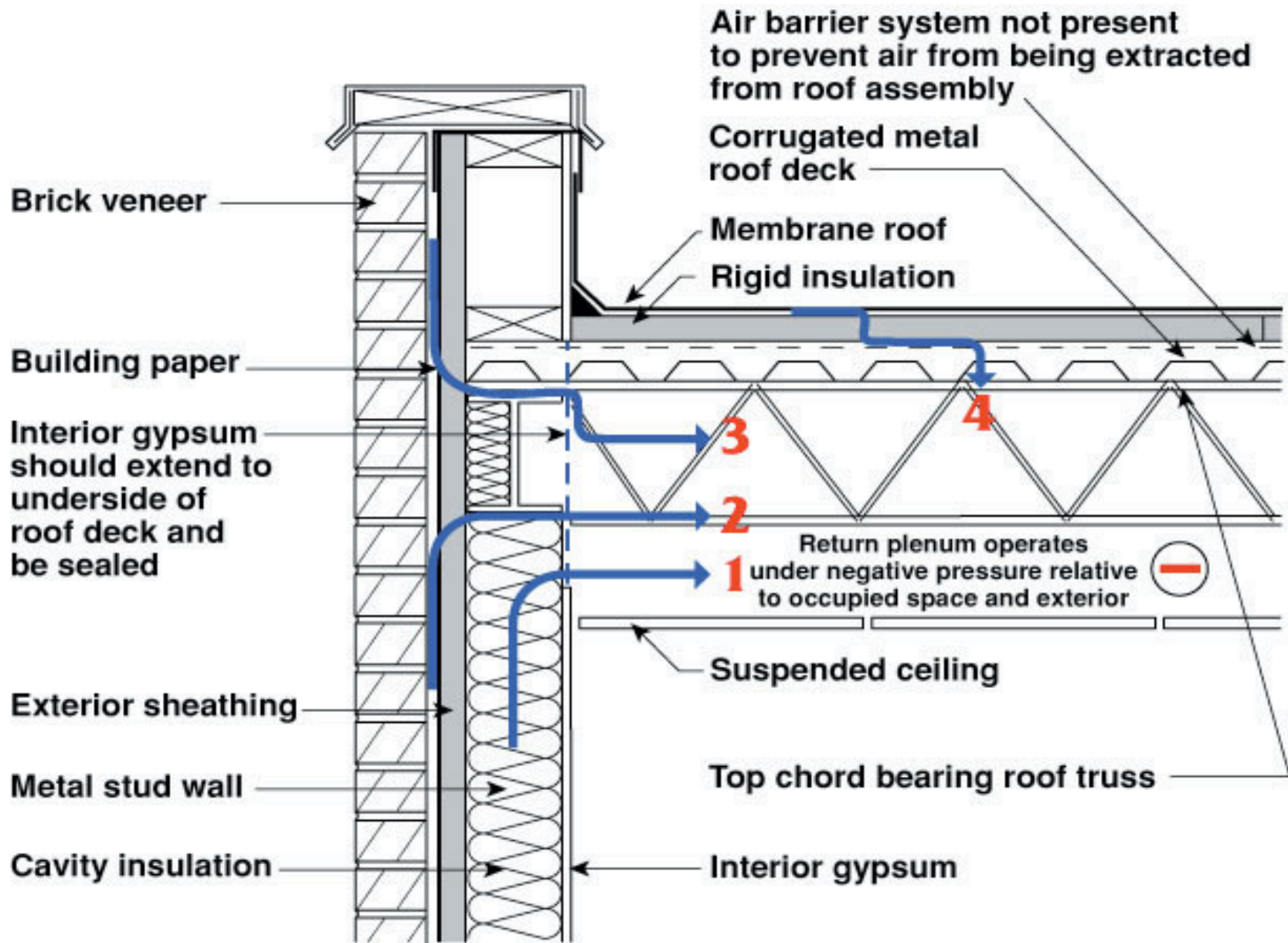
Supply air into occupied zone returns to AHU by passing through deliberately porous dropped ceiling or through return grilles installed in dropped ceiling

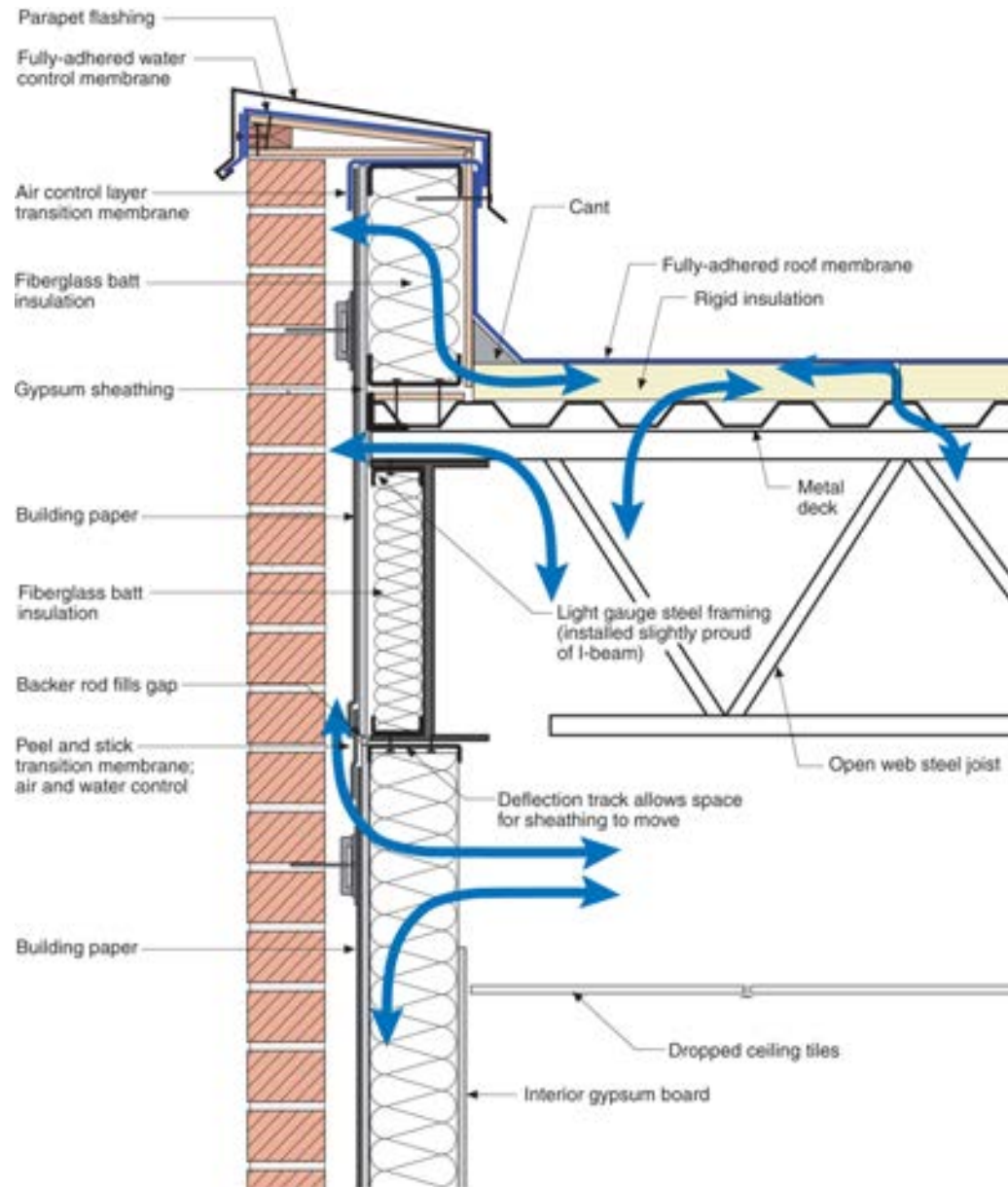
Air handling unit extracts air from dropped ceiling, conditions it and injects it into the occupied zones via supply ductwork

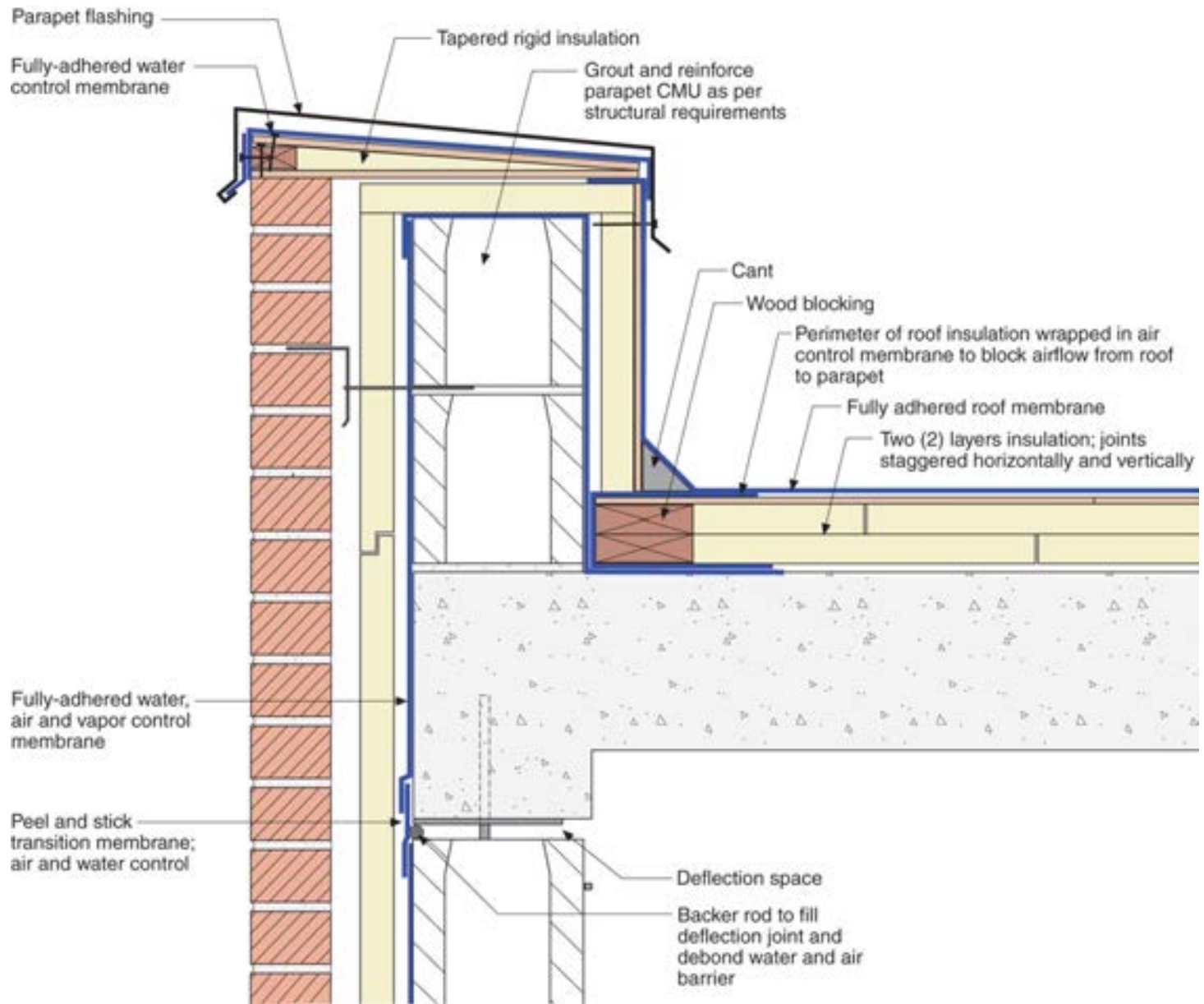
Dropped ceiling depressurized by air handling units extracting air from dropped ceiling

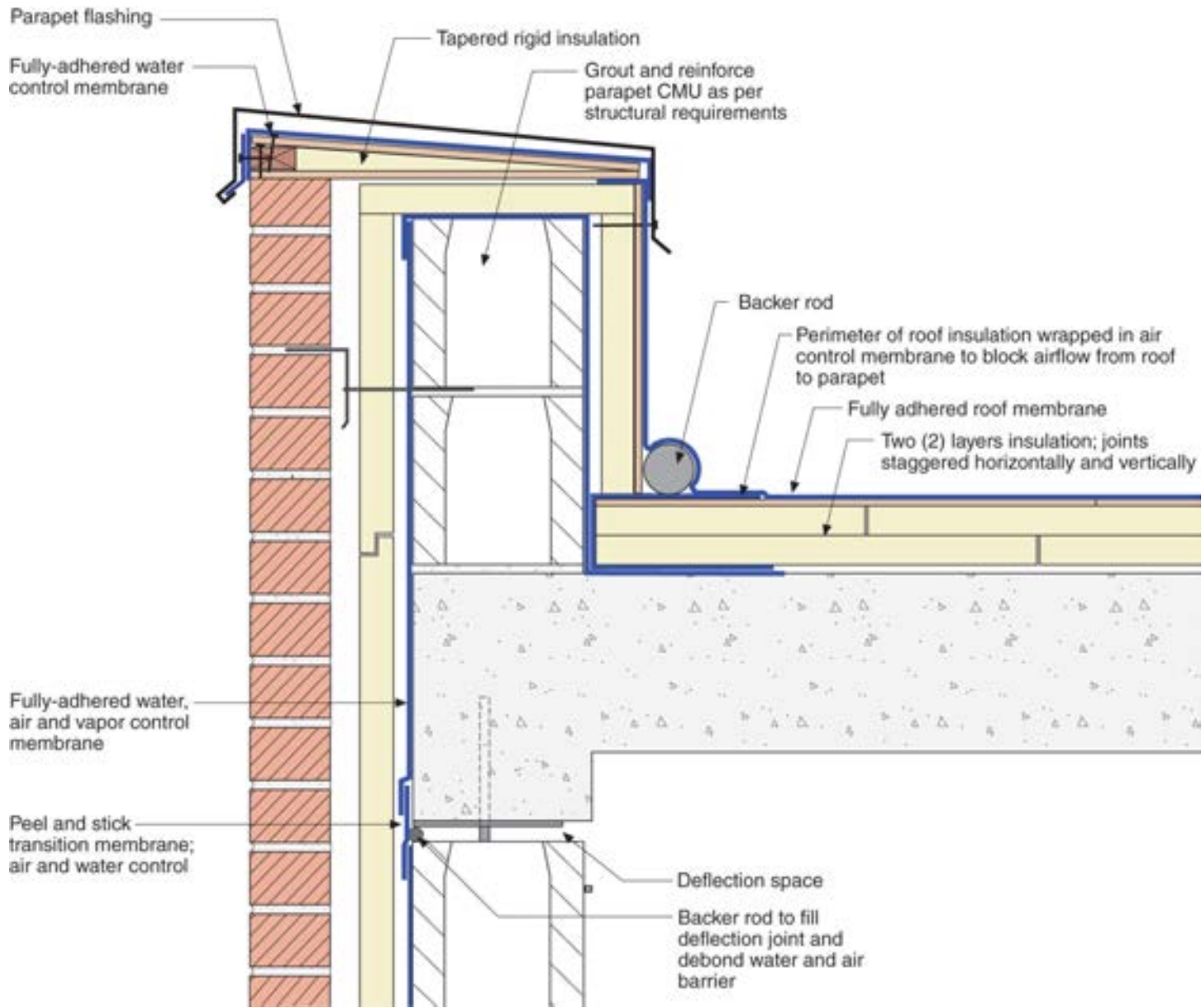


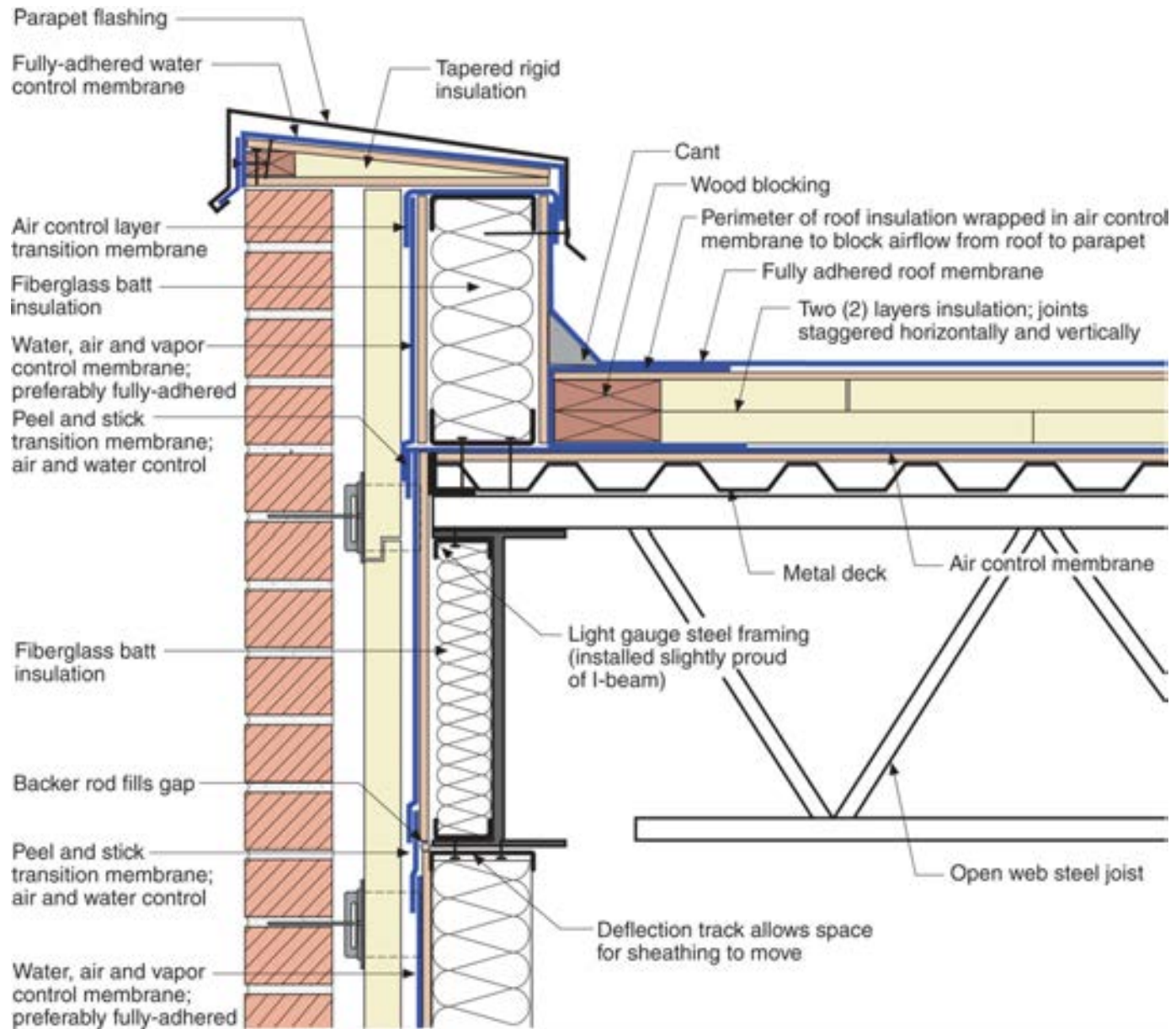


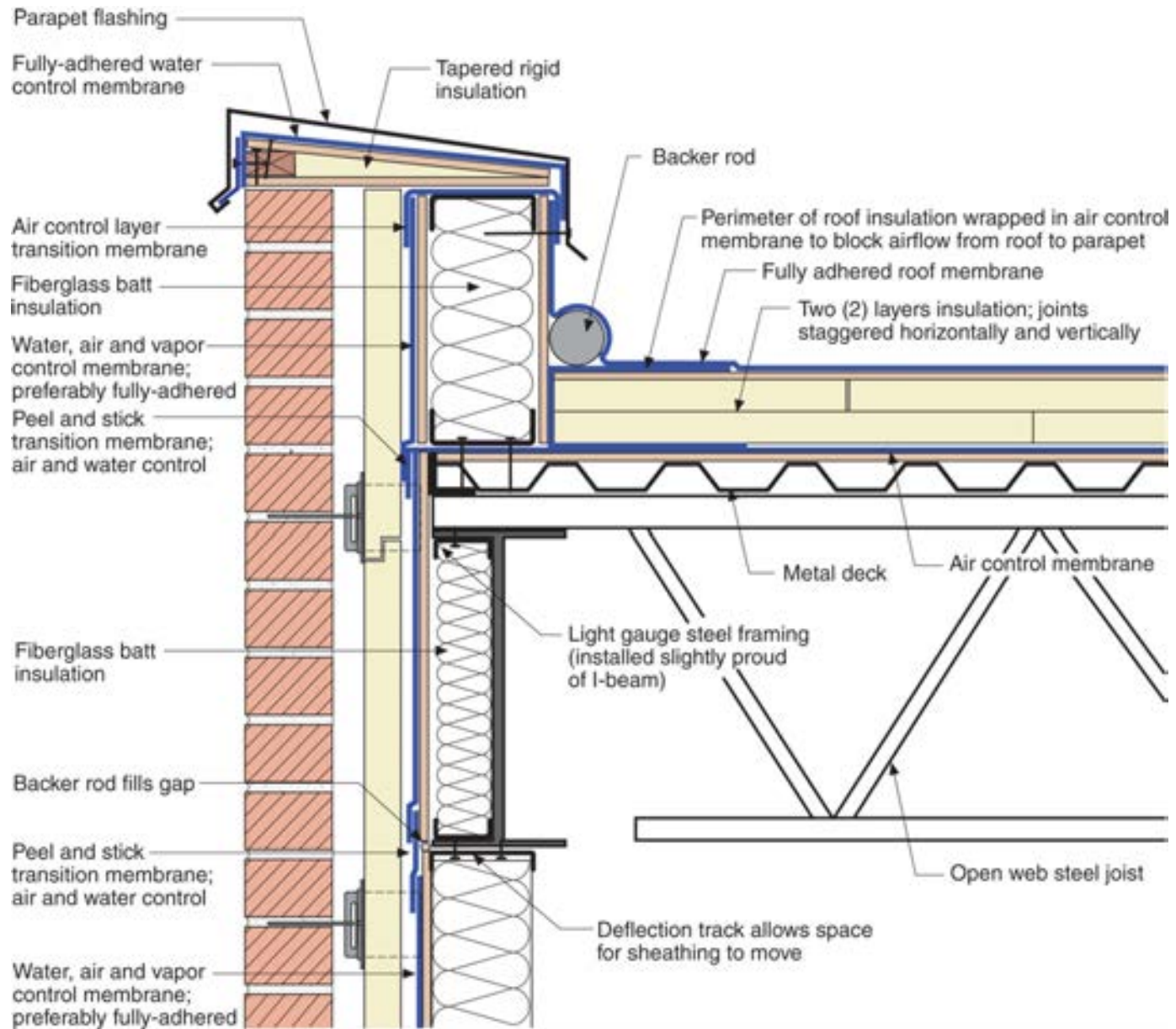


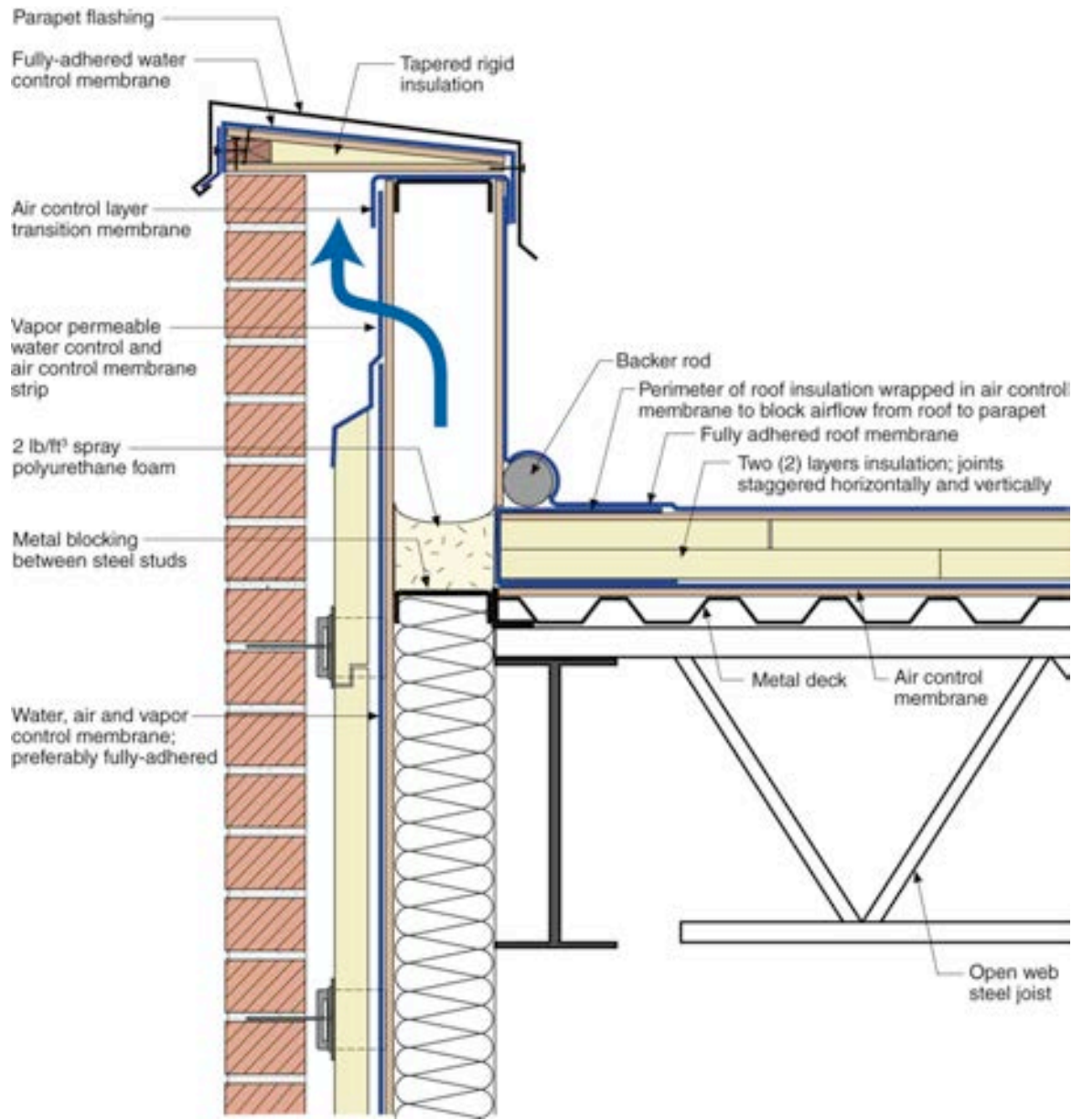


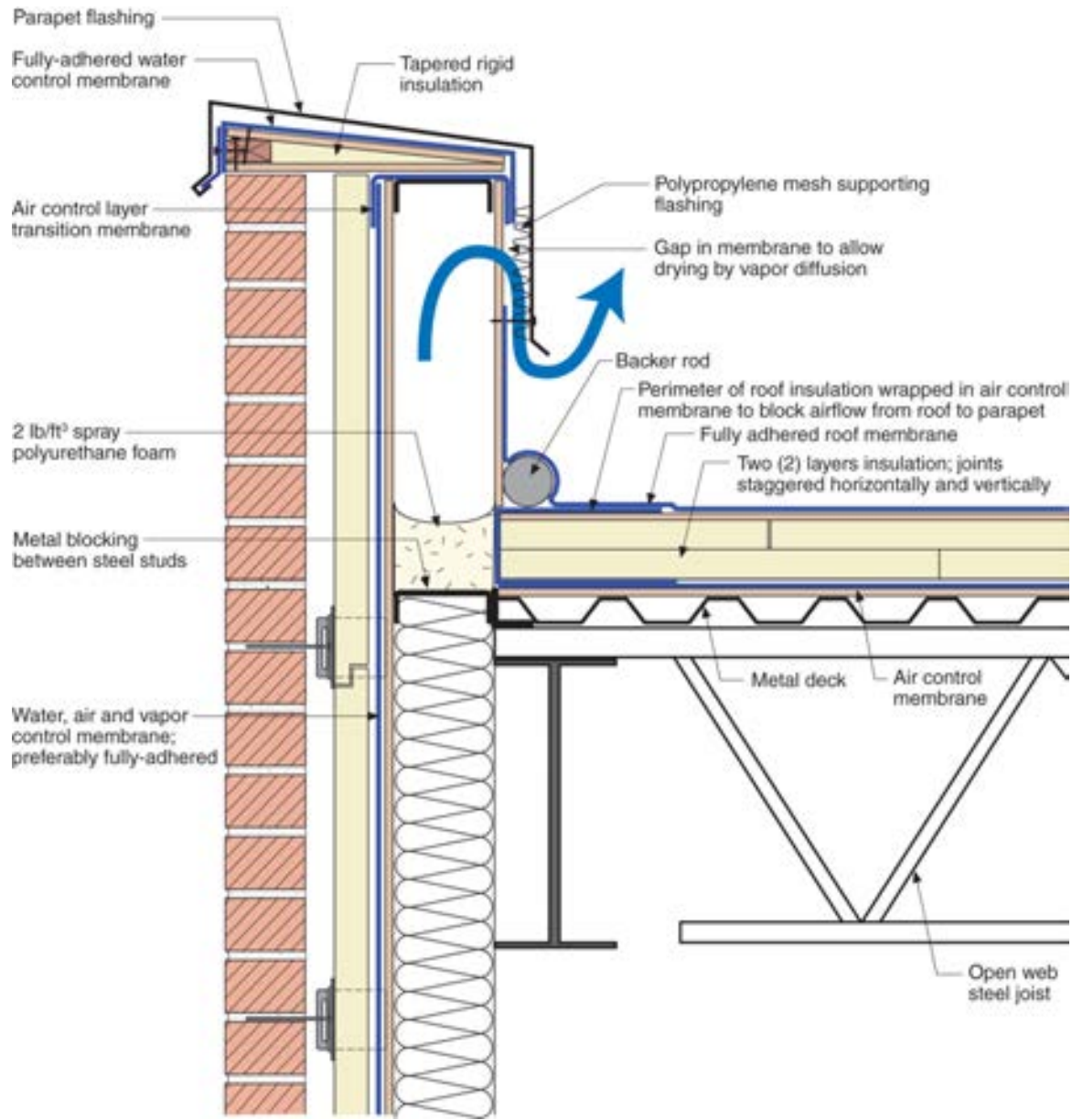




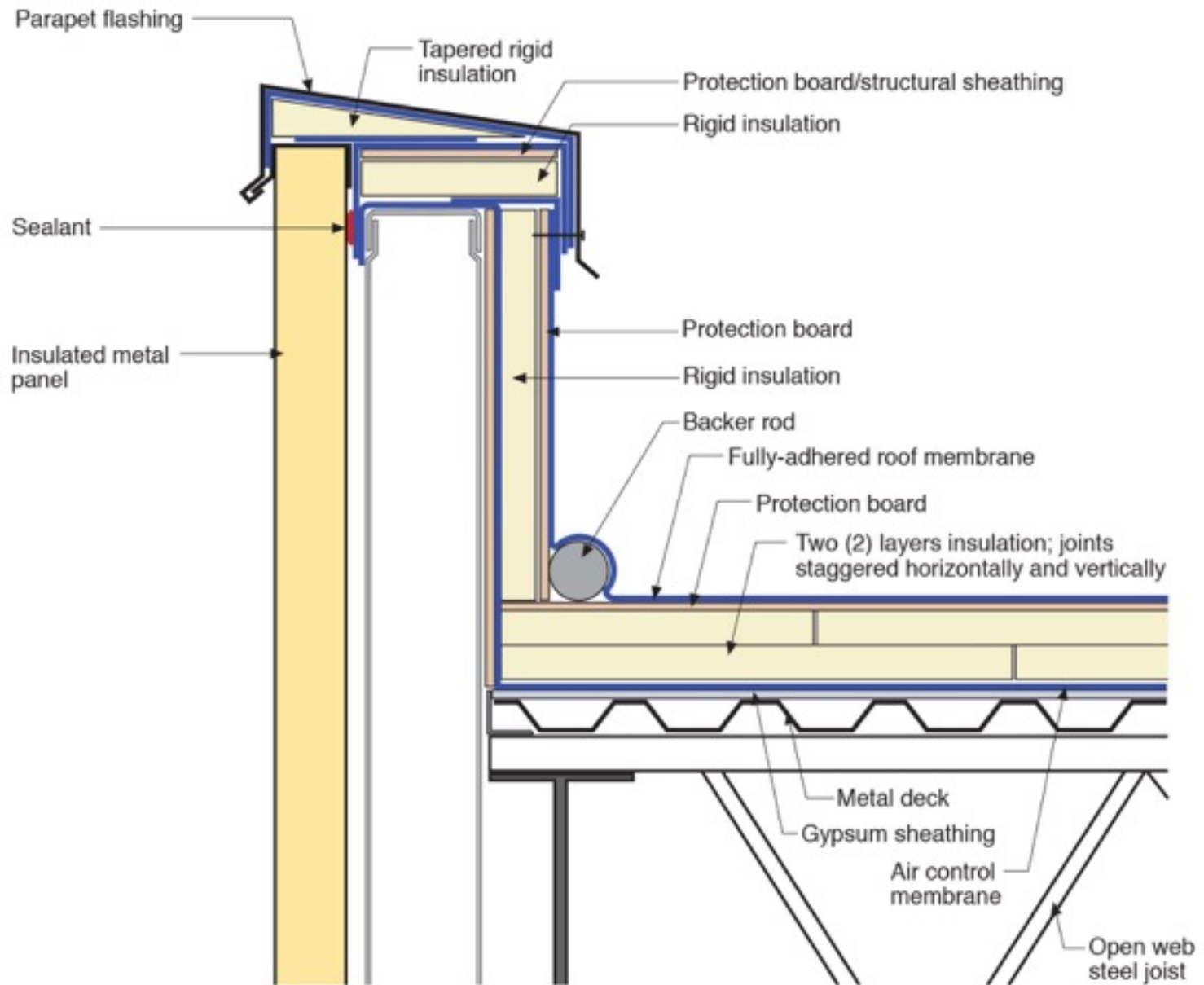


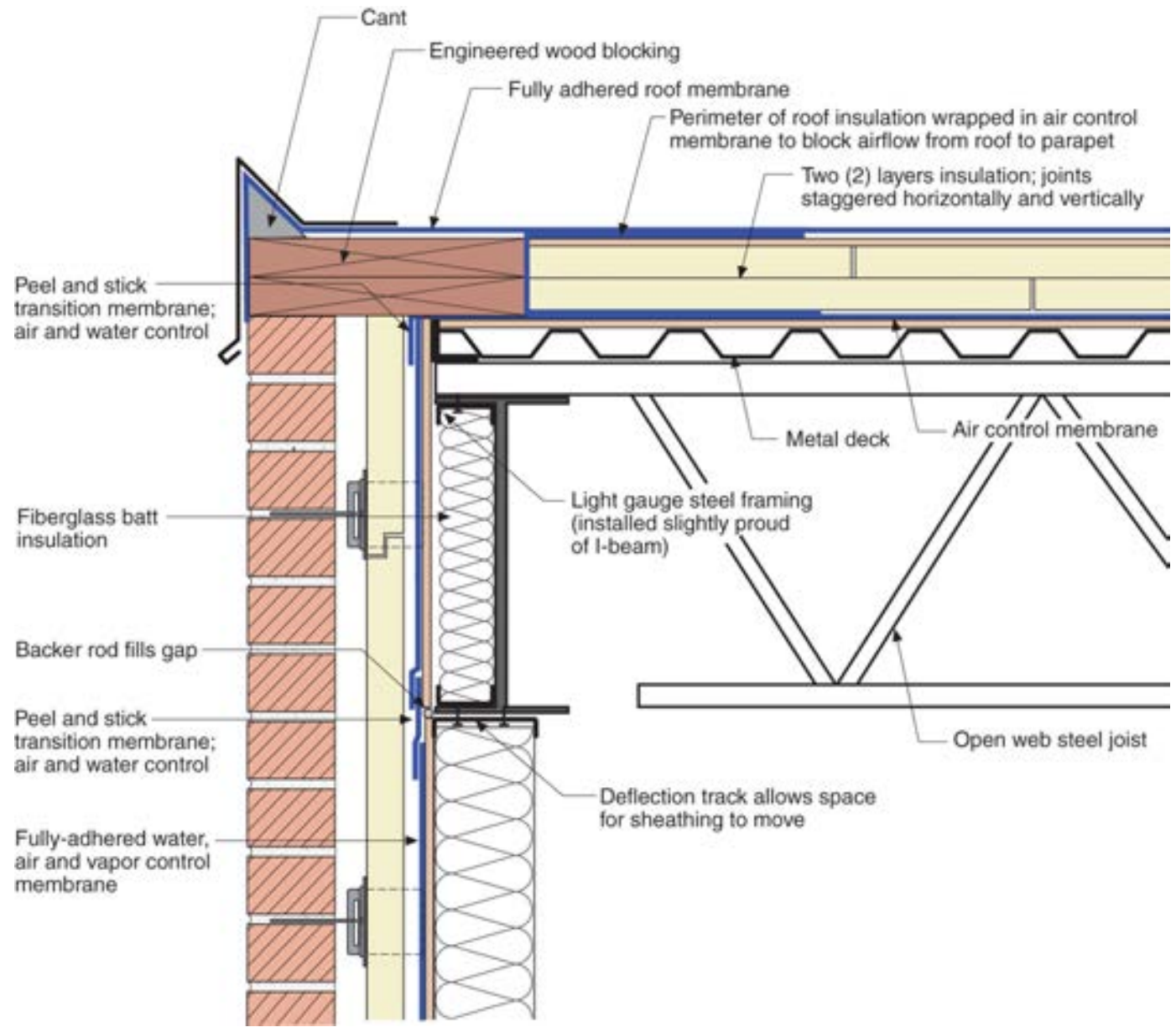


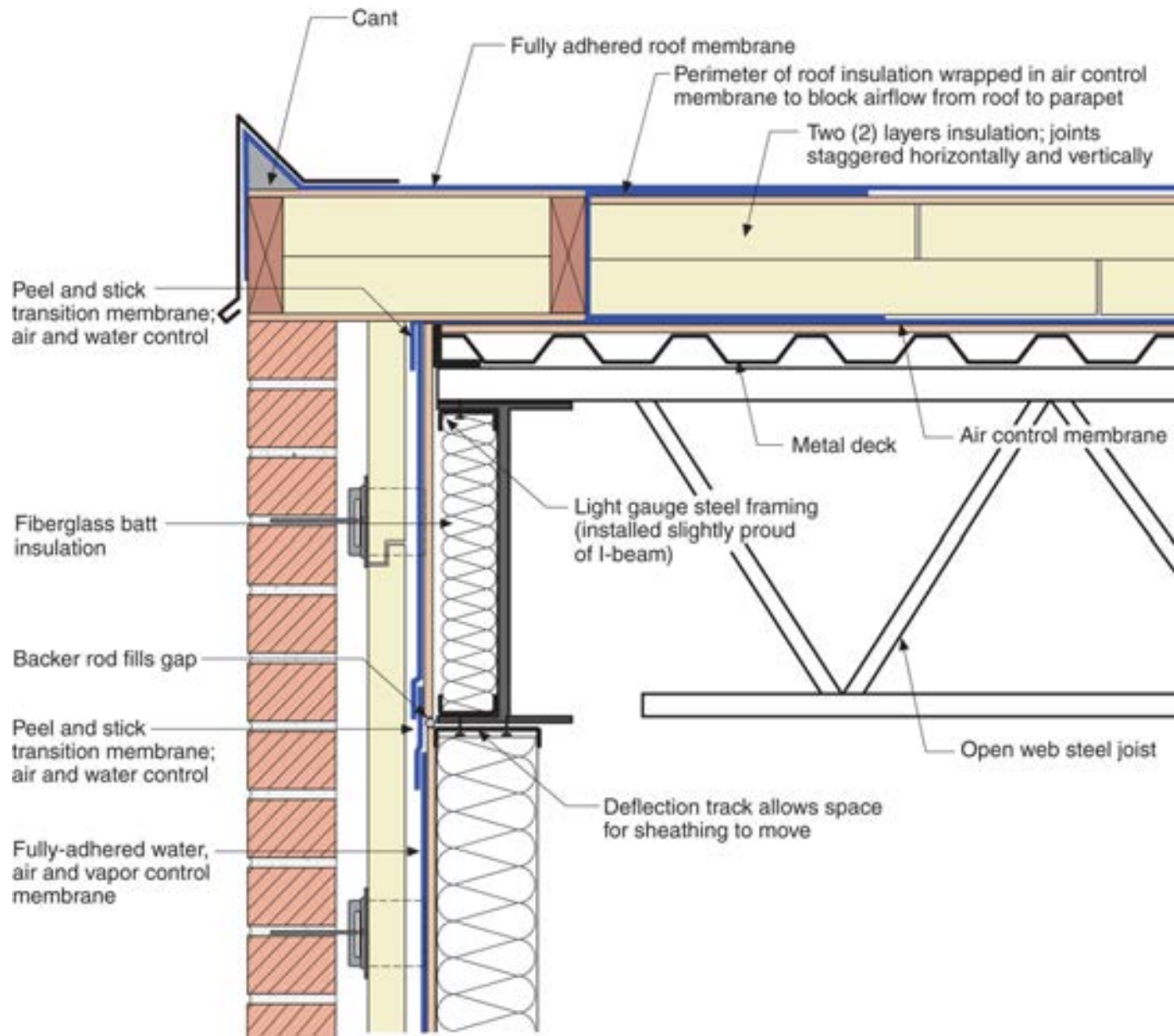


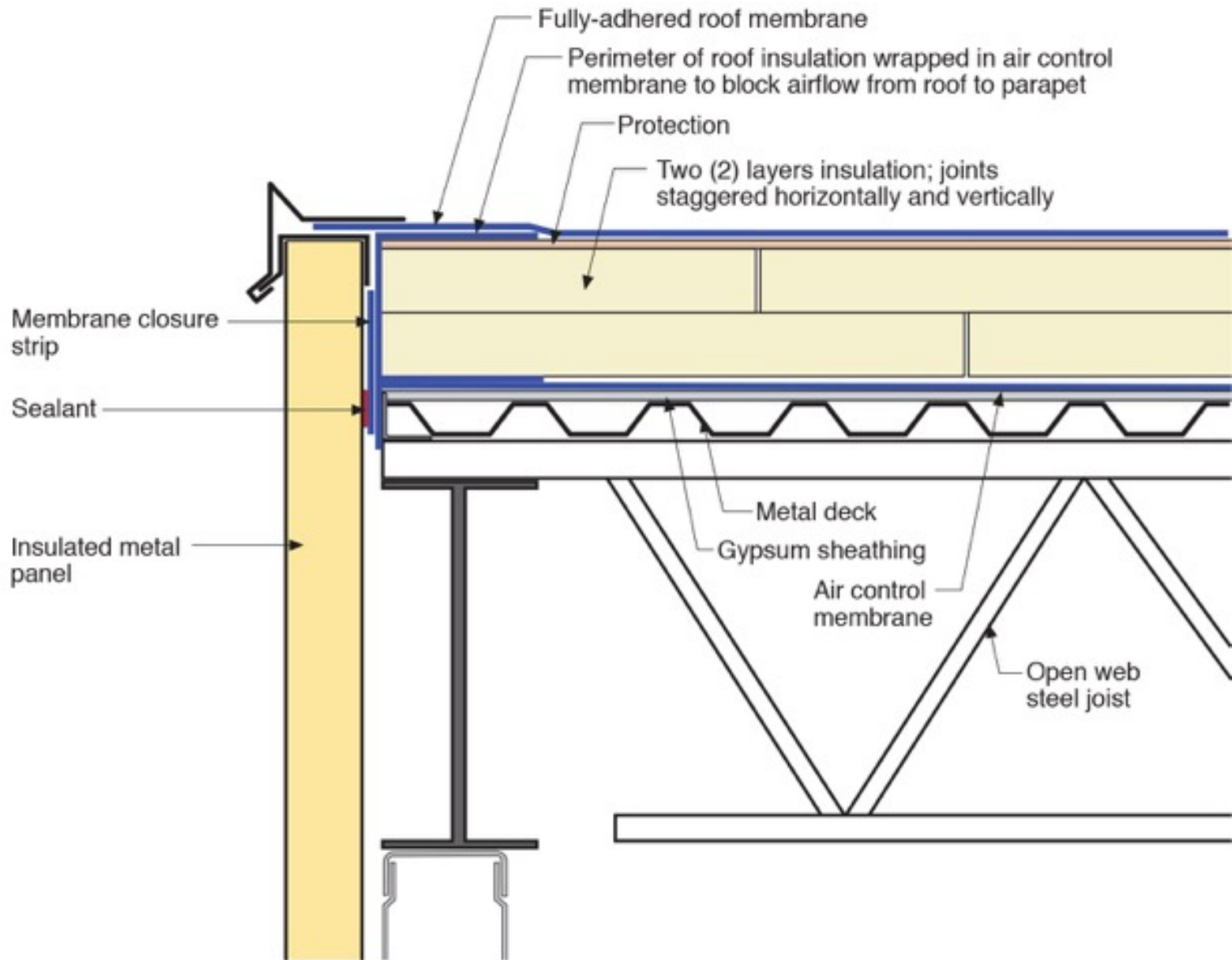












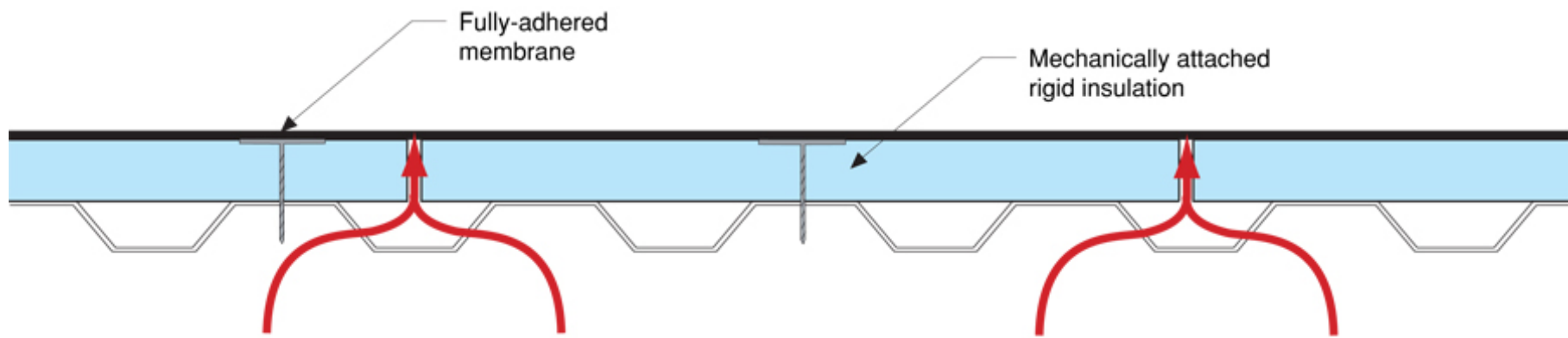
# It's a Case of Black or White

# It's a Case of Black or White Arrhenius

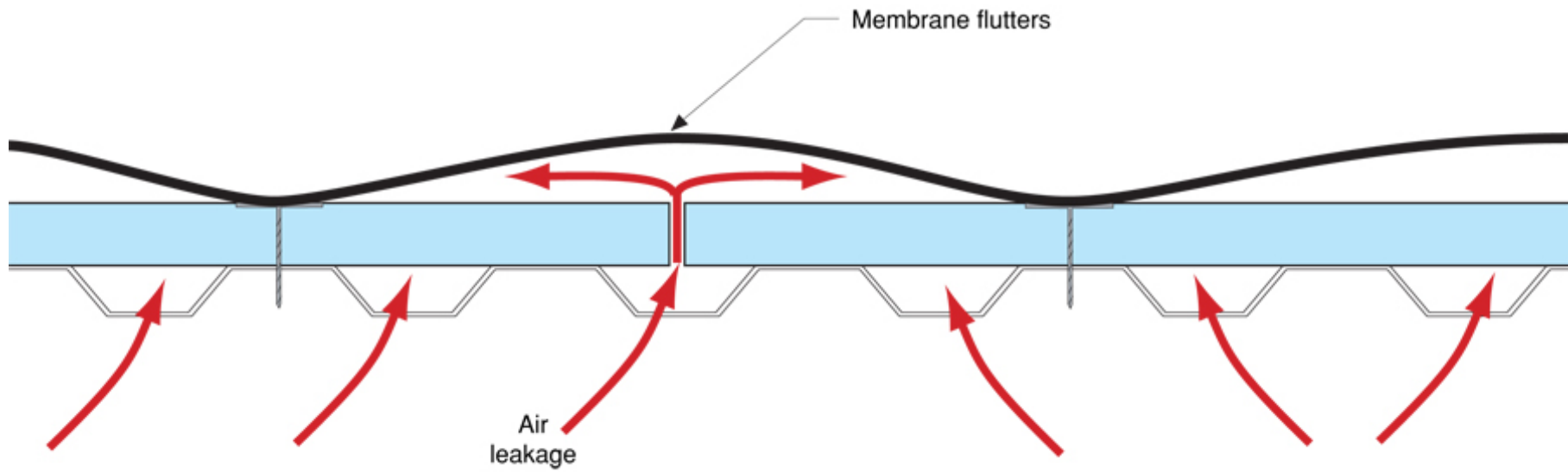
It's a Case of Black or White

Arrhenius

Every 10 degrees C – double the “badness”

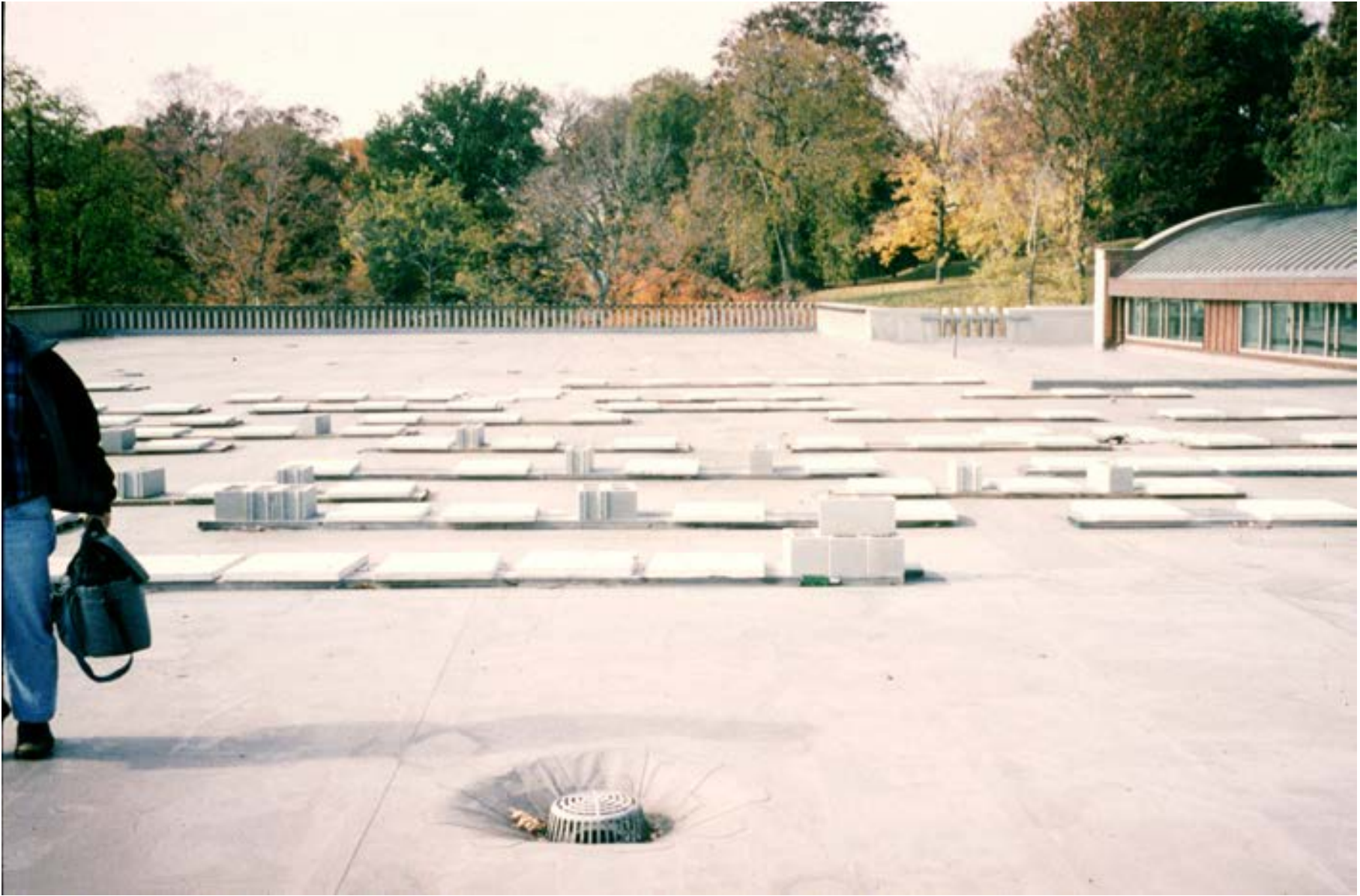












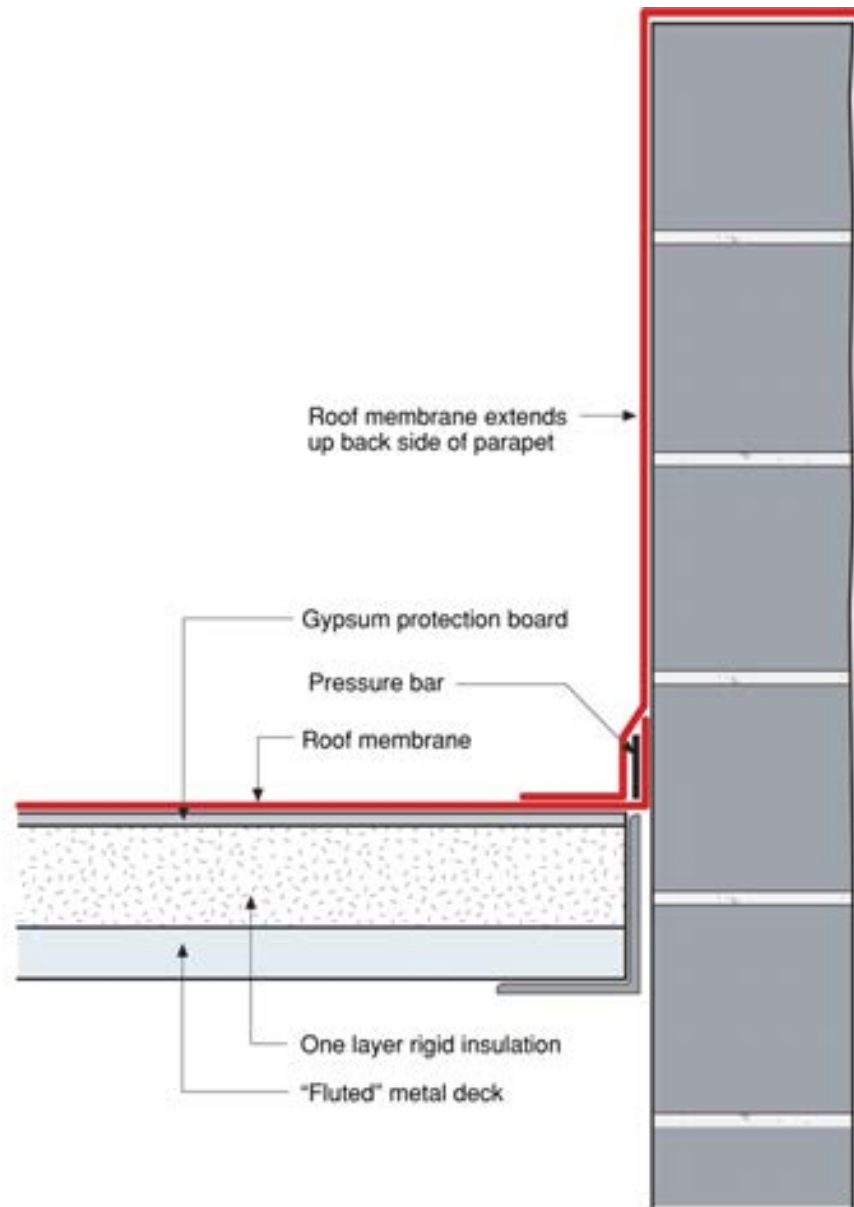


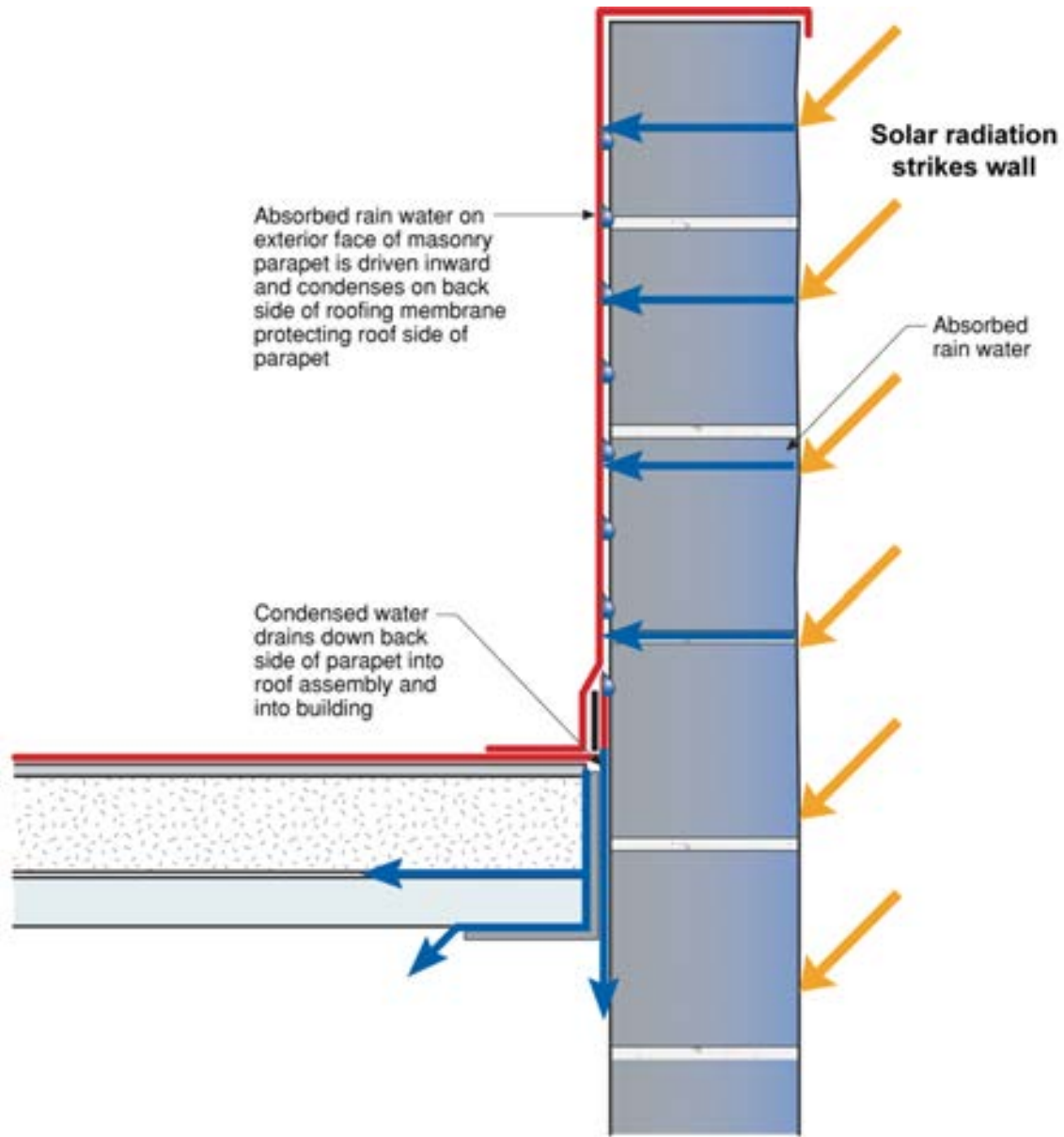


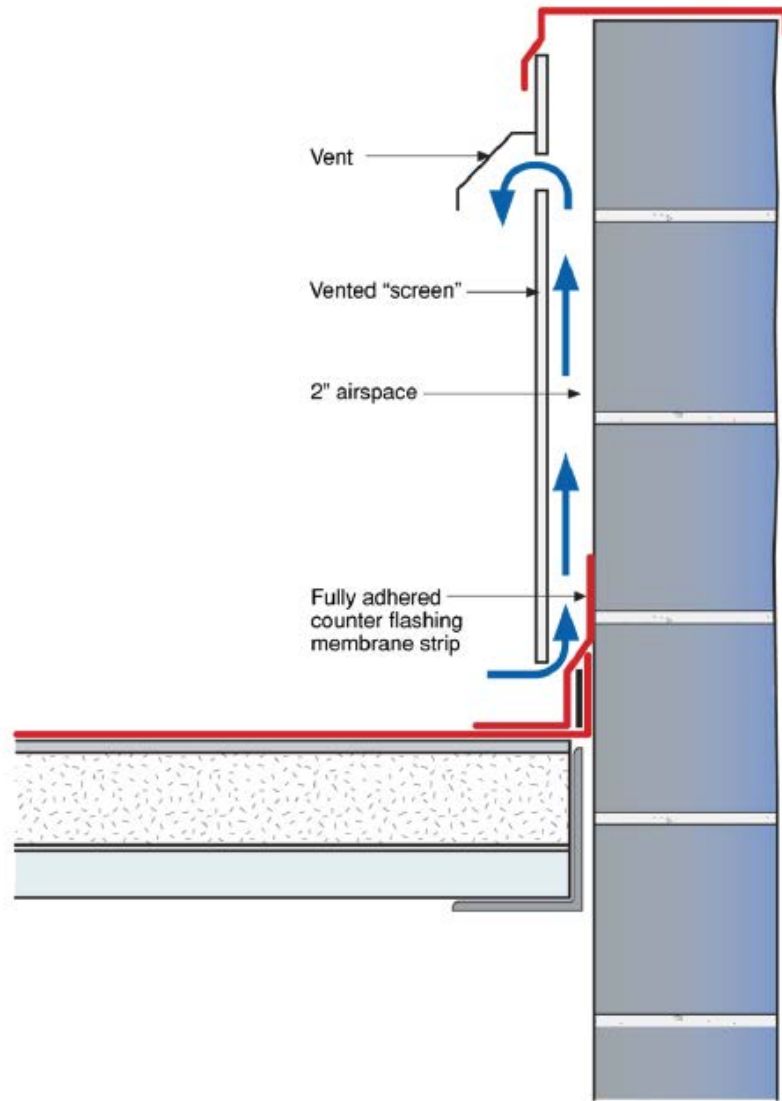


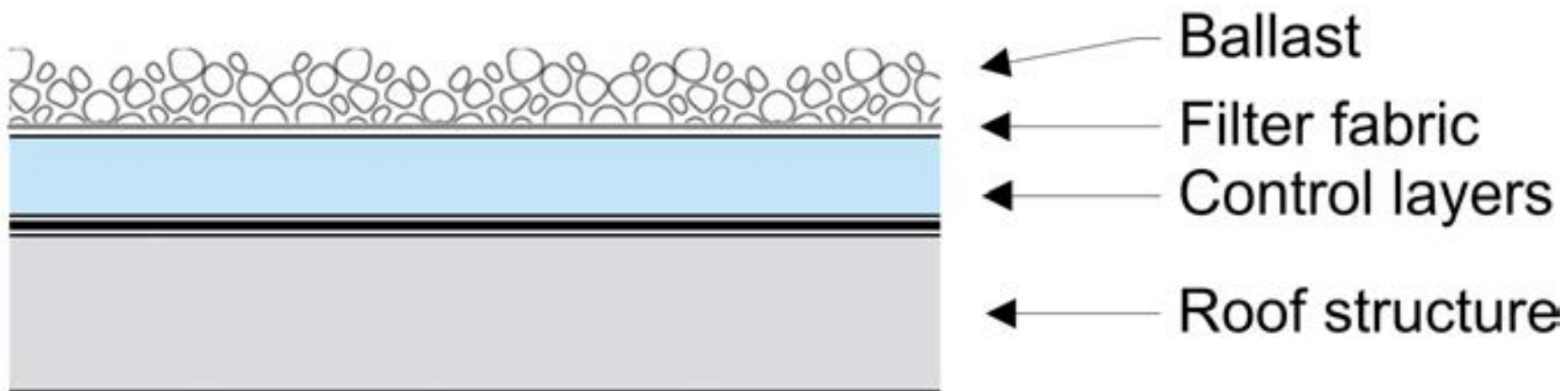


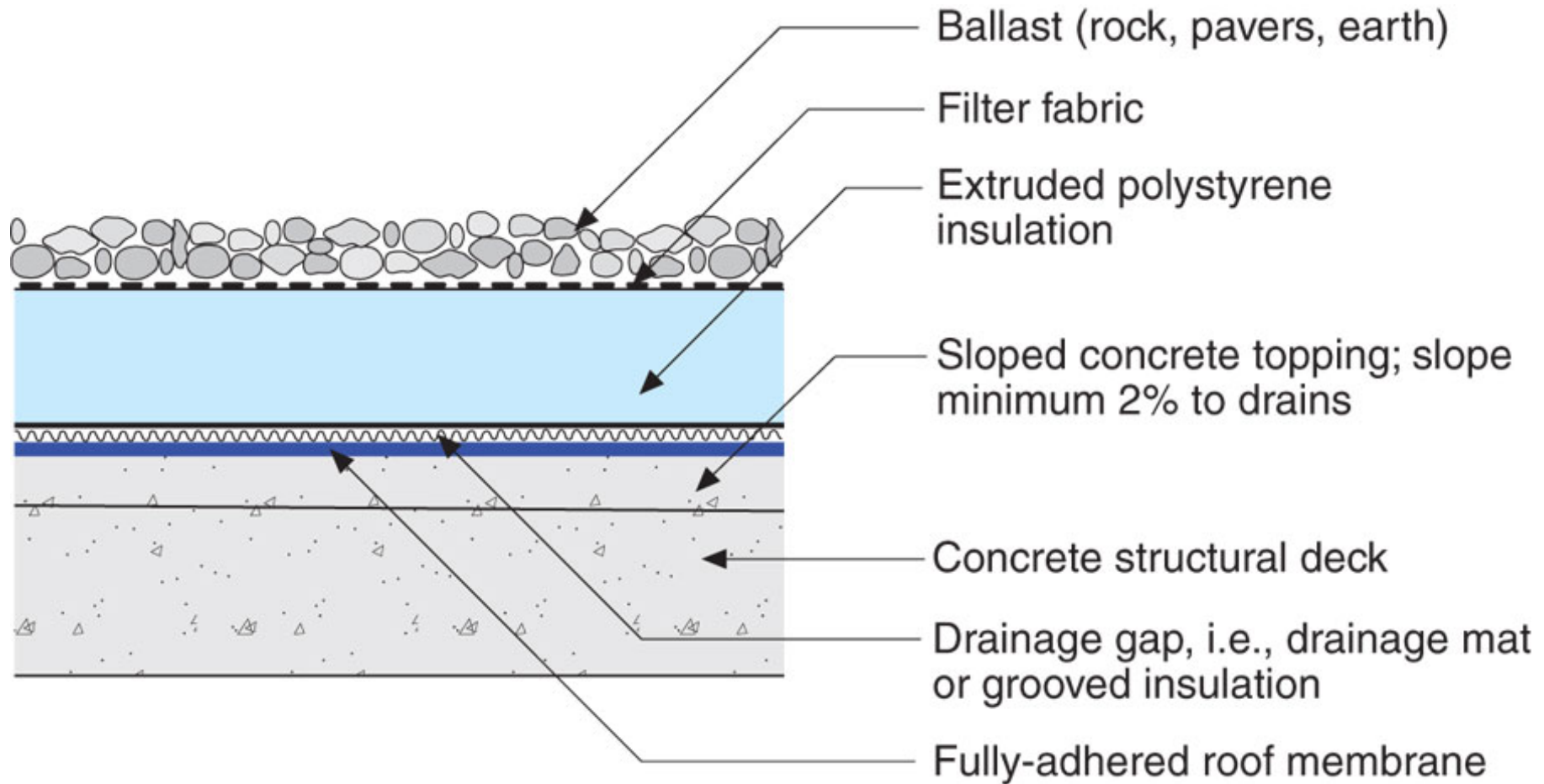


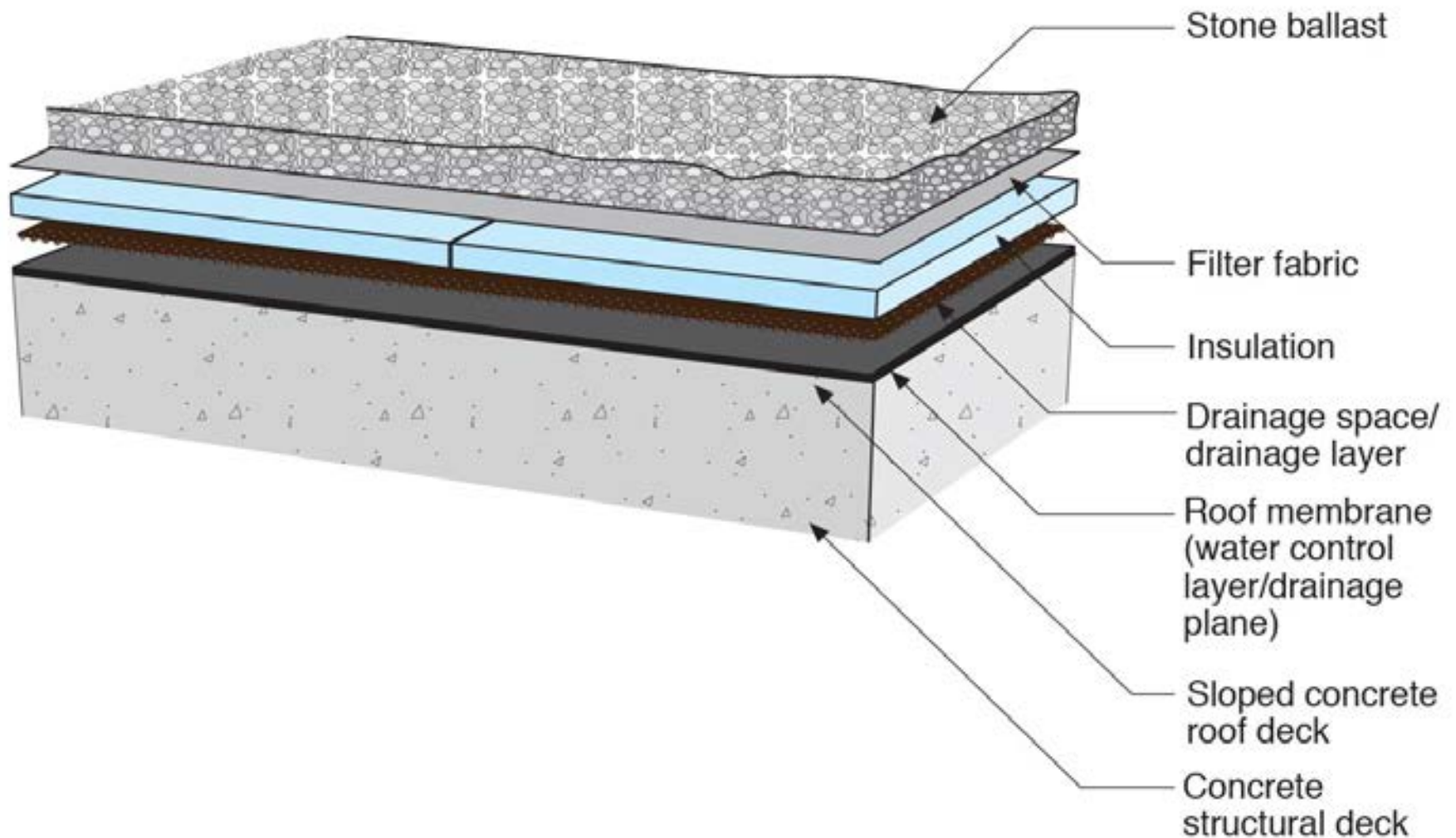


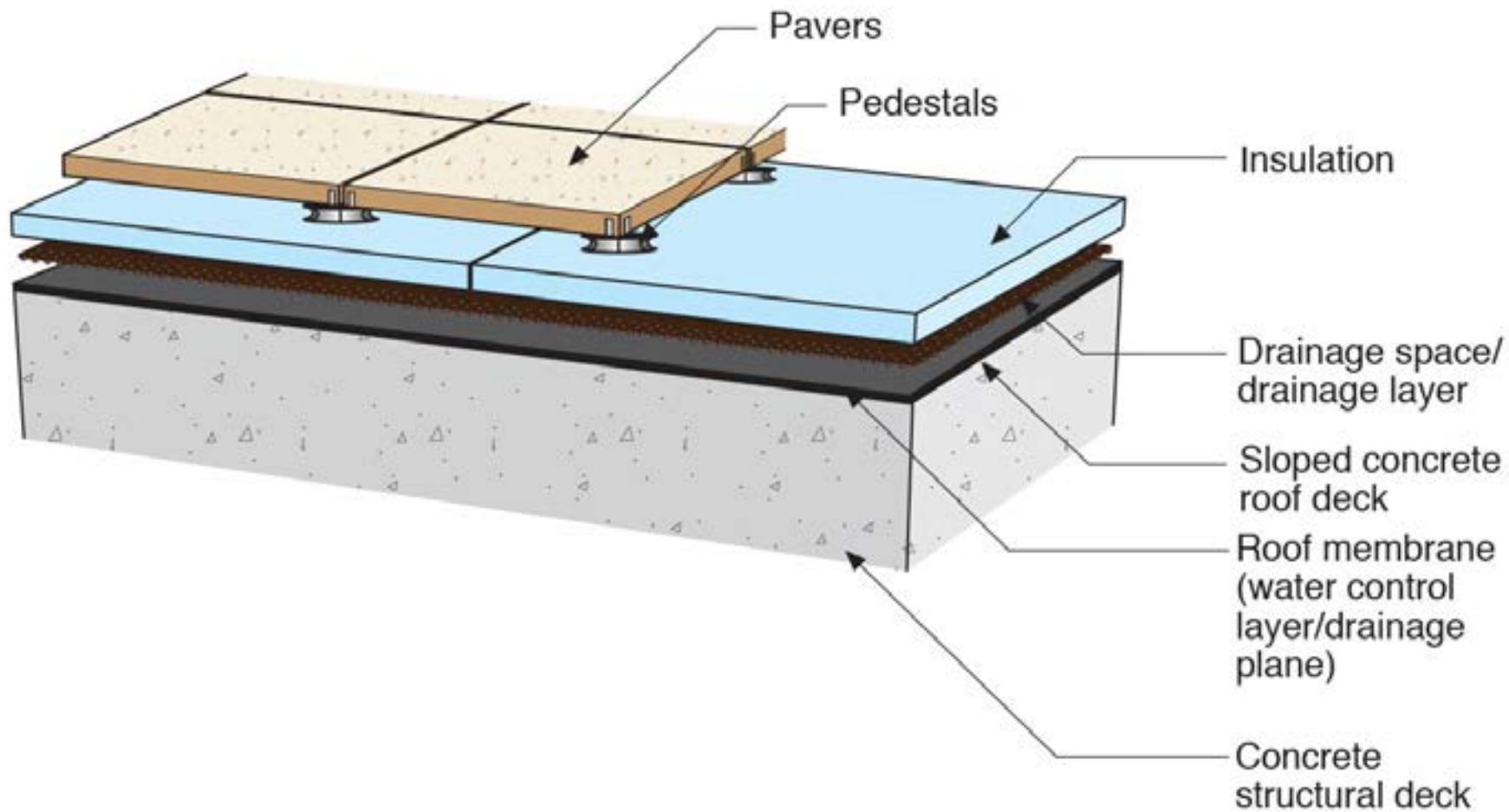


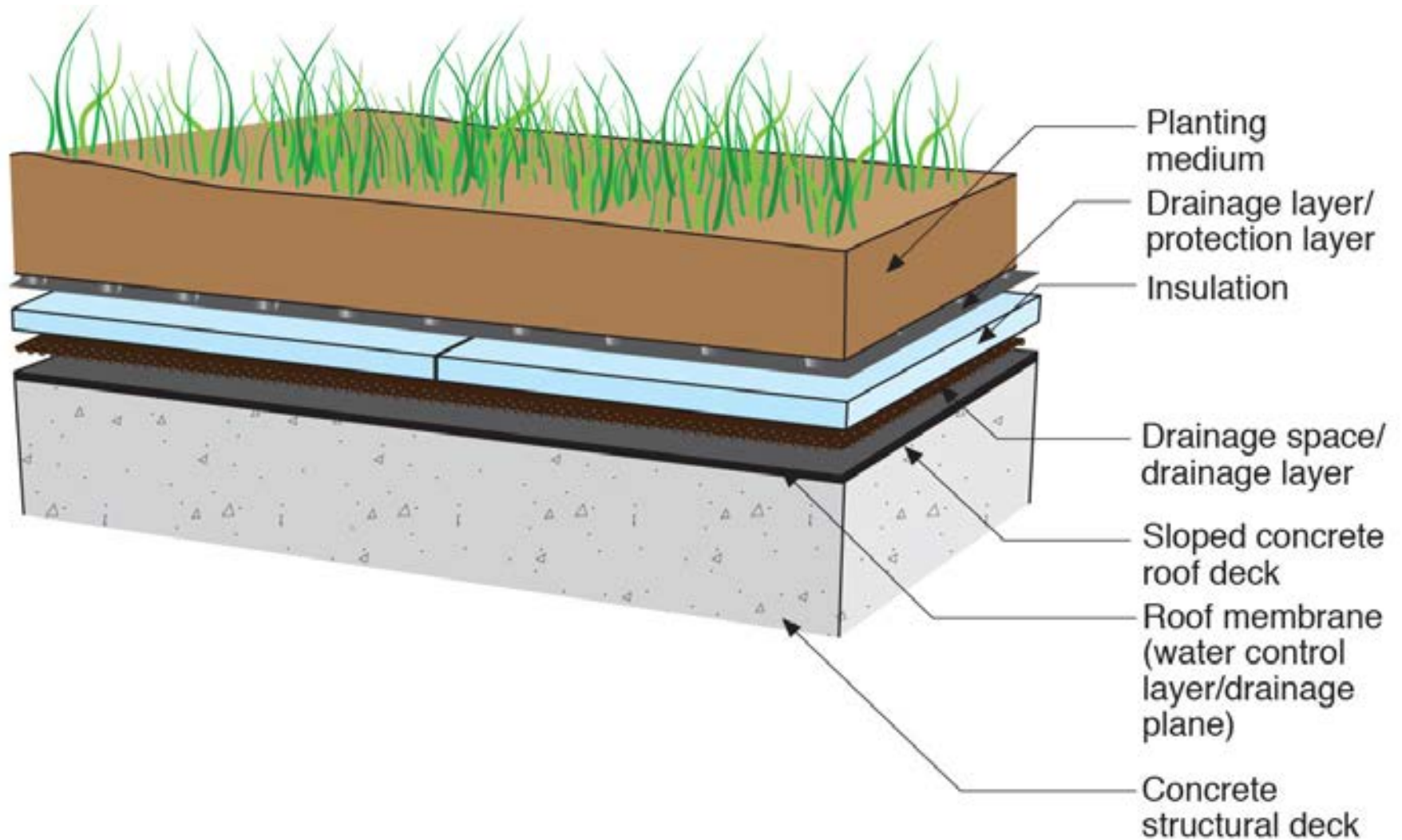




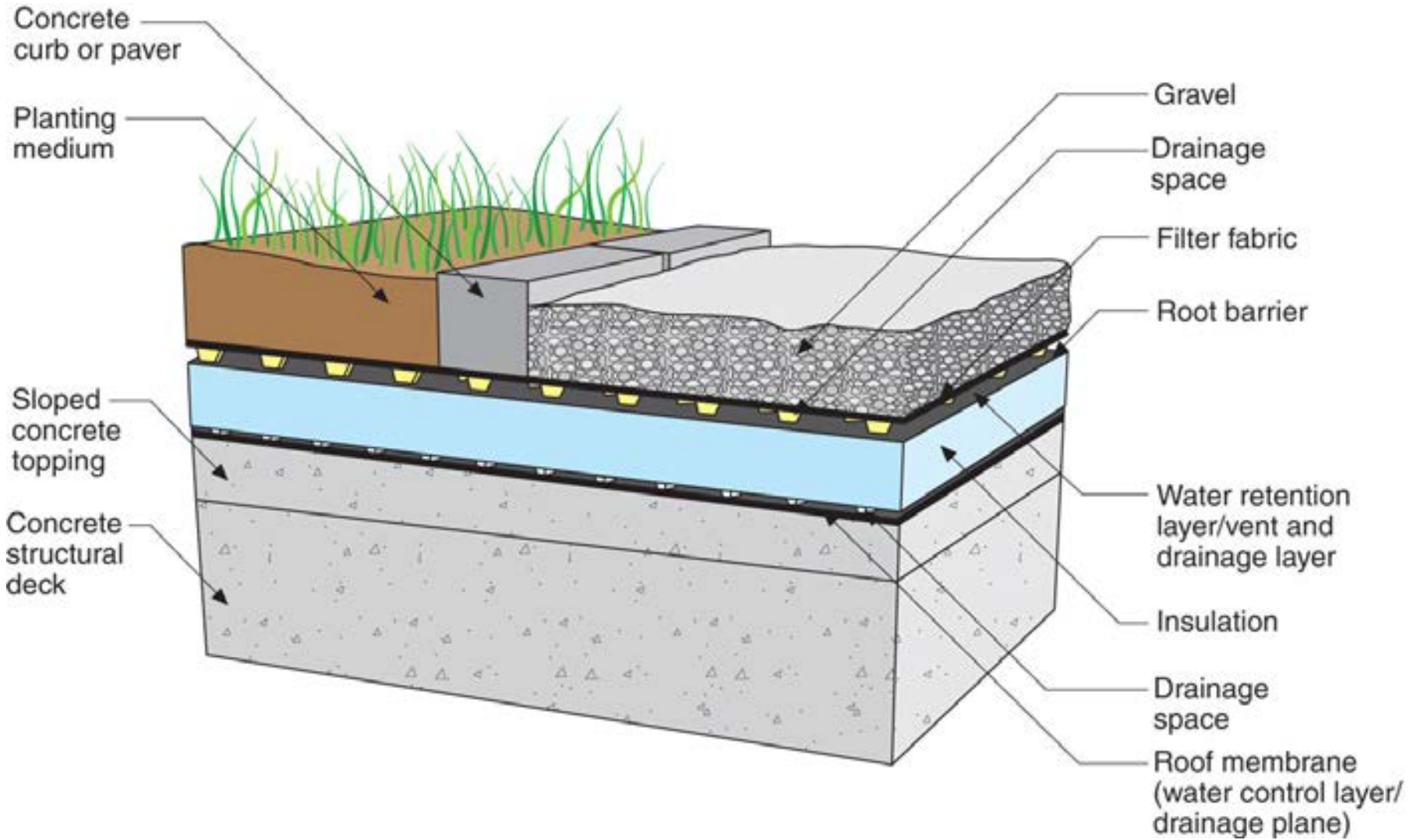


















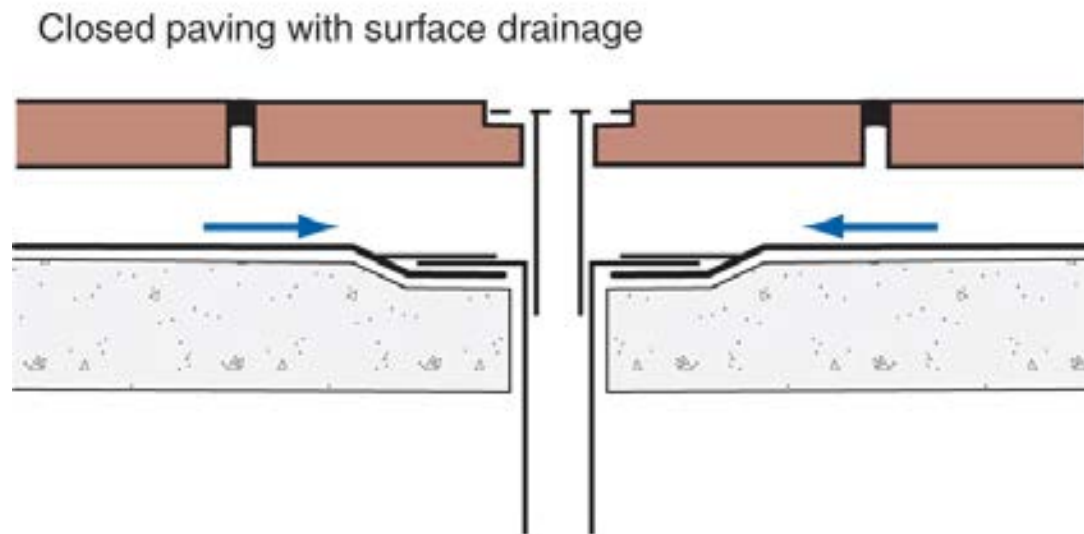
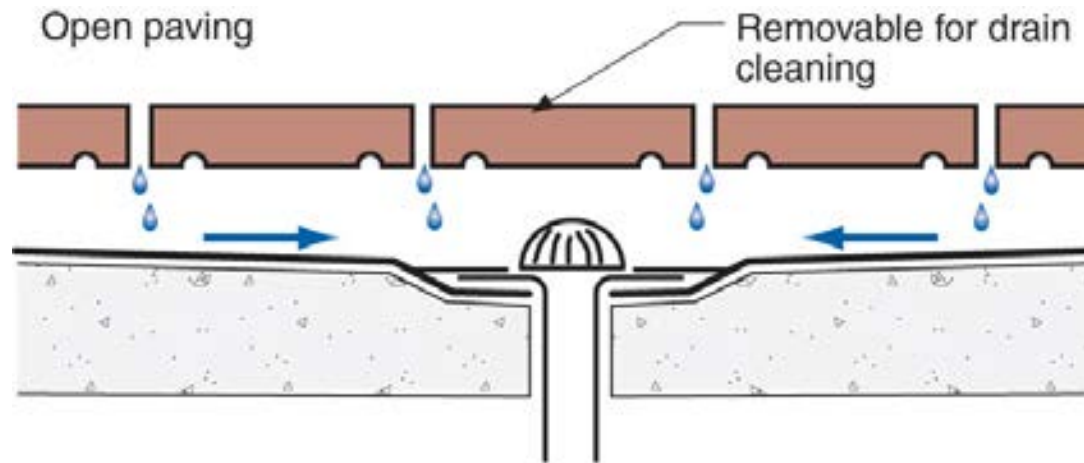




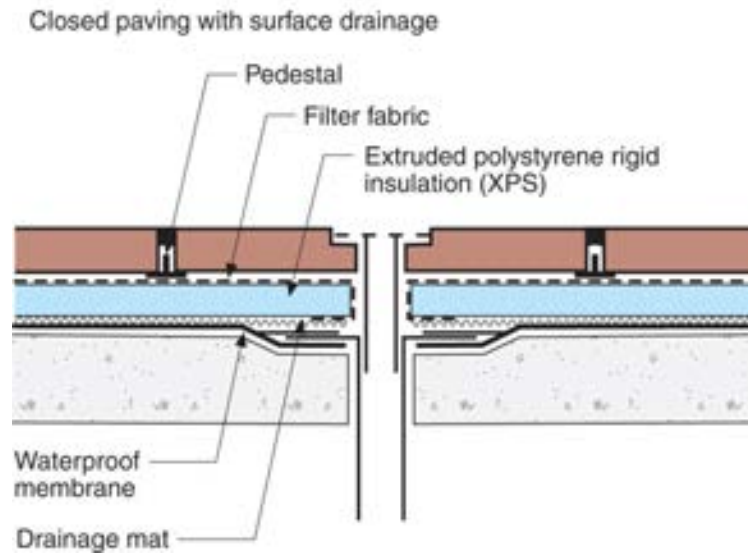
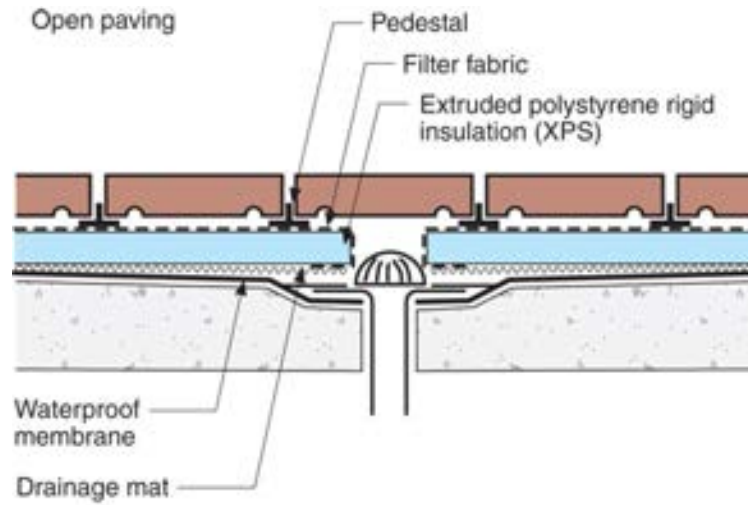
# Plaza Decks





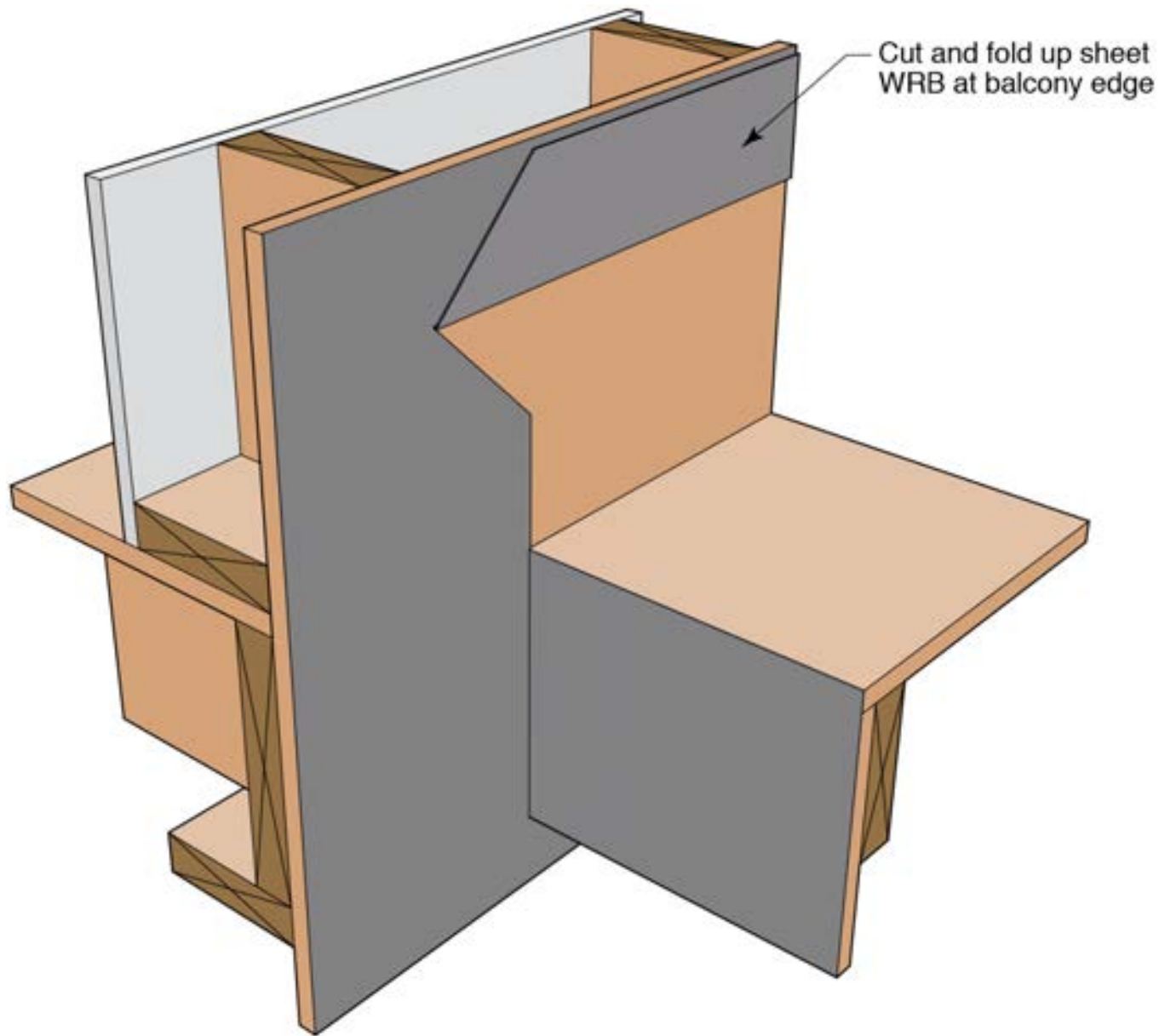


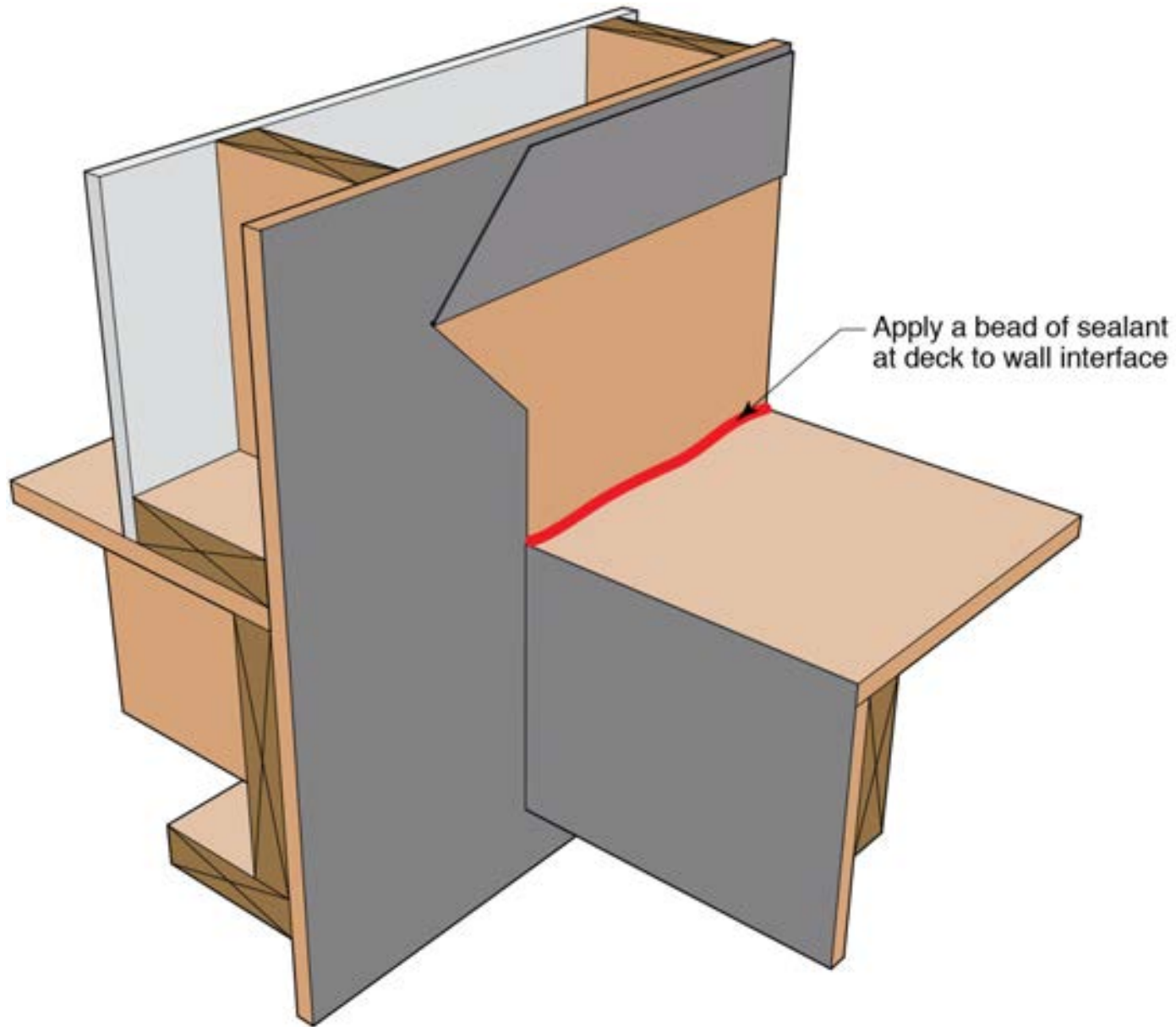
*From Baker, M.; Roofs, 1980  
 Courtesy National Research Council of Canada*

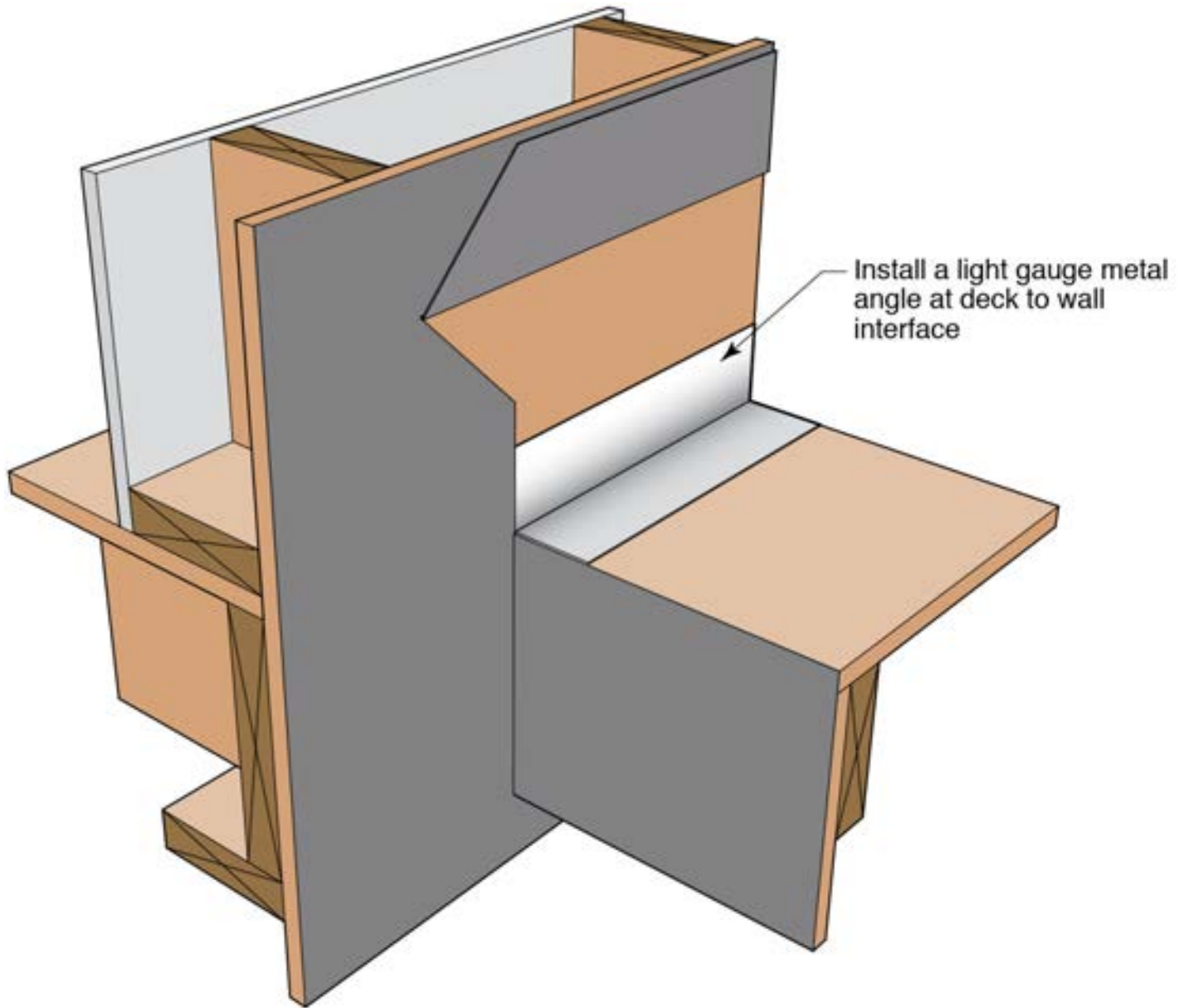


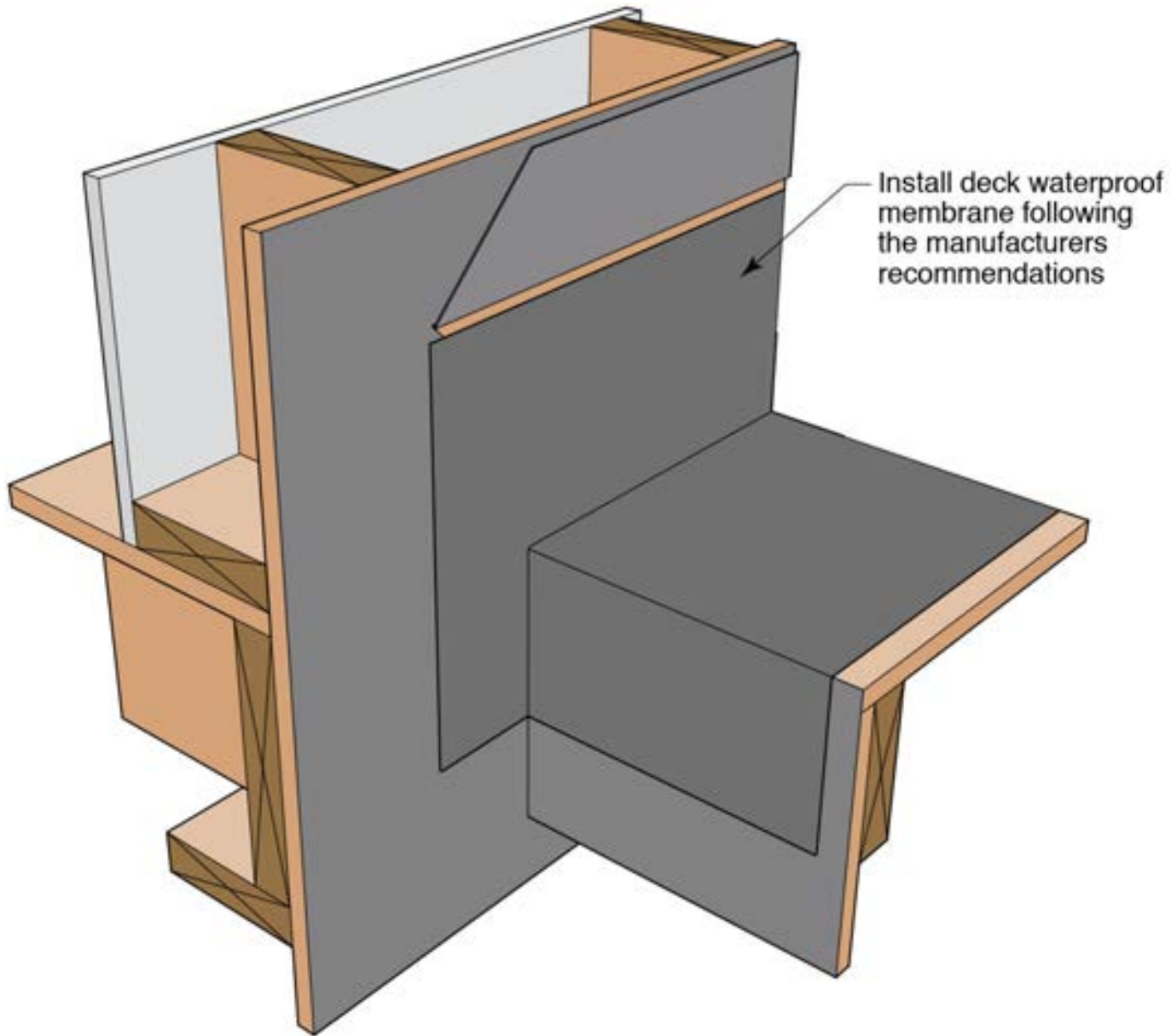




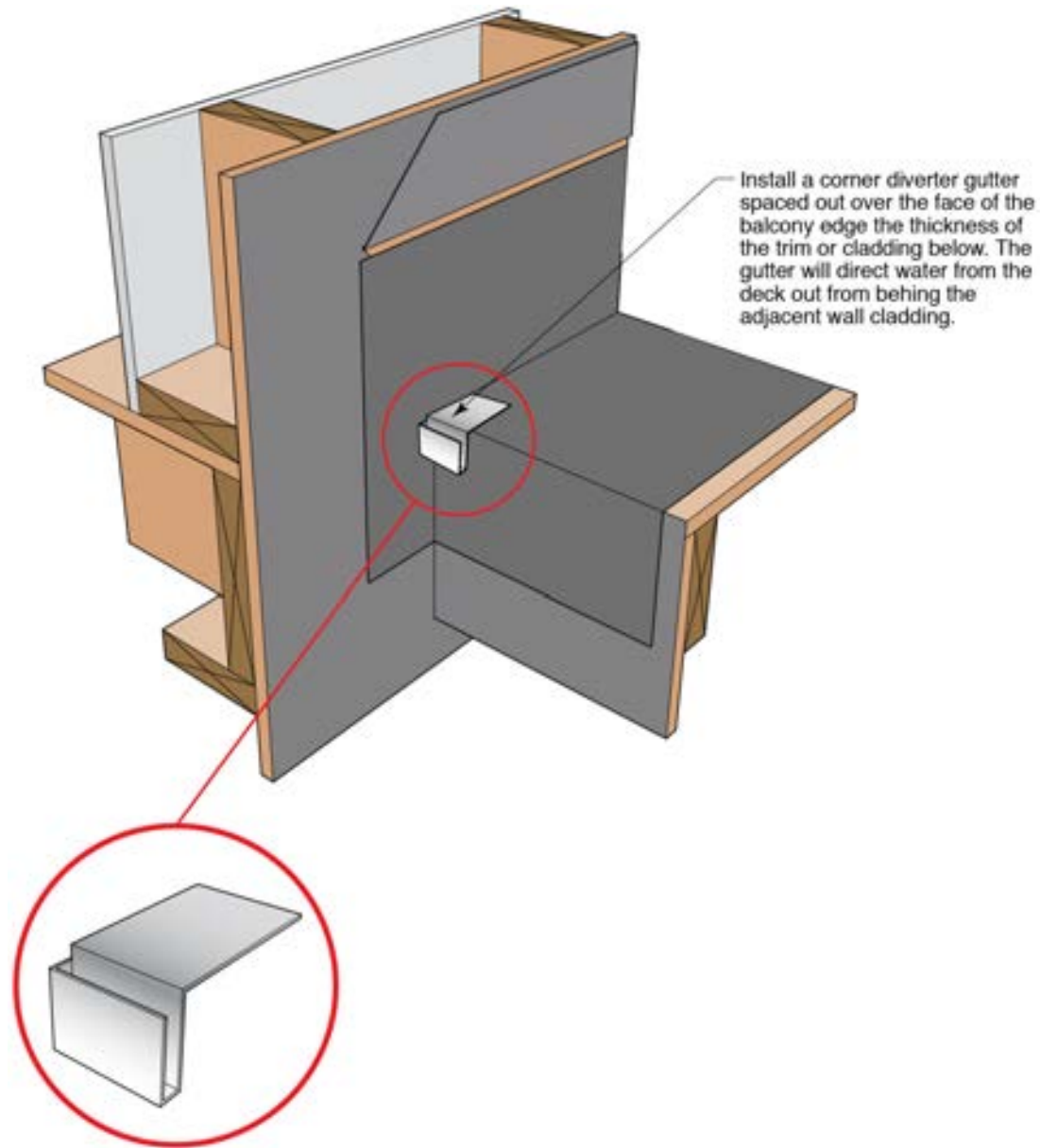


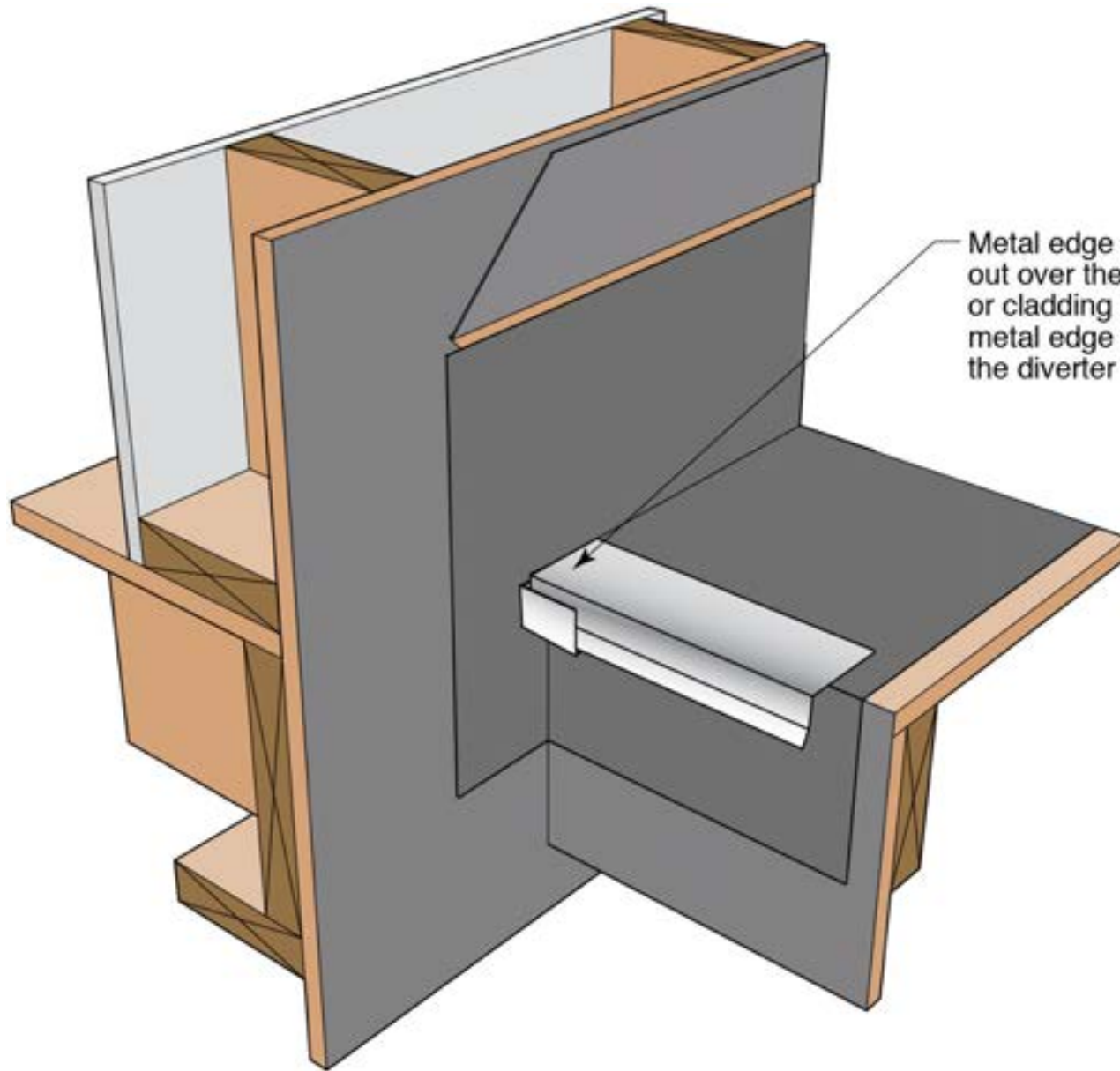




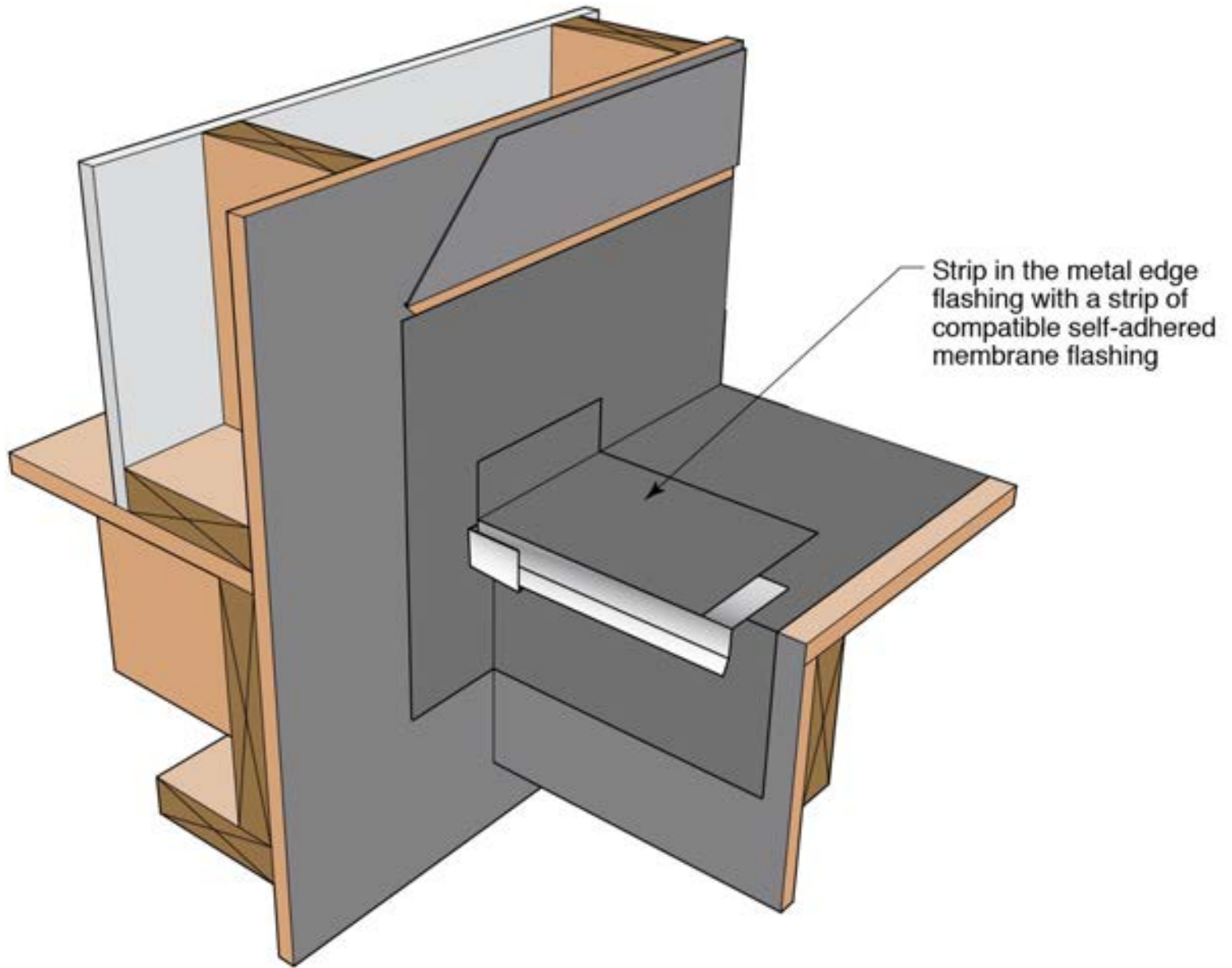




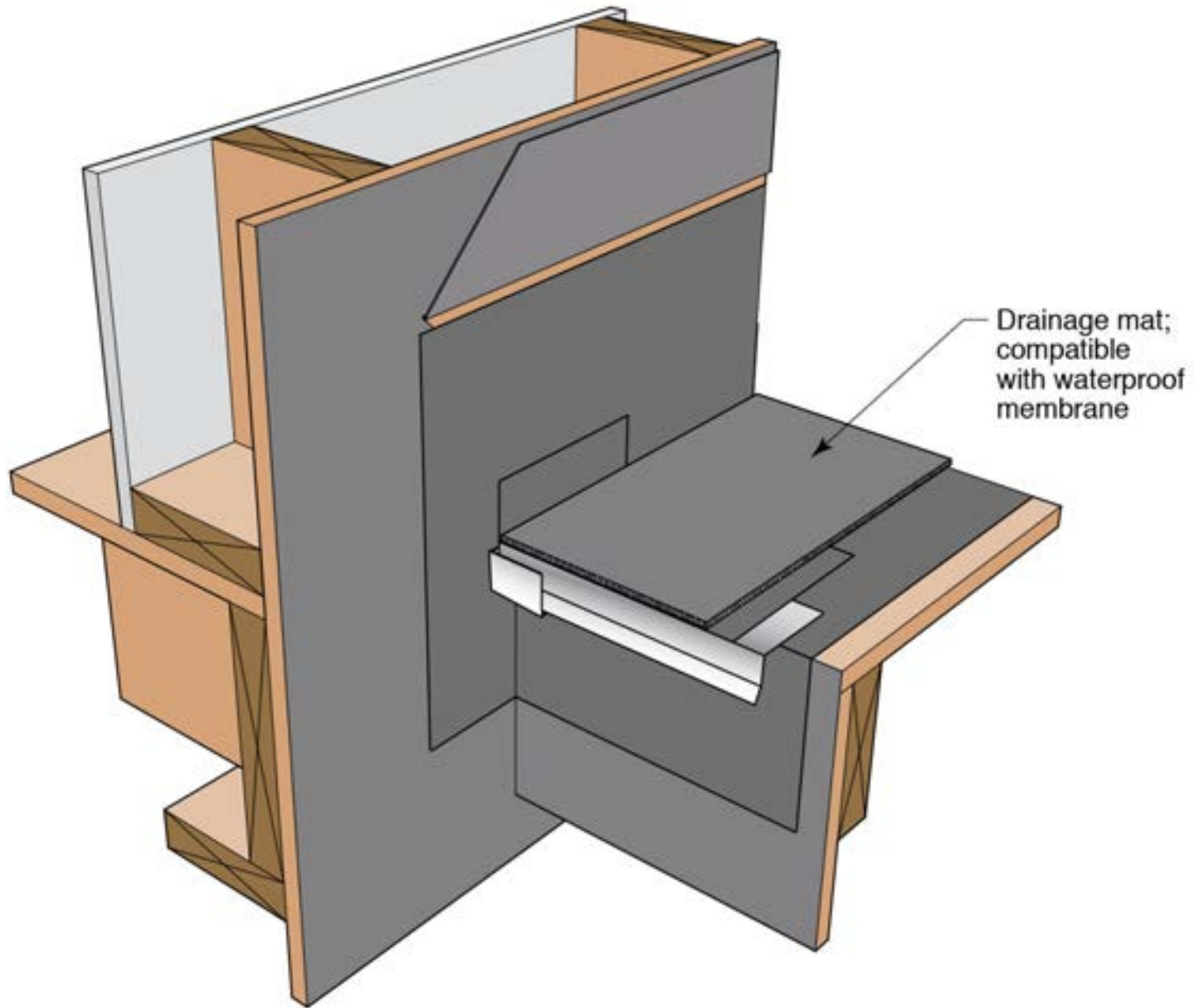


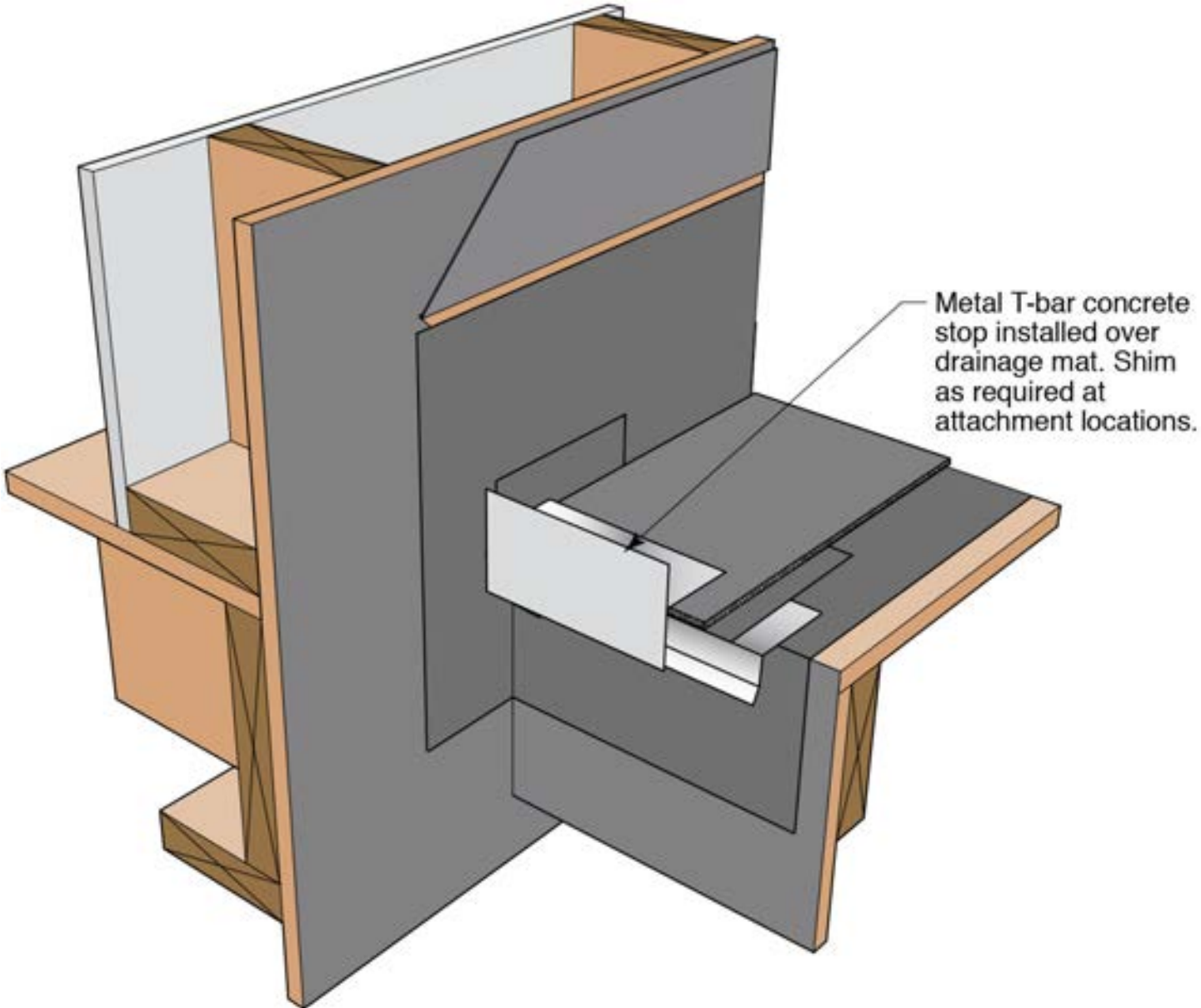


Metal edge angle spaced out over the face of the trim or cladding below. End of metal edge flashing fits into the diverter gutter.

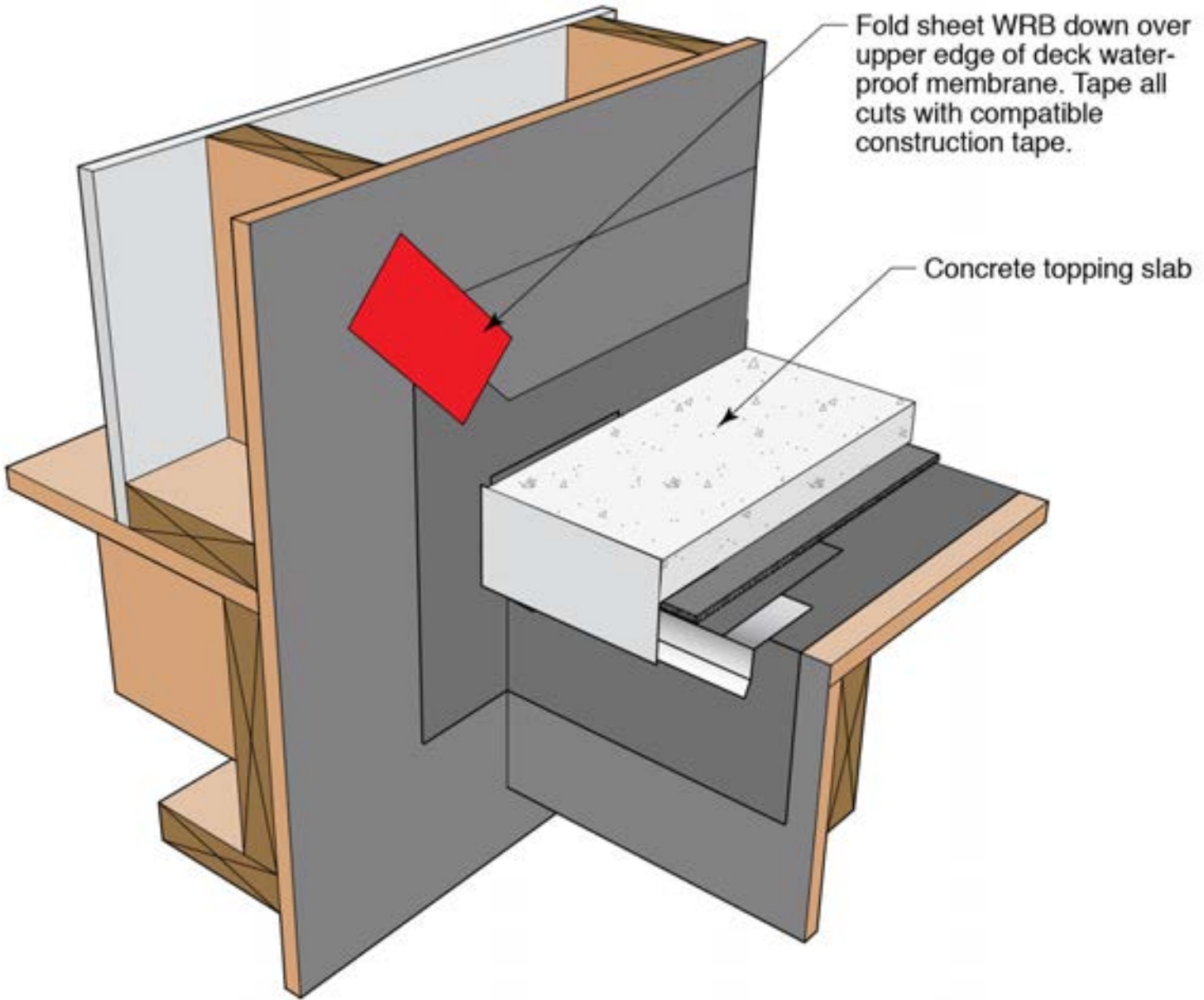


Strip in the metal edge flashing with a strip of compatible self-adhered membrane flashing





Metal T-bar concrete stop installed over drainage mat. Shim as required at attachment locations.



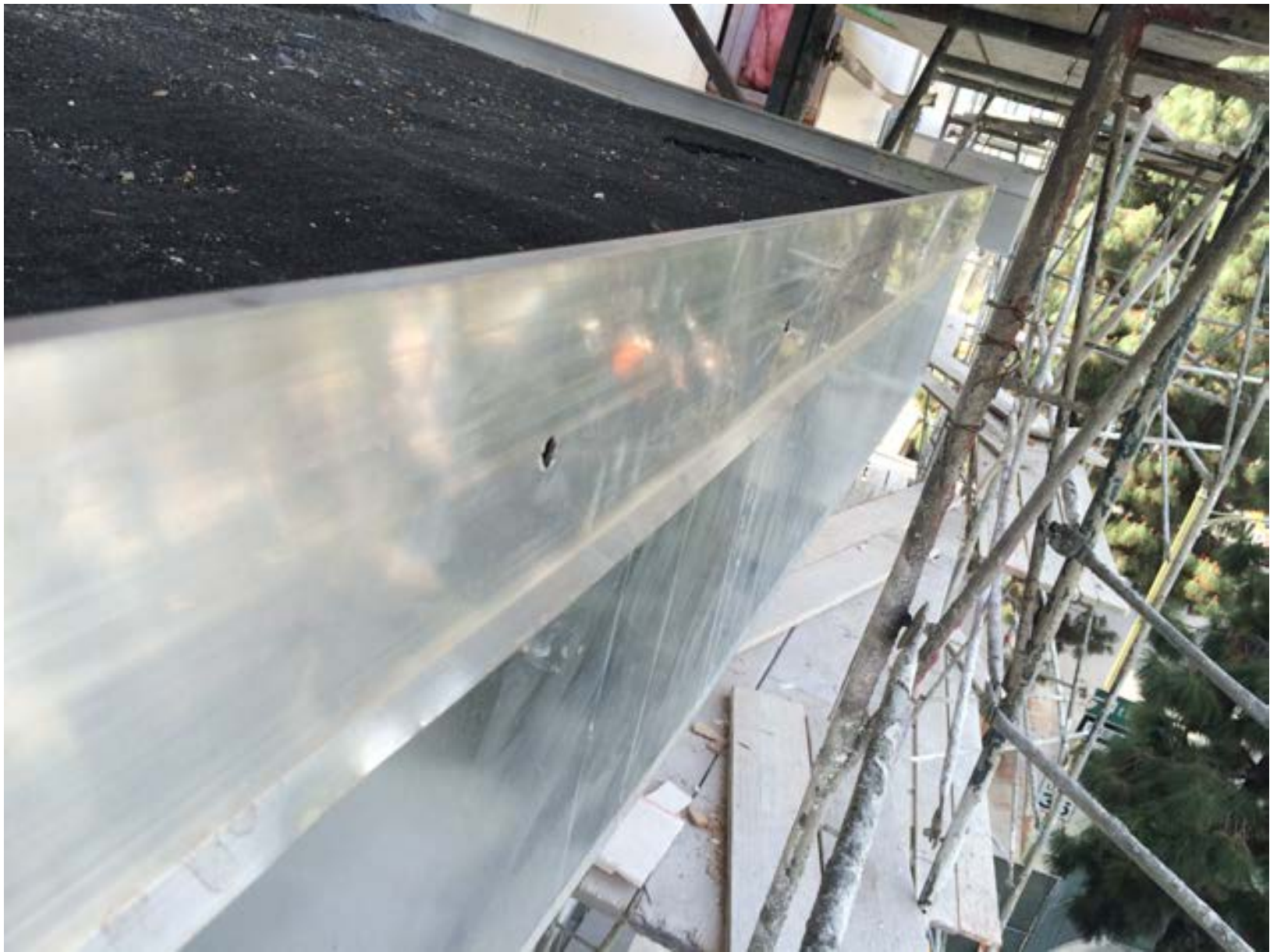


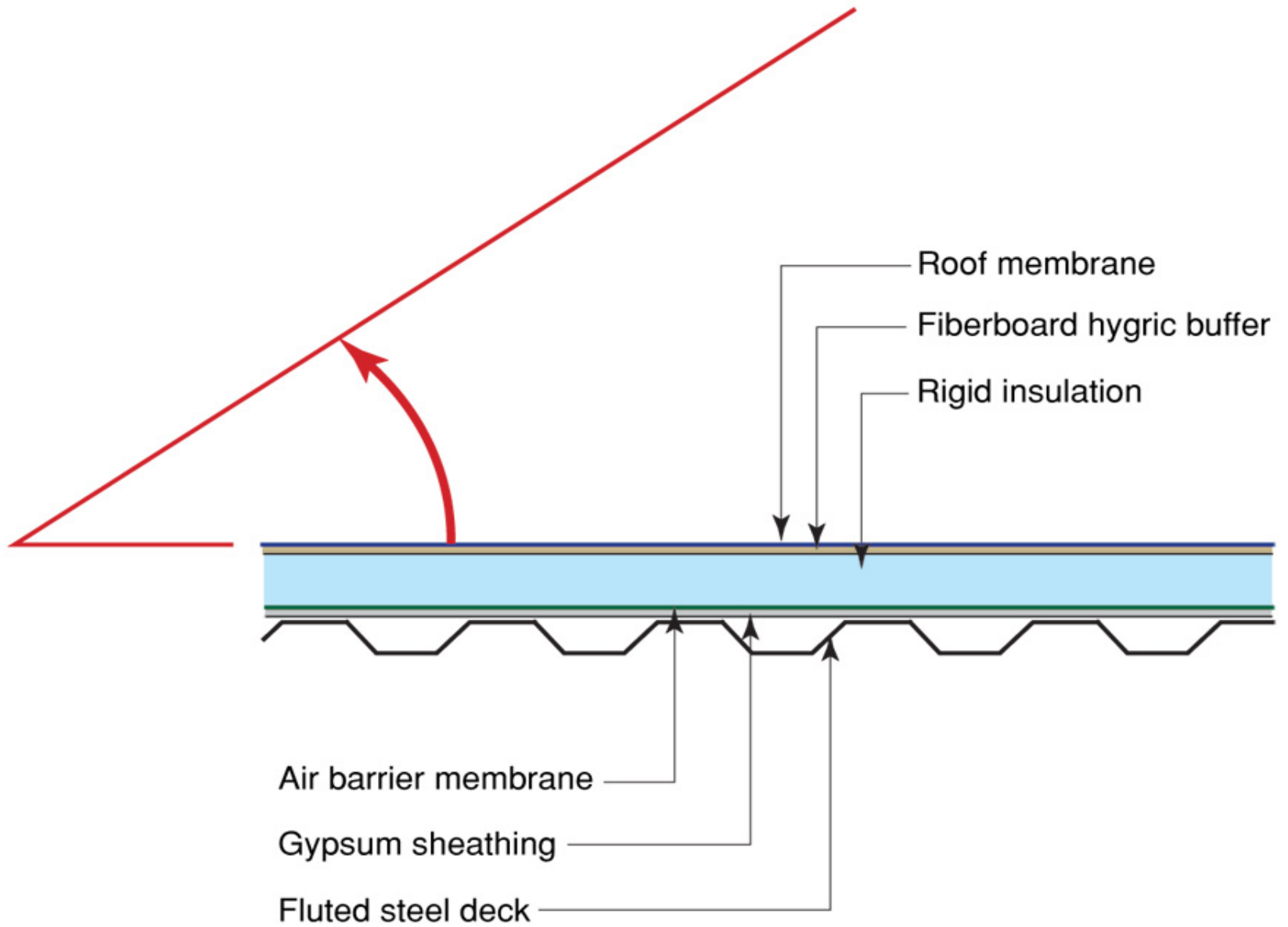


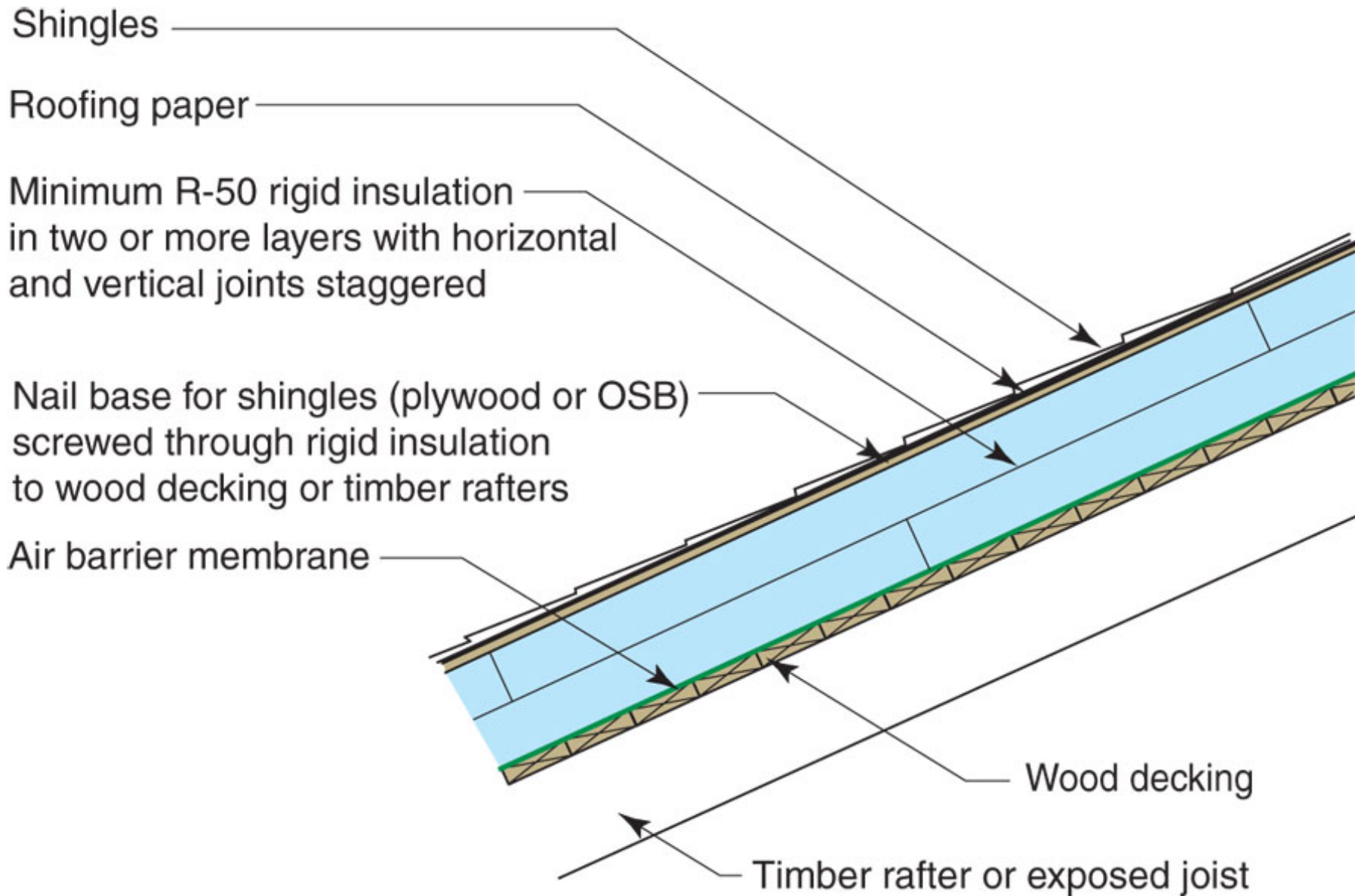


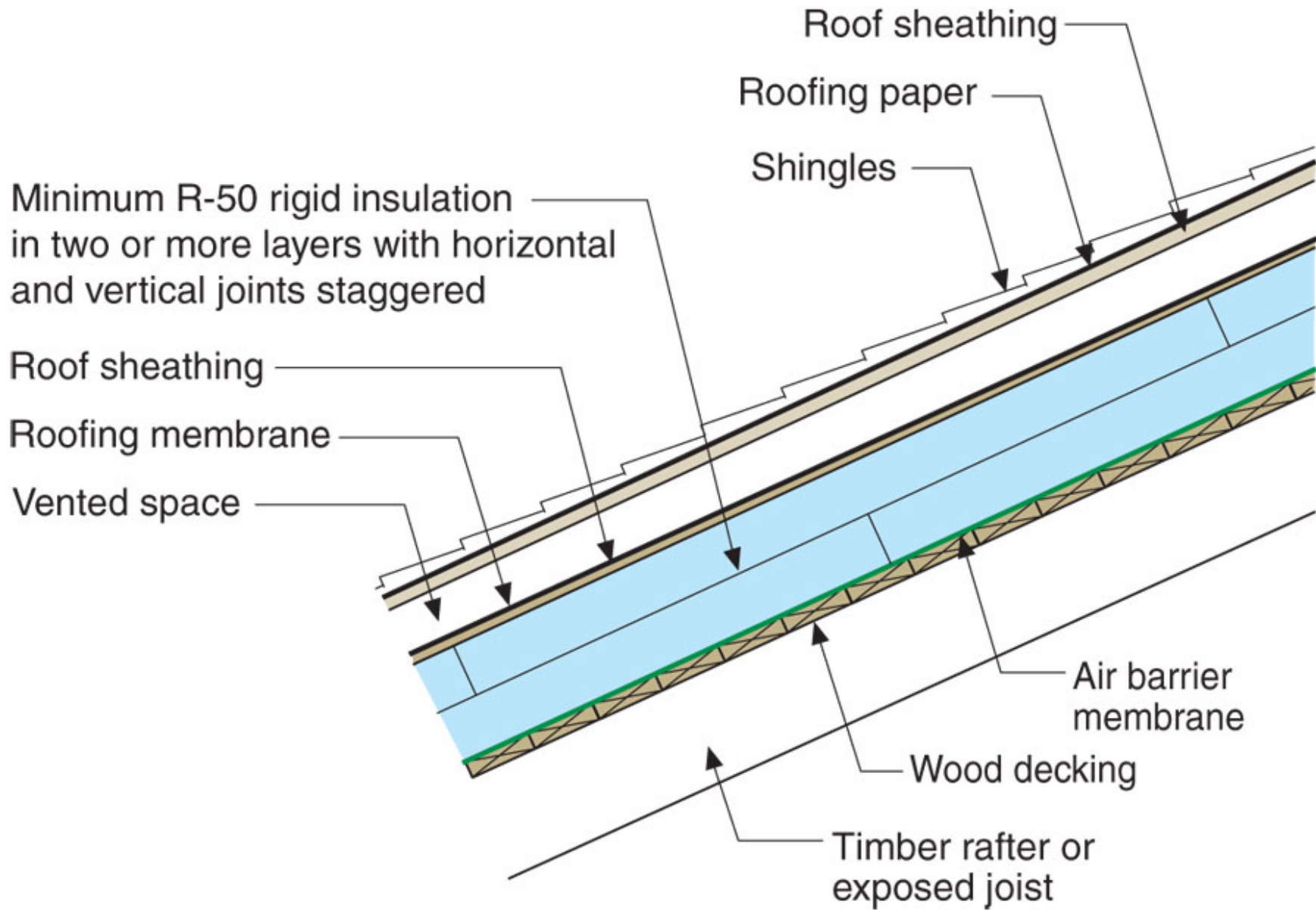
















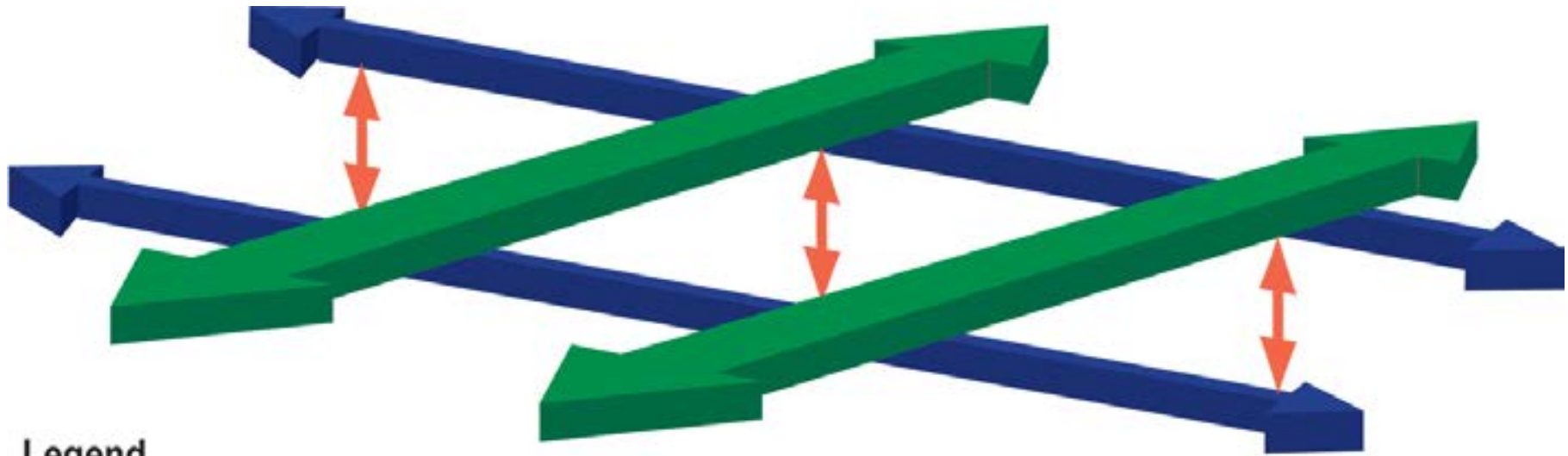












**Legend**

- ↔ Upper level air flows
- ↔ Lower level air flows
- ↕ Air flow at panel joints

