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Building Science

Adventures In Building Science

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What is a Building?

A Building is an Environmental Separator

- Control heat flow
- Control airflow
- Control water vapor flow
- Control rain
- Control ground water
- Control light and solar radiation
- Control noise and vibrations
- Control contaminants, environmental hazards and odors
- Control insects, rodents and vermin
- Control fire
- Provide strength and rigidity
- Be durable
- Be aesthetically pleasing
- Be economical

Arrhenius Equation

For Every 10 Degree K Rise
Reaction Rate Doubles

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

Damage Functions

Water

Heat

Ultra-violet Radiation

2nd 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

Thermodynamic Potential



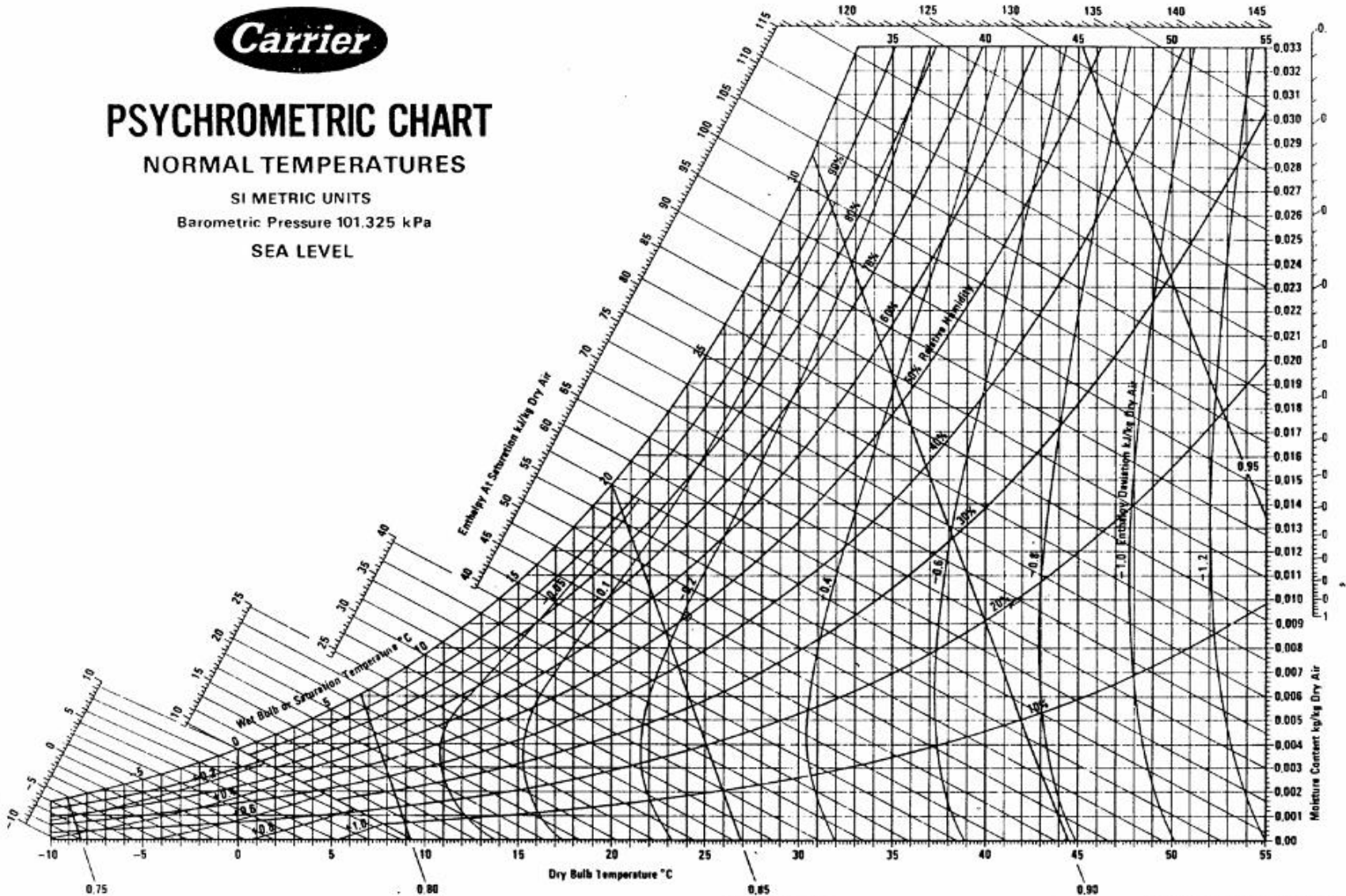
PSYCHROMETRIC CHART

NORMAL TEMPERATURES

SI METRIC UNITS

Barometric Pressure 101.325 kPa

SEA LEVEL







Below 0°C Properties and Enthalpy Deviation Lines Are For Ice

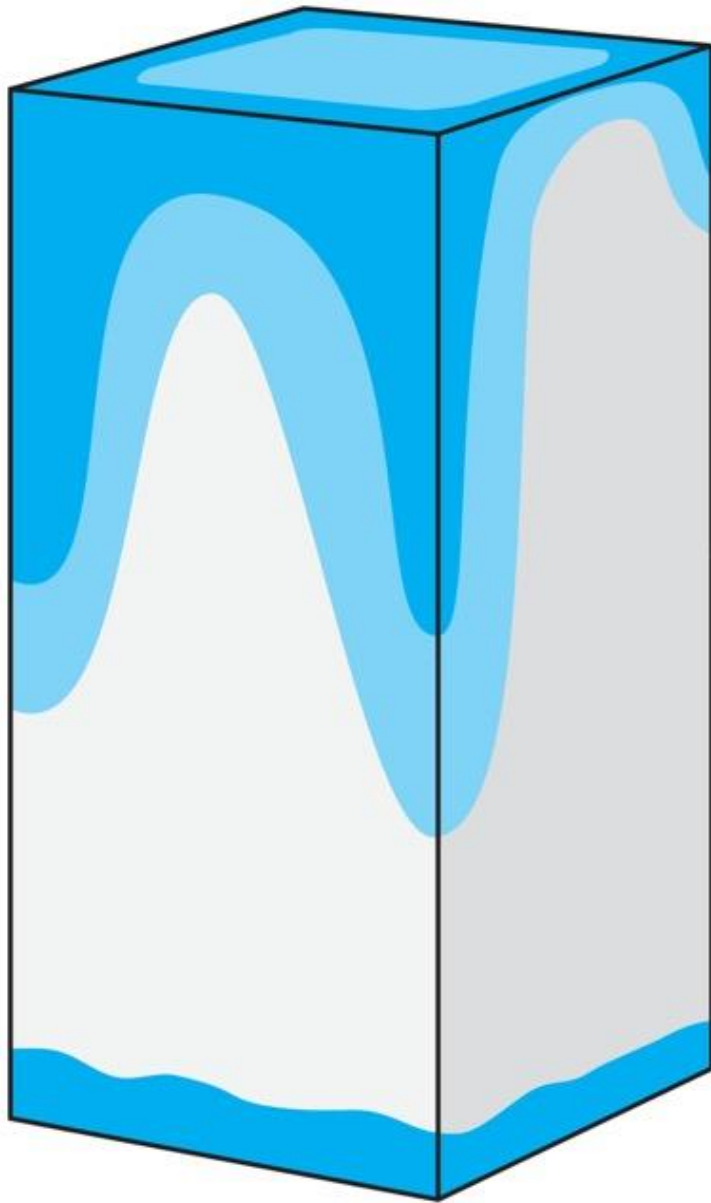
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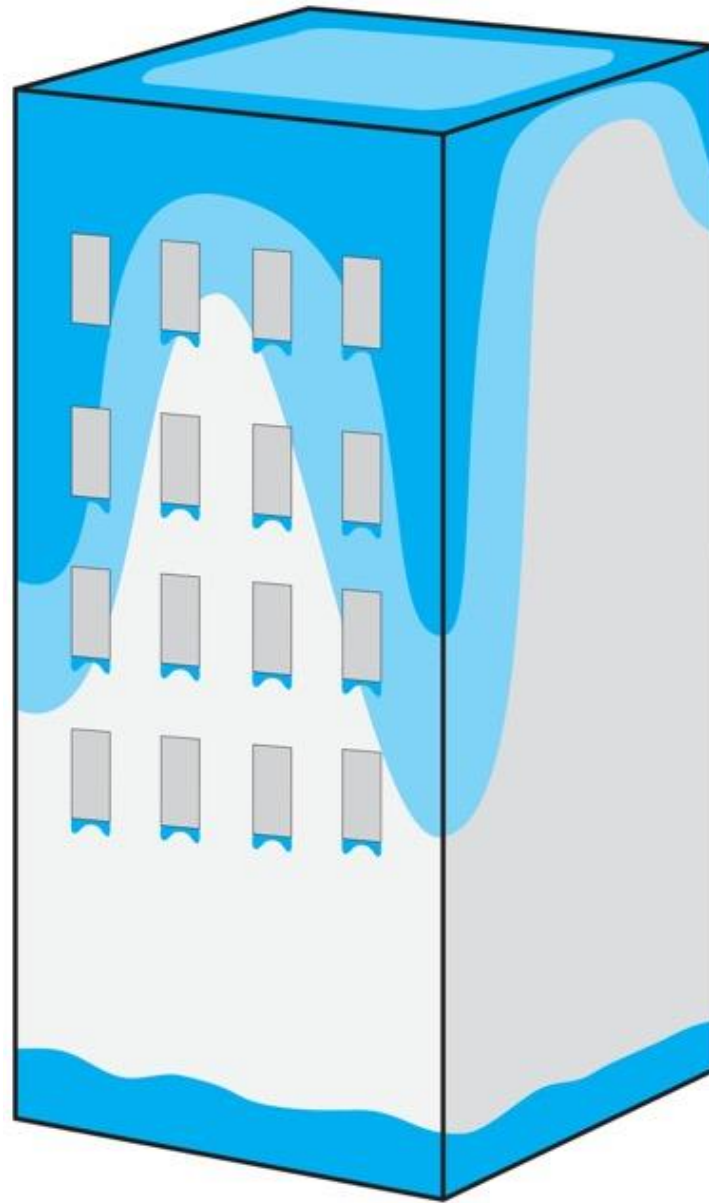




Exposure

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



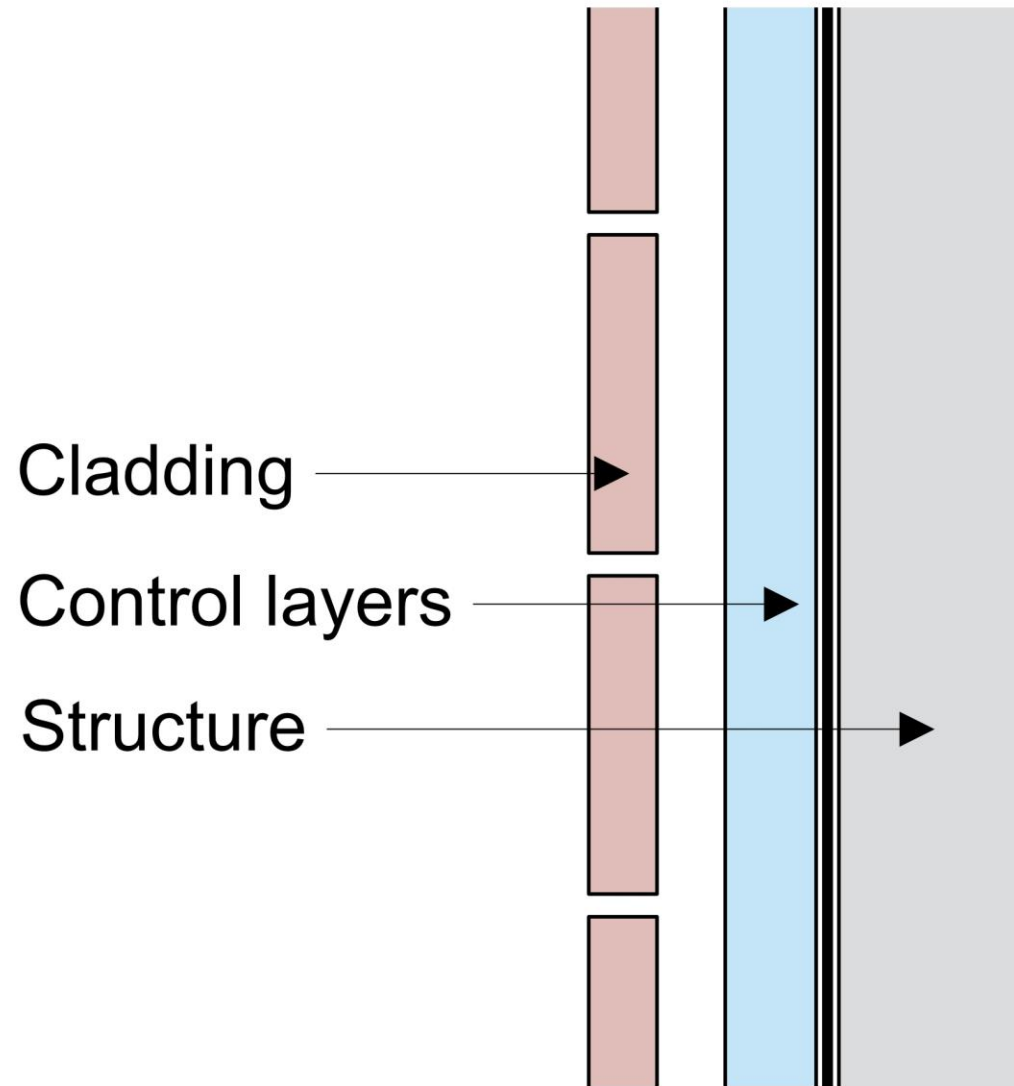


Water Control Layer

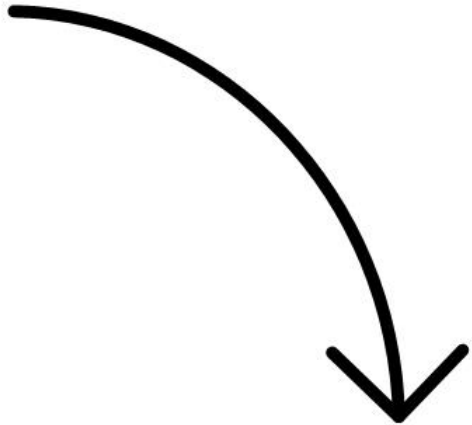
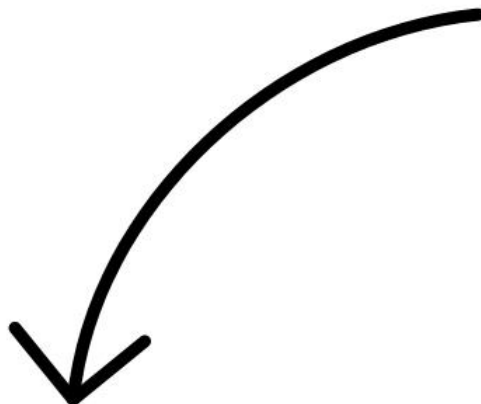
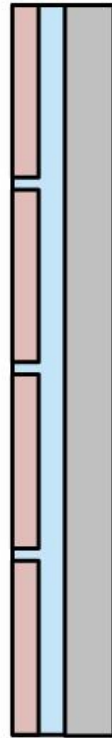
Air Control Layer

Vapor Control Layer

Thermal Control Layer



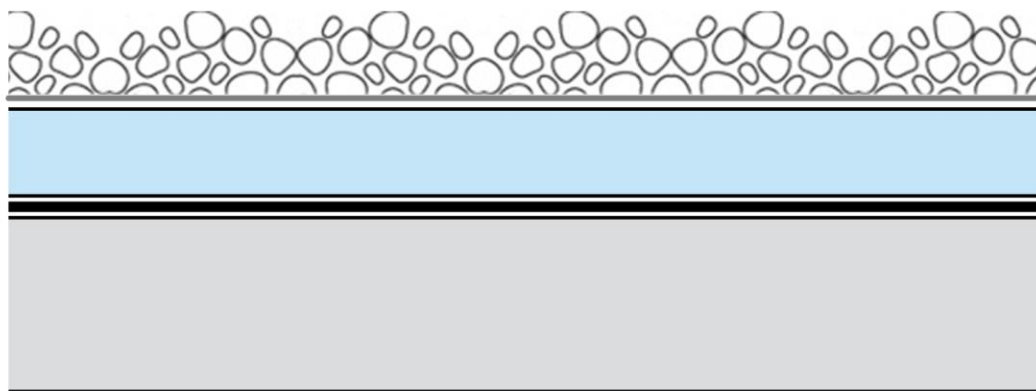
Wall



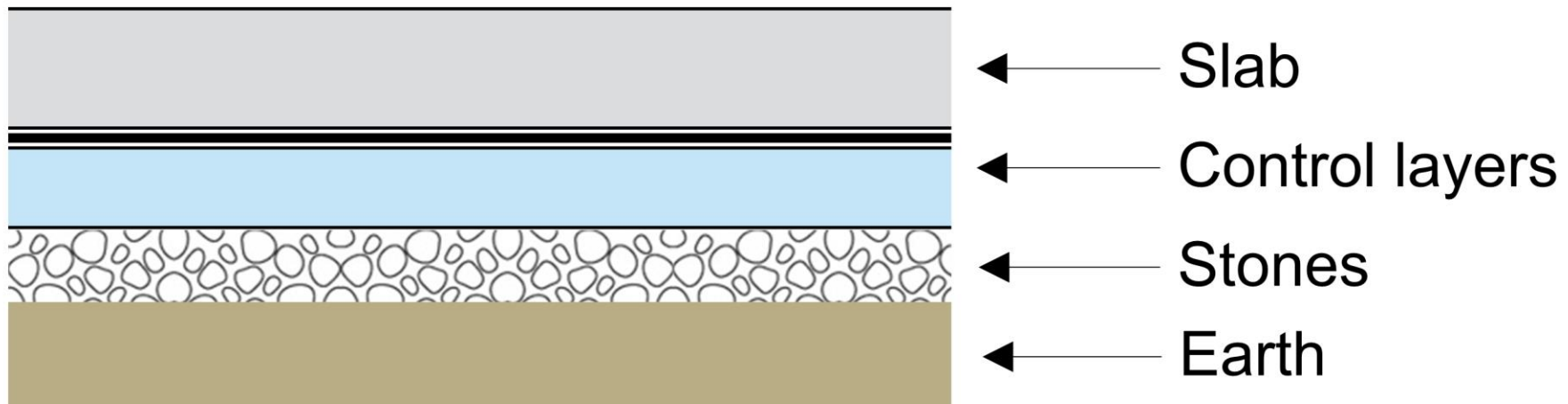
Slab

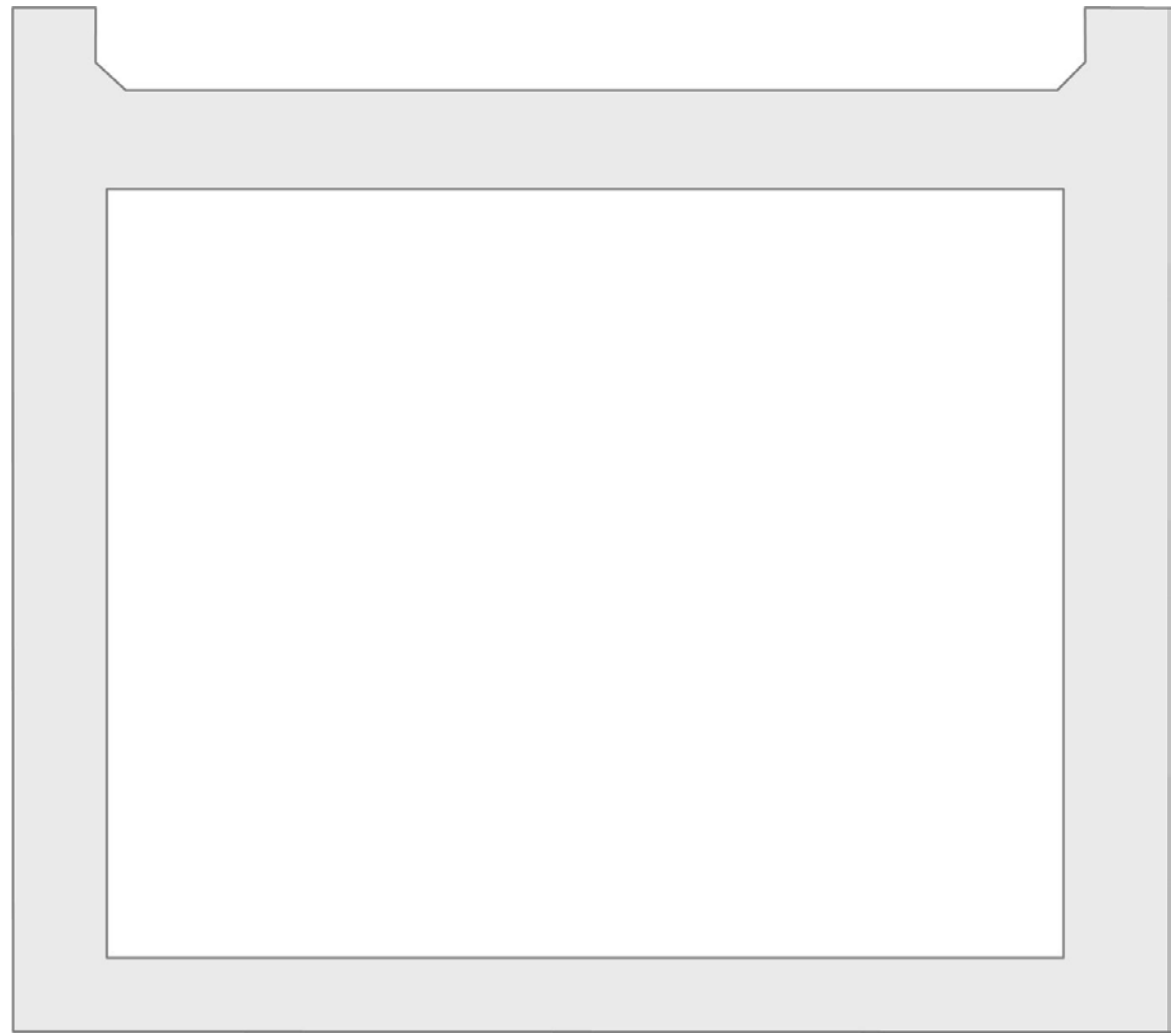


Roof

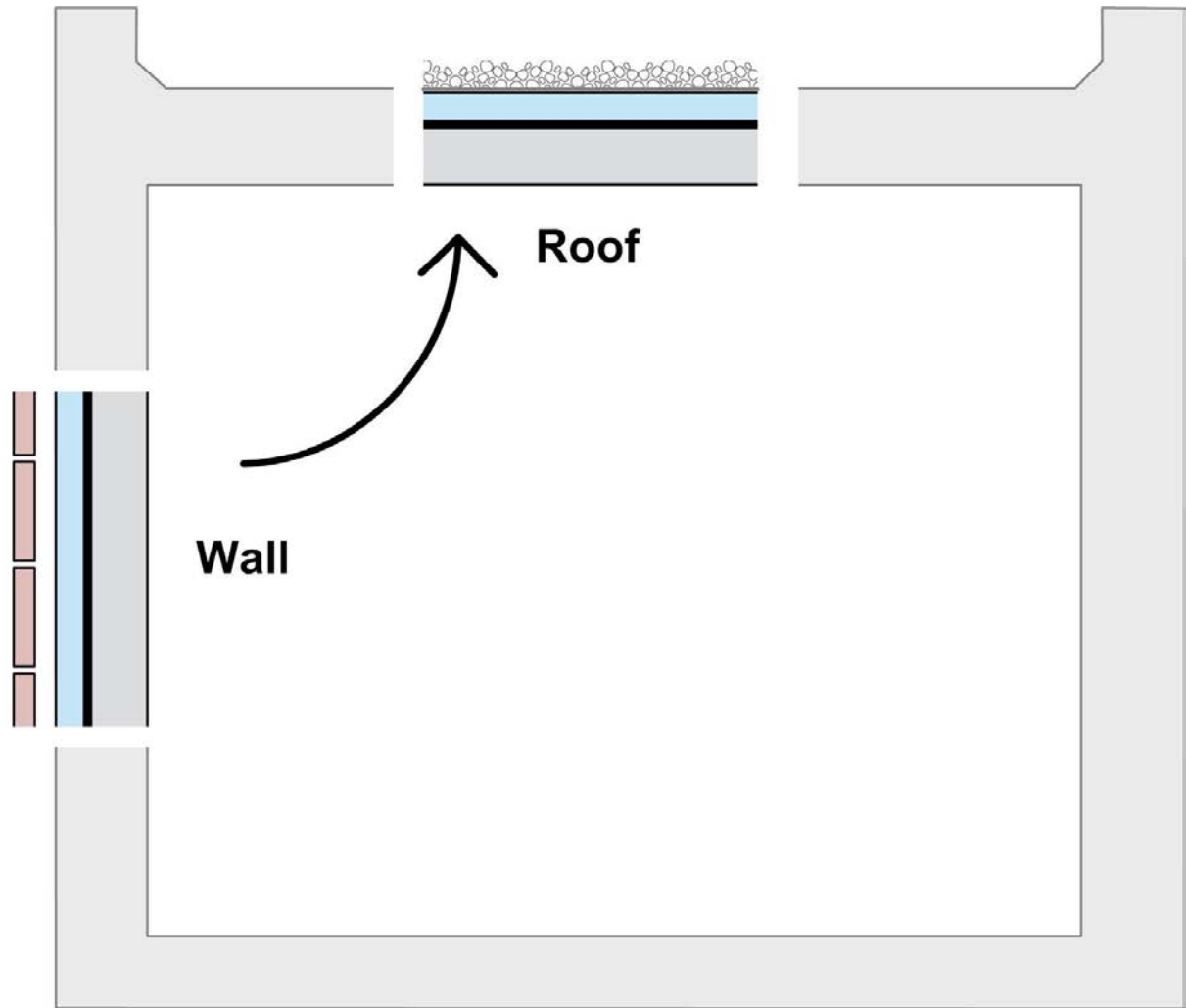


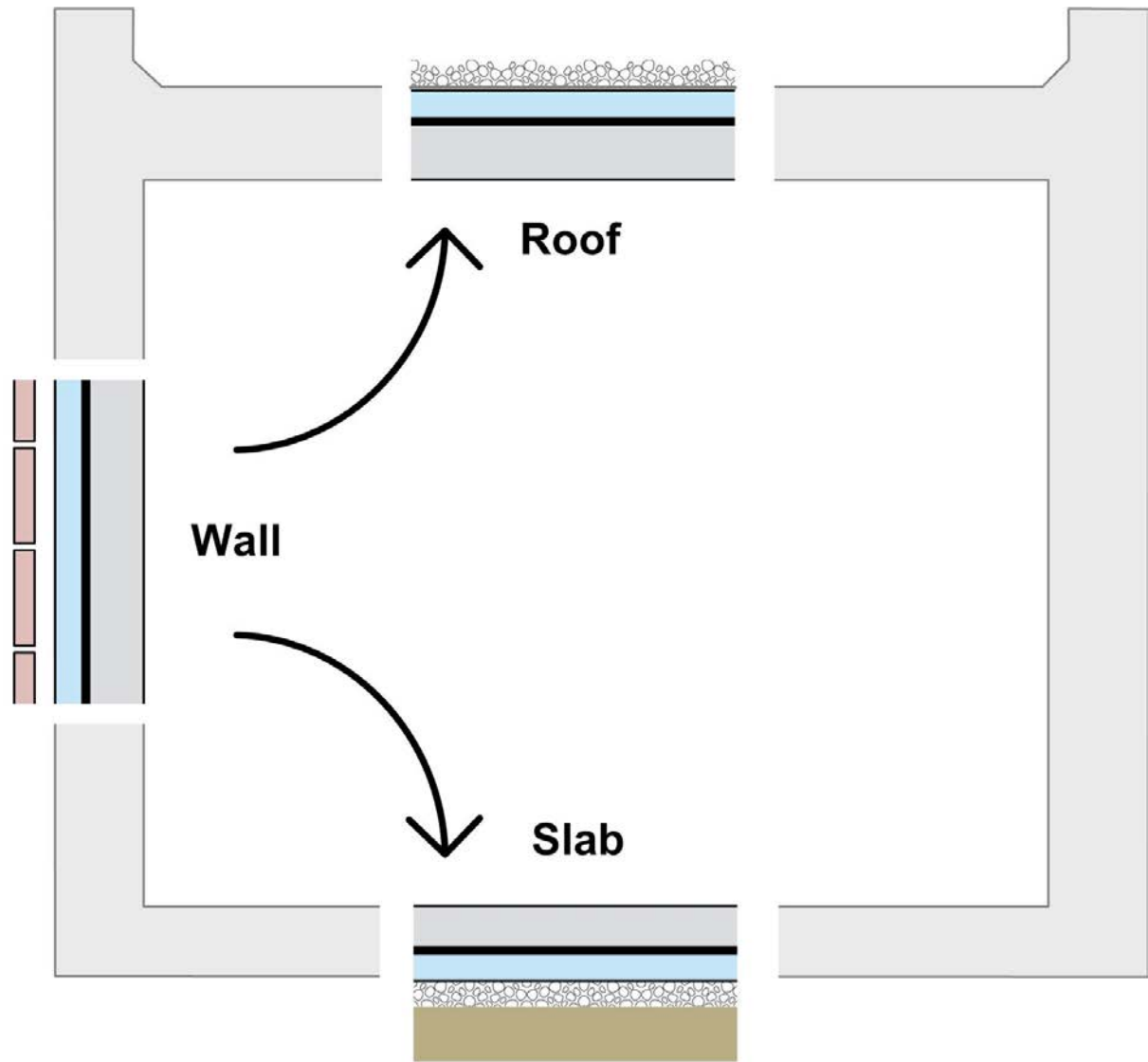
- ← Ballast
- ← Filter fabric
- ← Control layers
- ← Roof structure

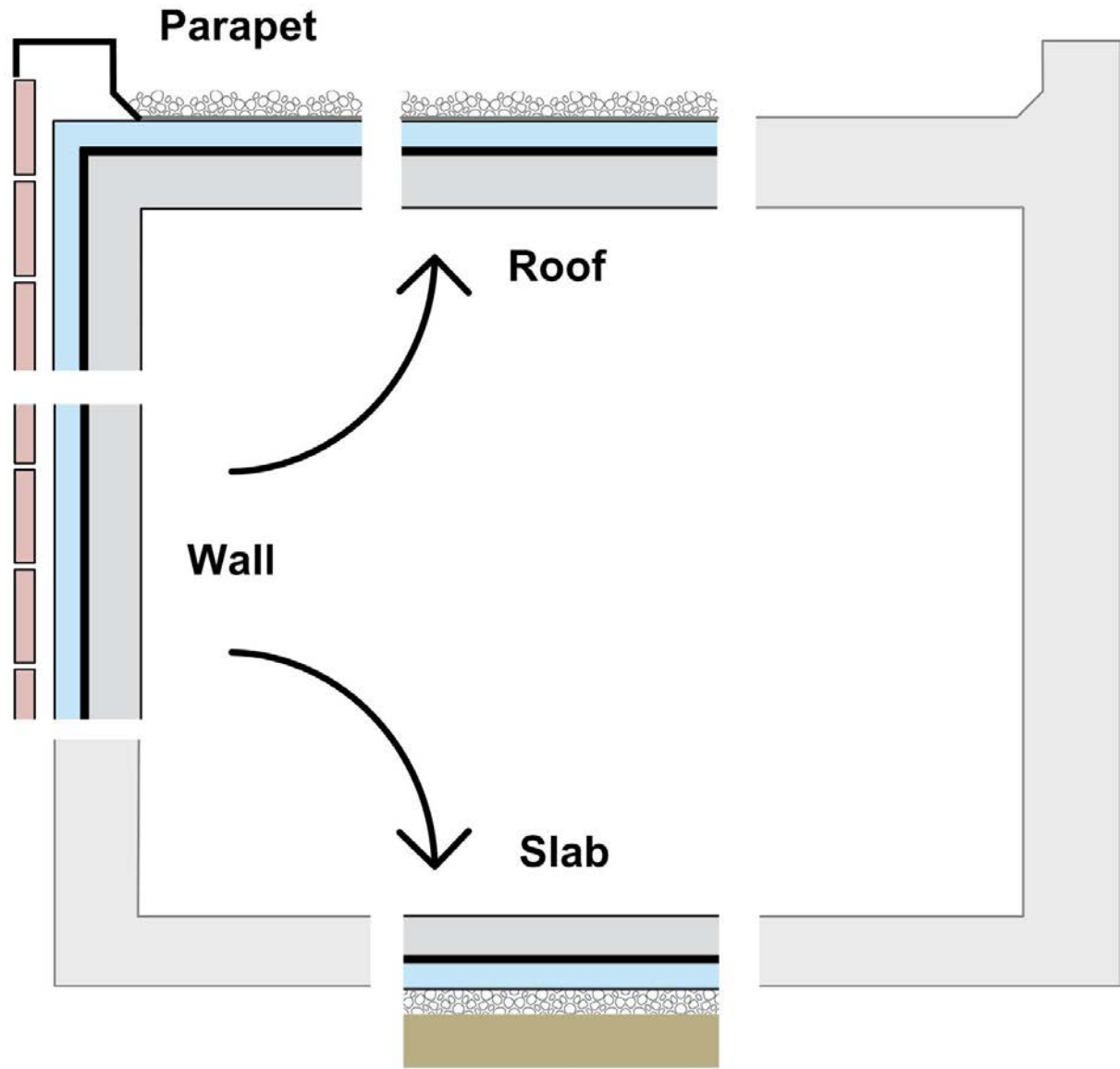


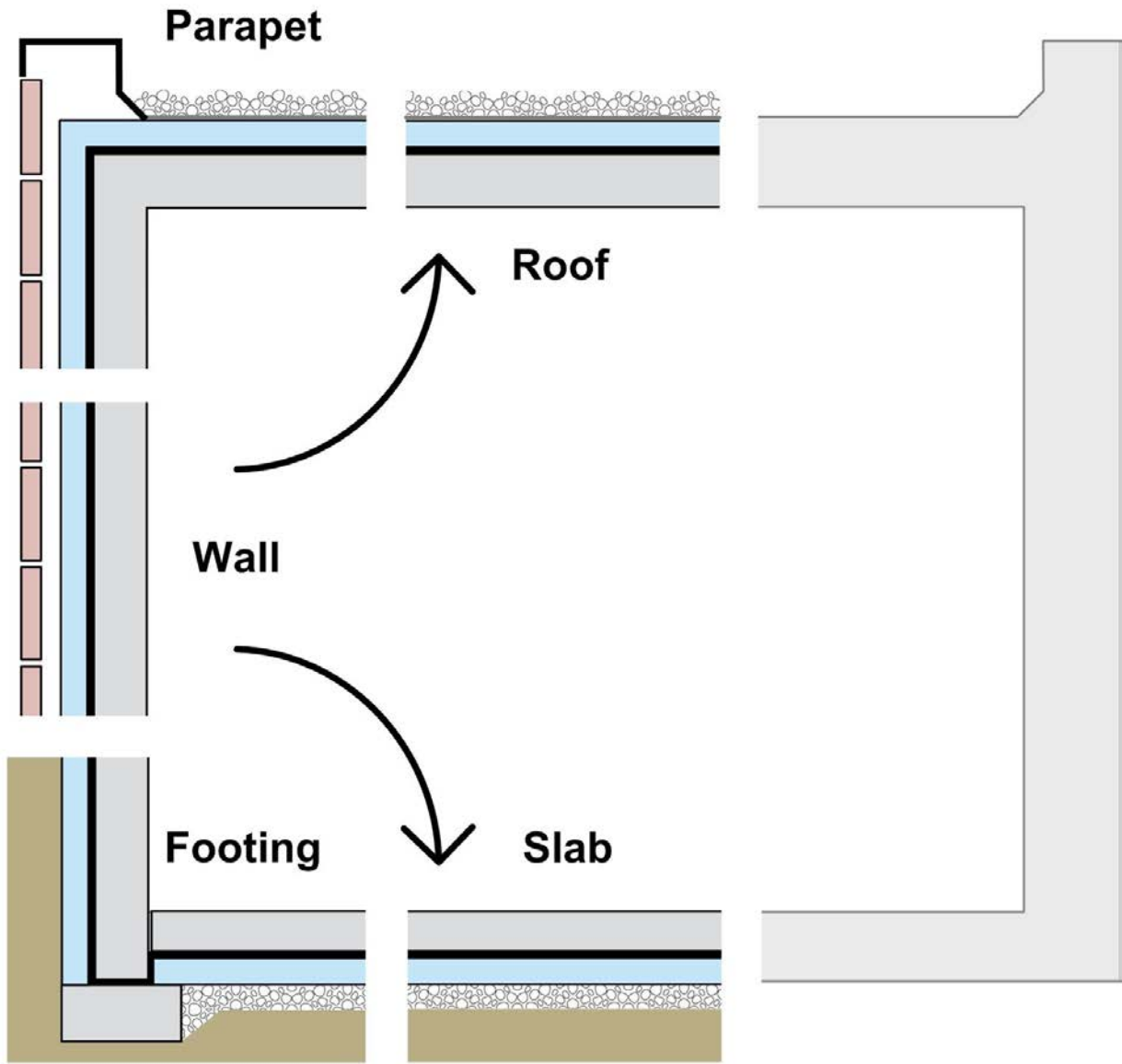


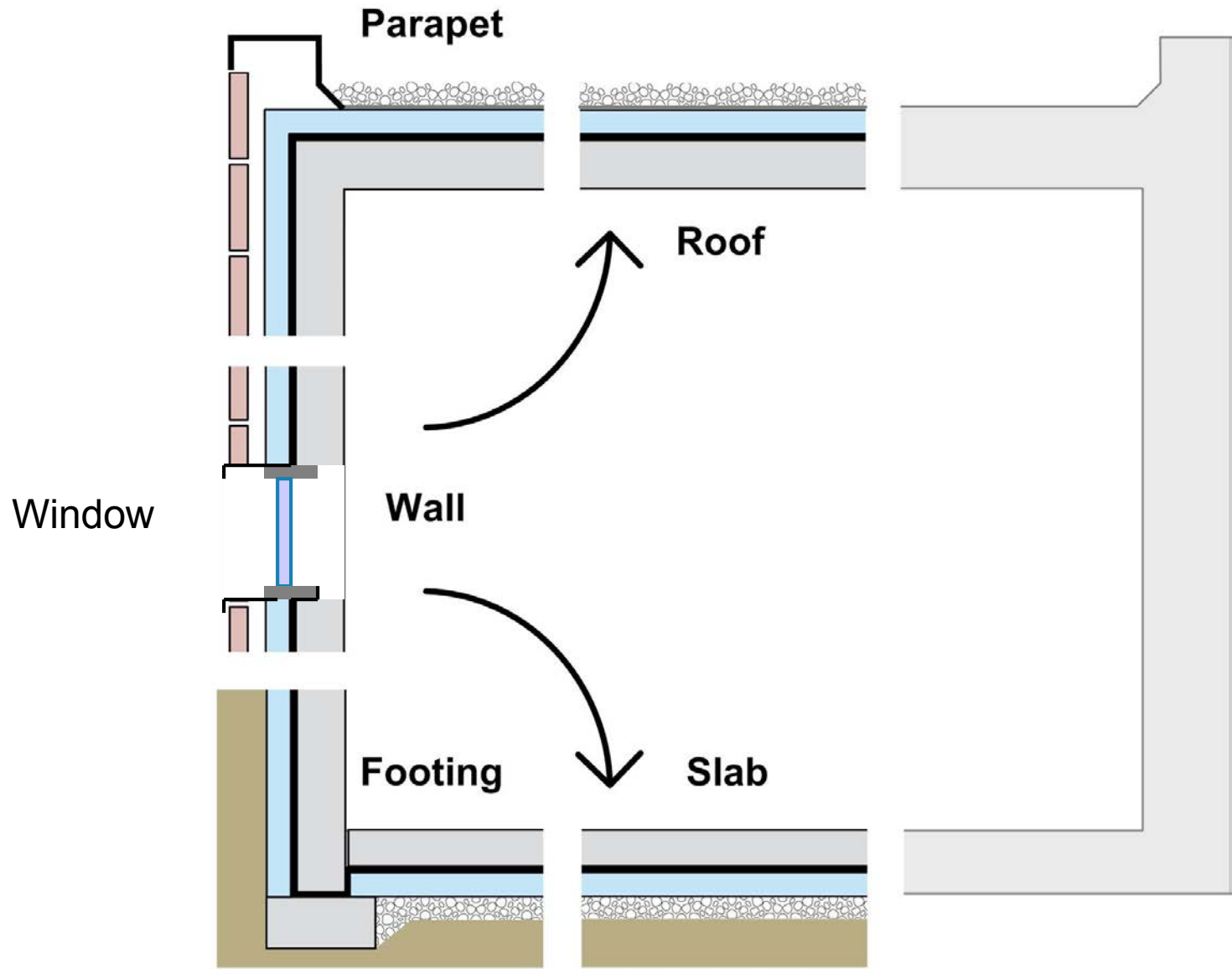


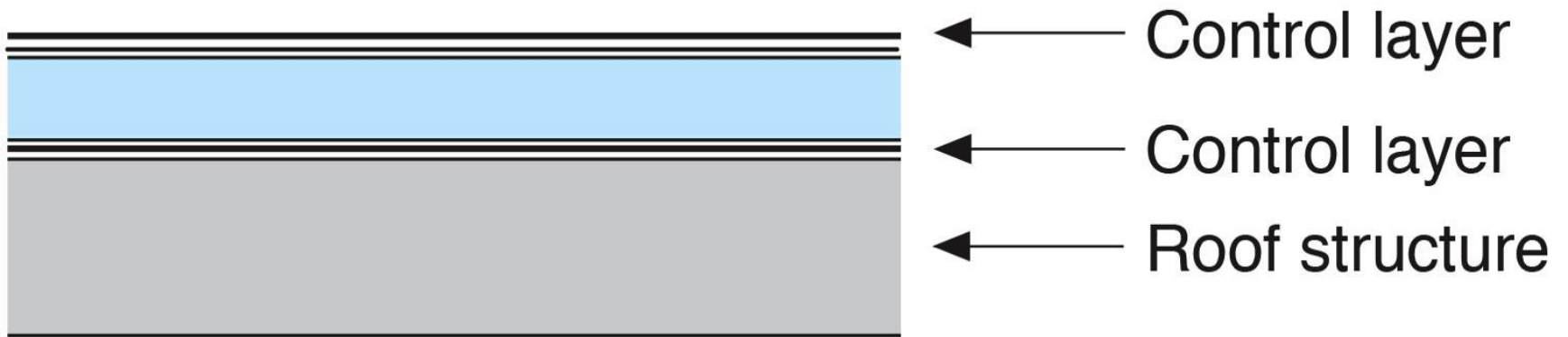


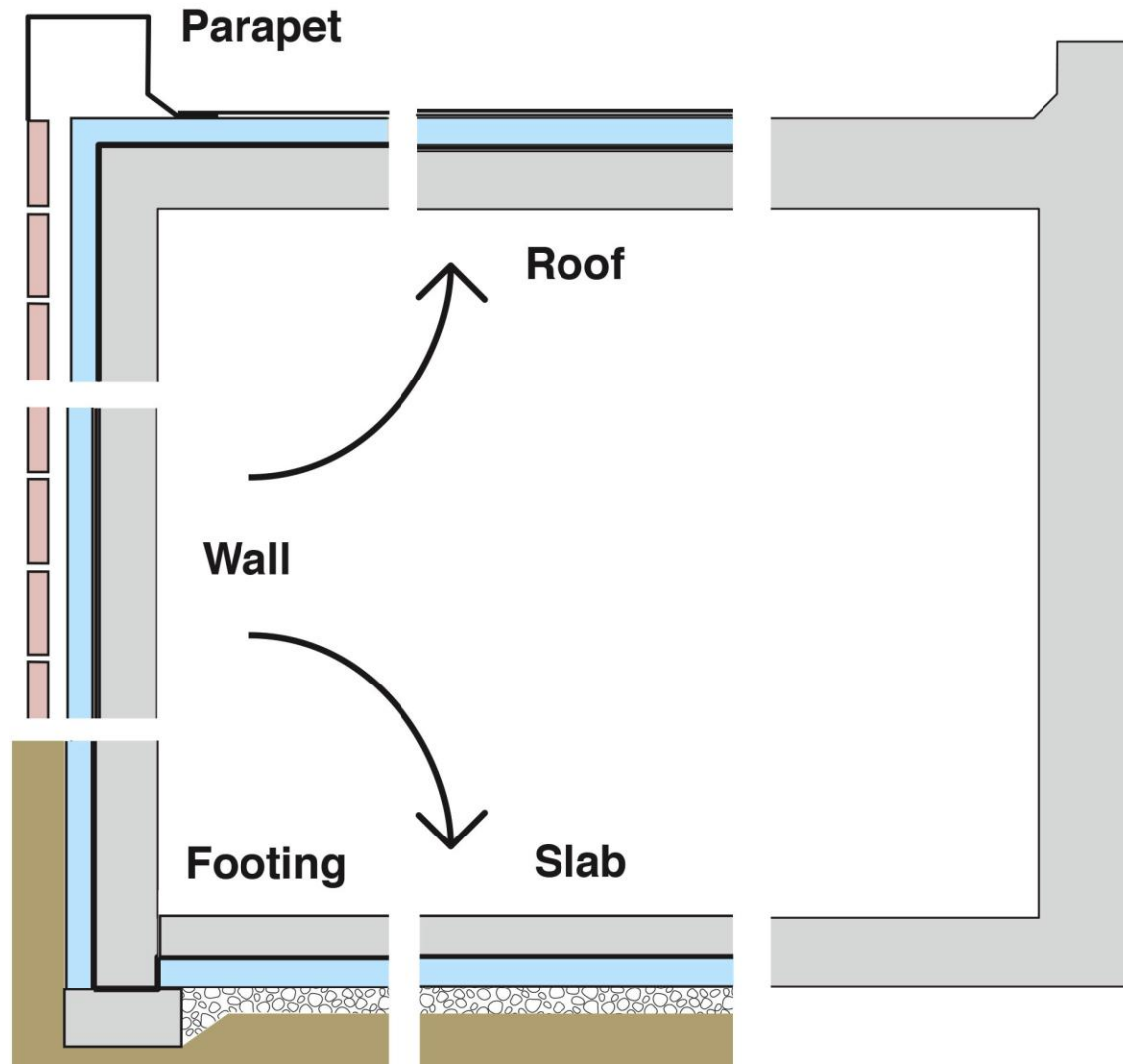


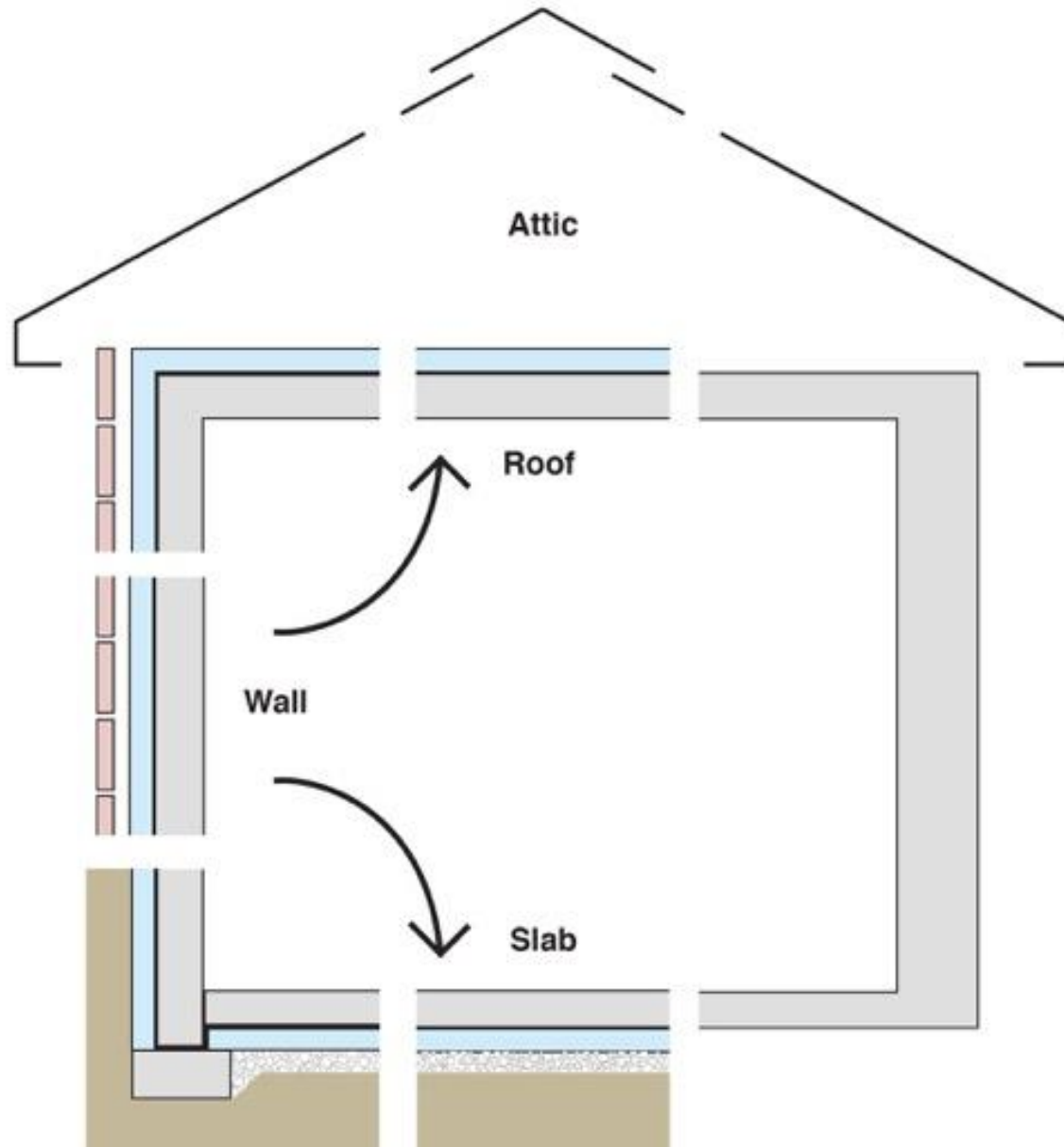


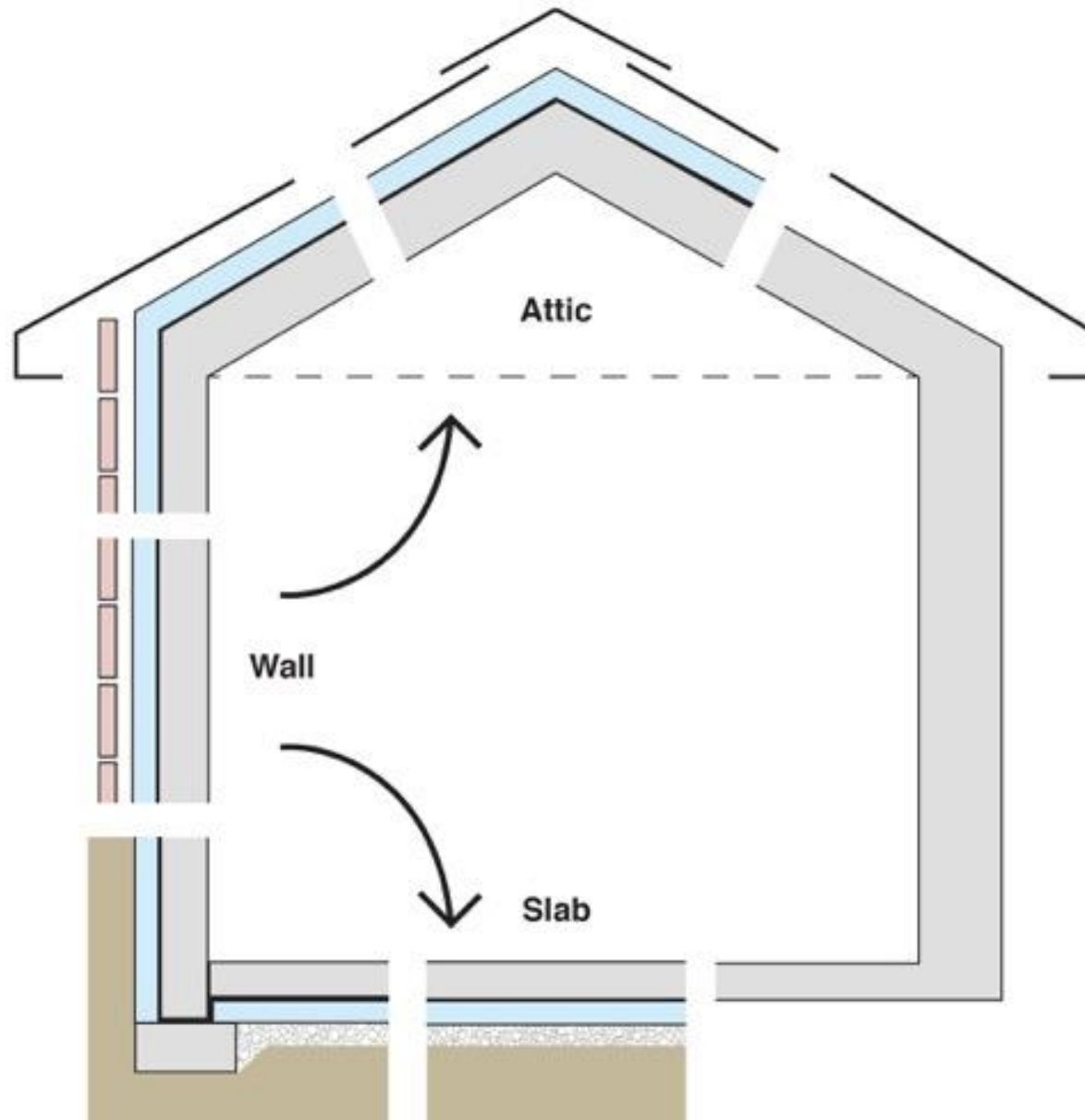


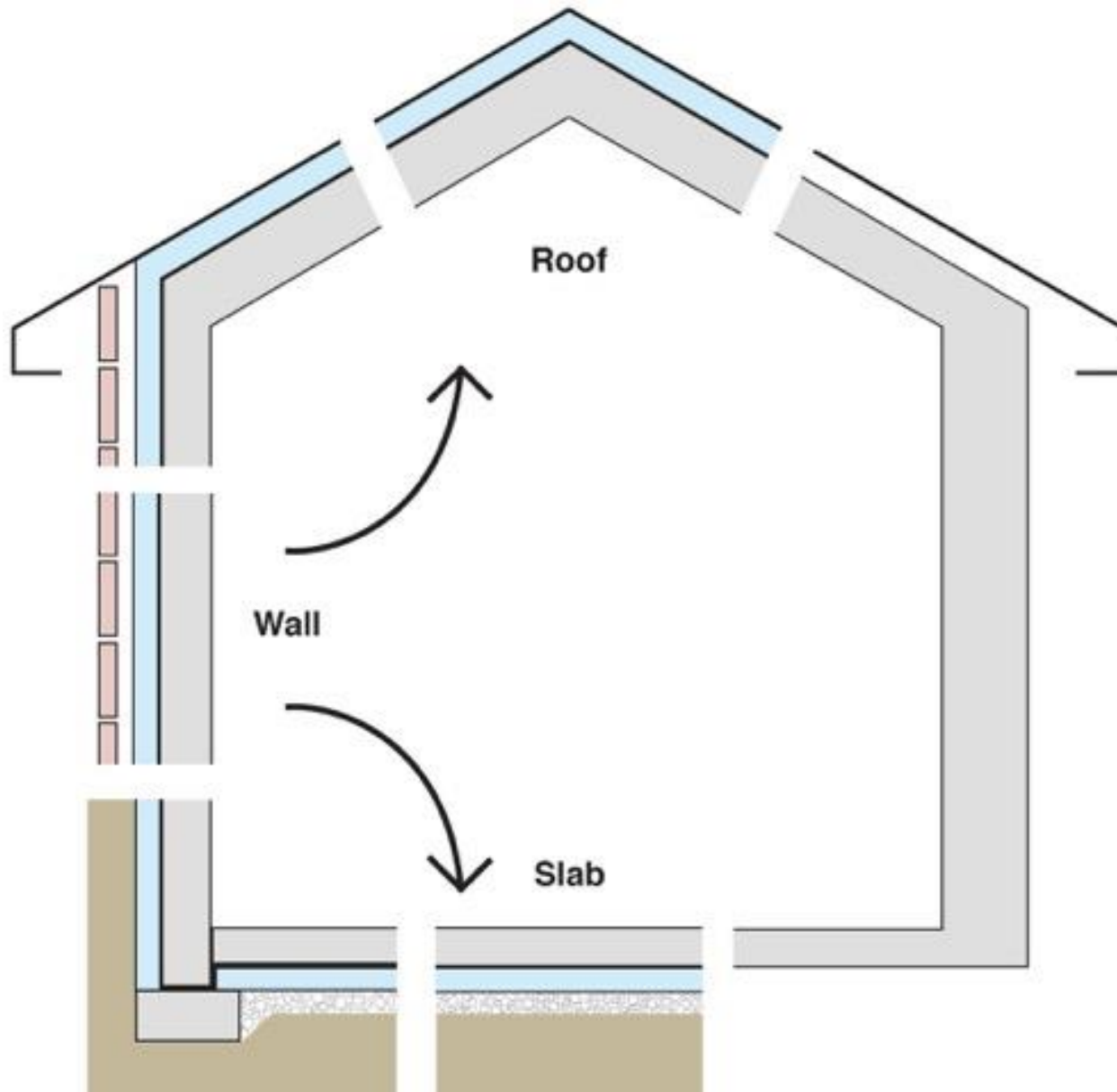


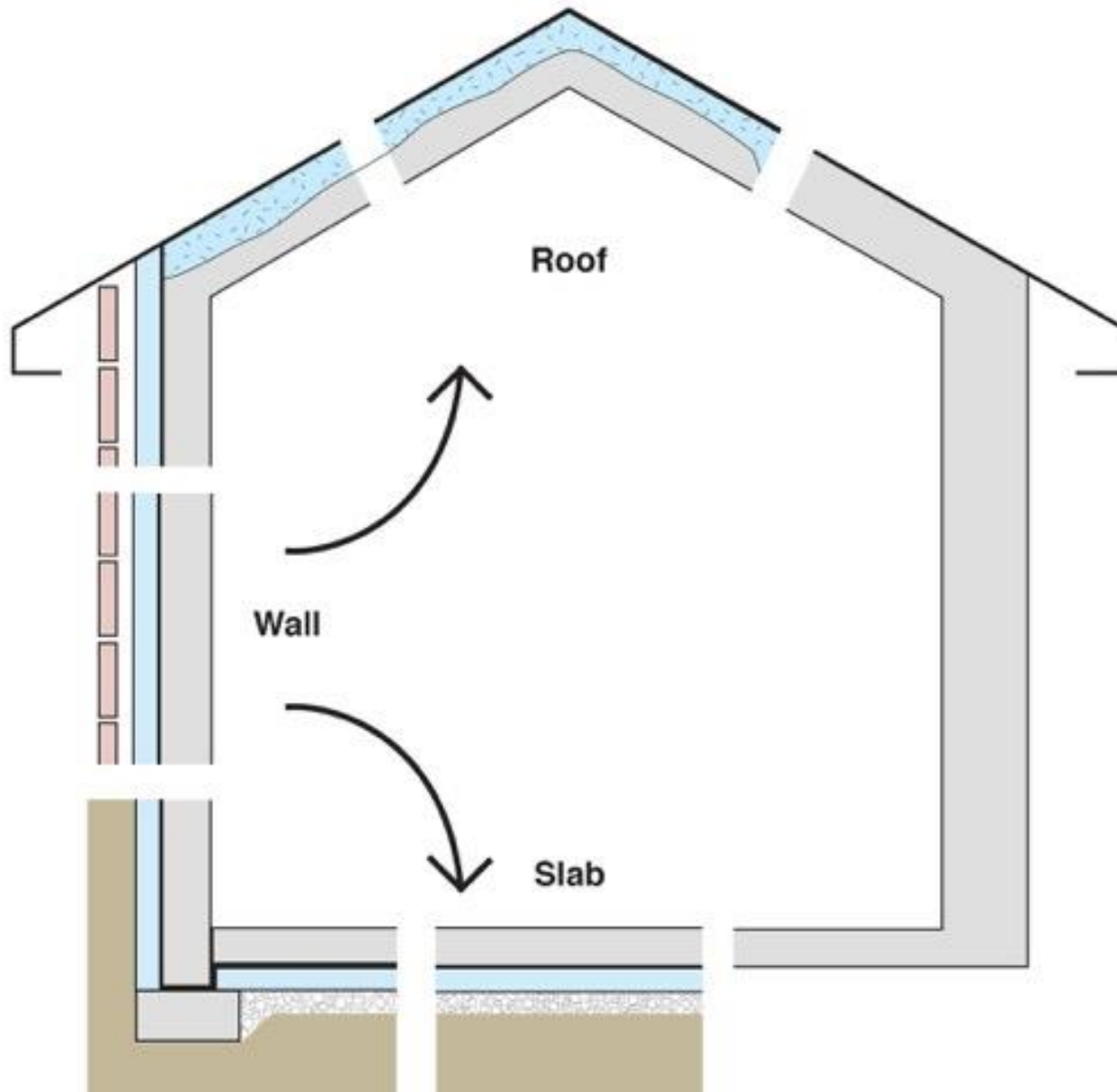




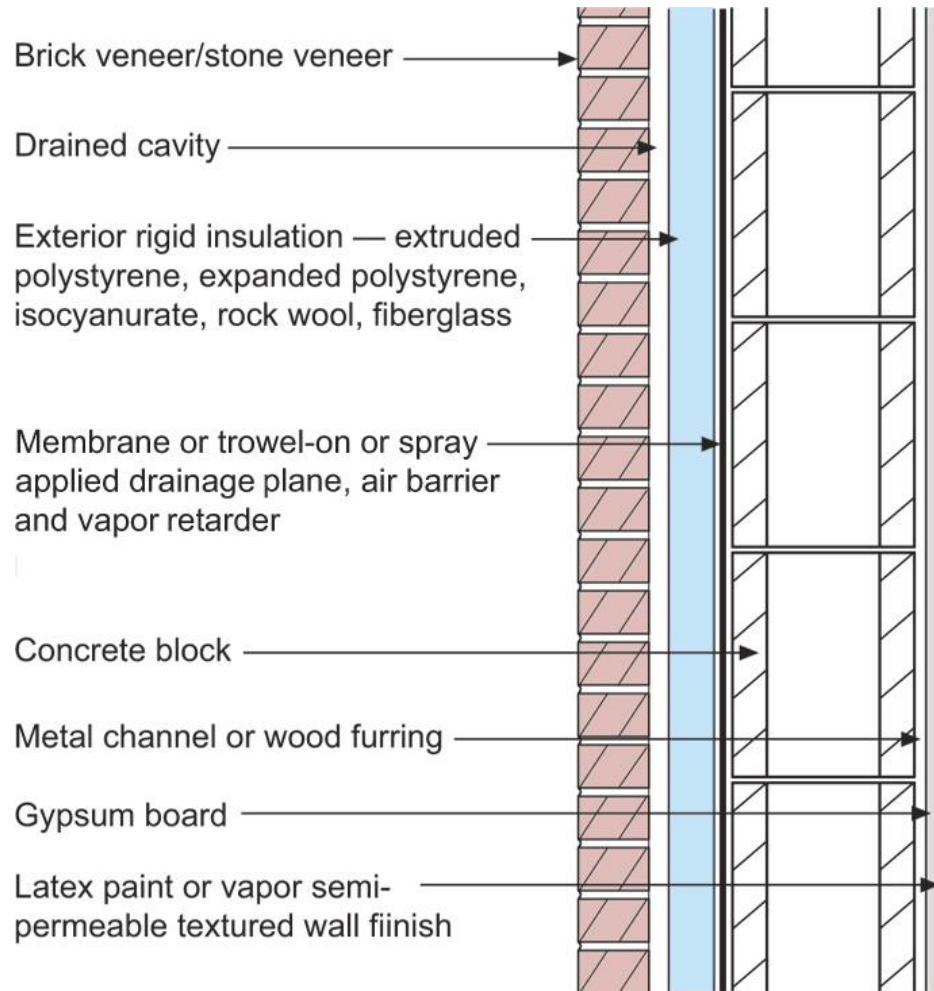




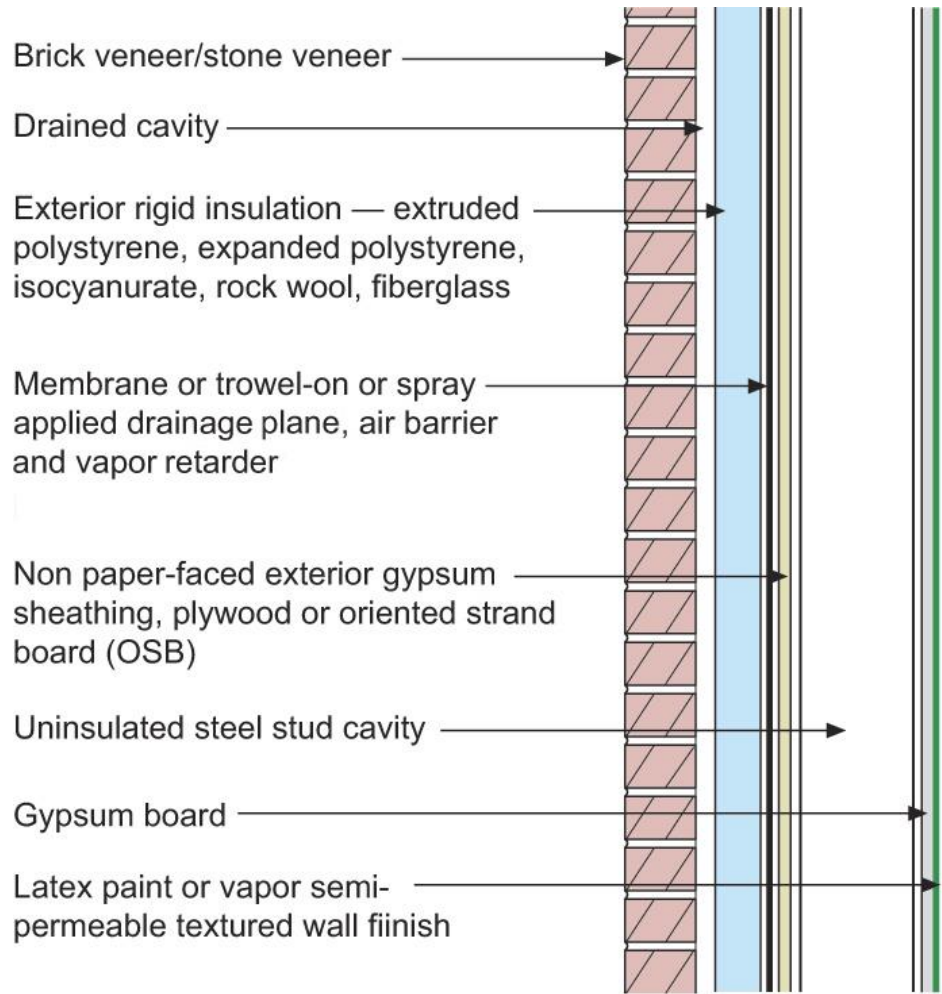


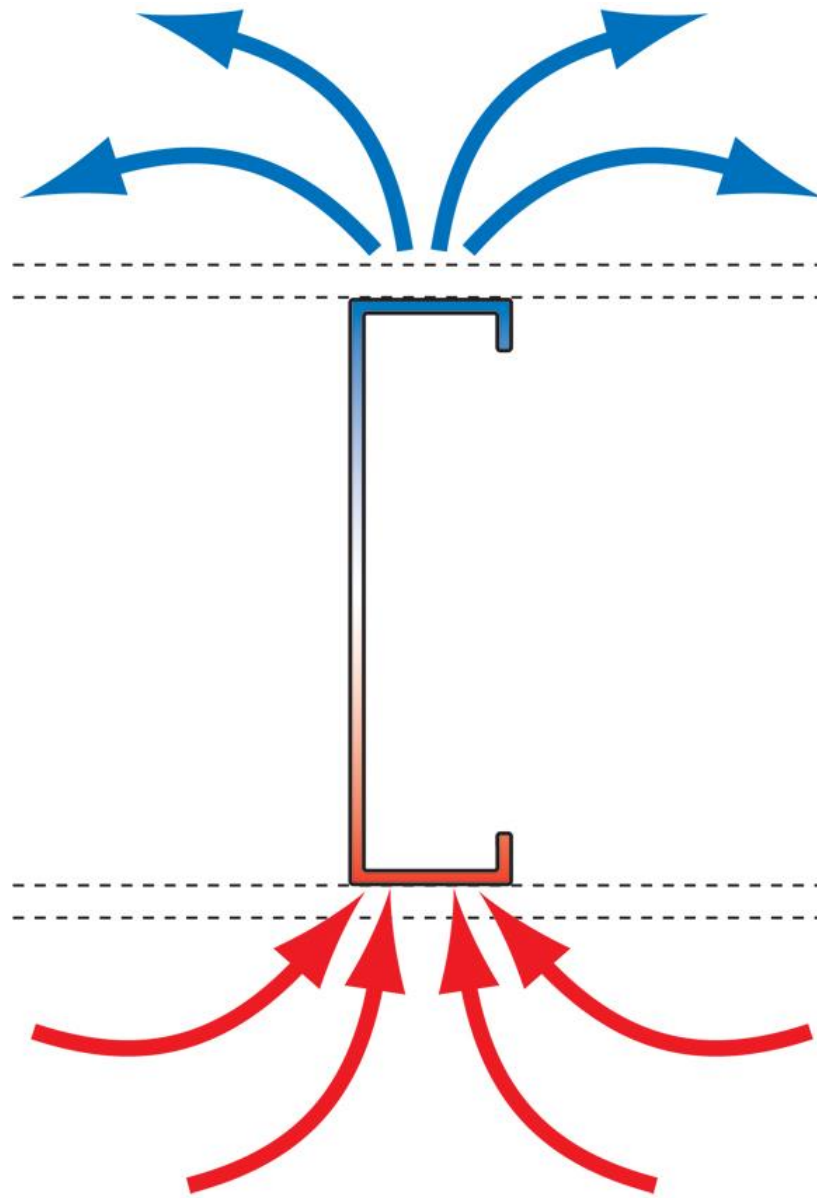


Configurations of the Perfect Wall

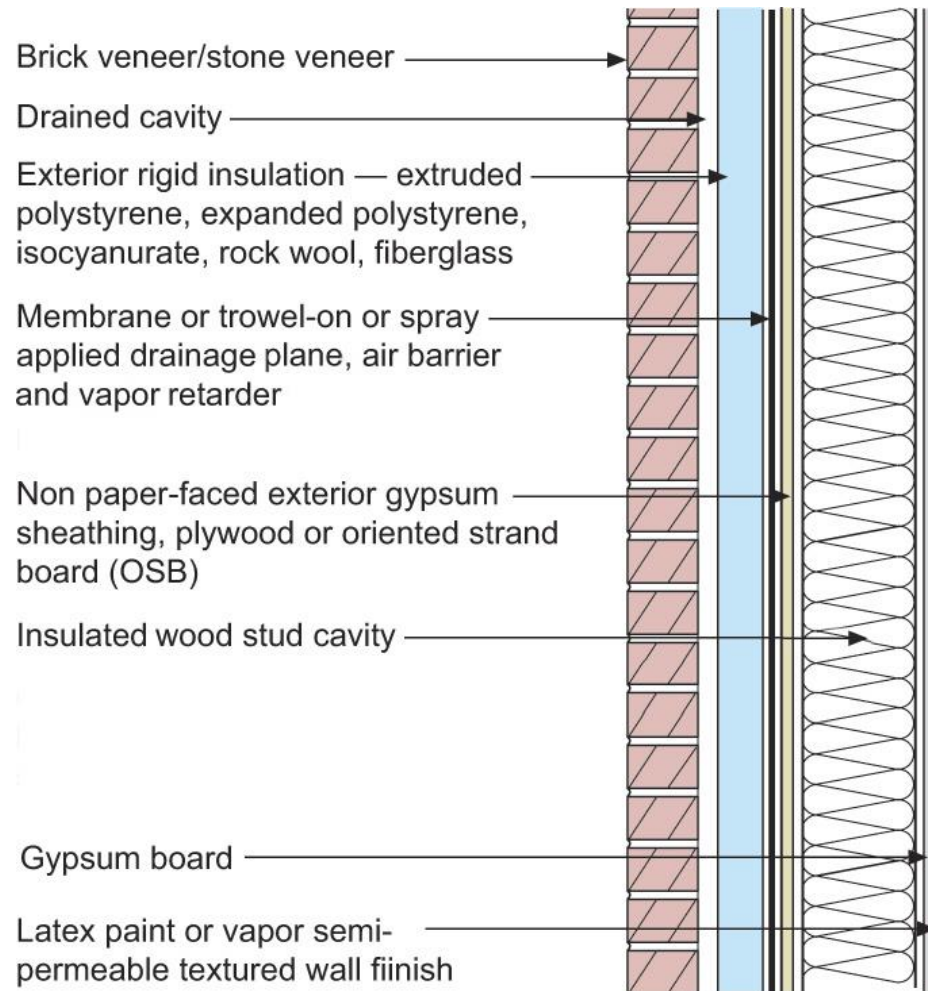


Vapor Profile









Commercial Enclosure: Simple Layers



- Structure
- Rain/Air/Vapor
- Insulation
- Finish

