



Installing Contractor Insulation Boot Camp

Lesson 14: Insulating Kneewalls

House 3: Lesson Topics

What we'll cover

- House 3 overview
- Parts of a house
- Thermal boundary and air barrier exercise
- Insulating kneewall areas



Lesson Topics



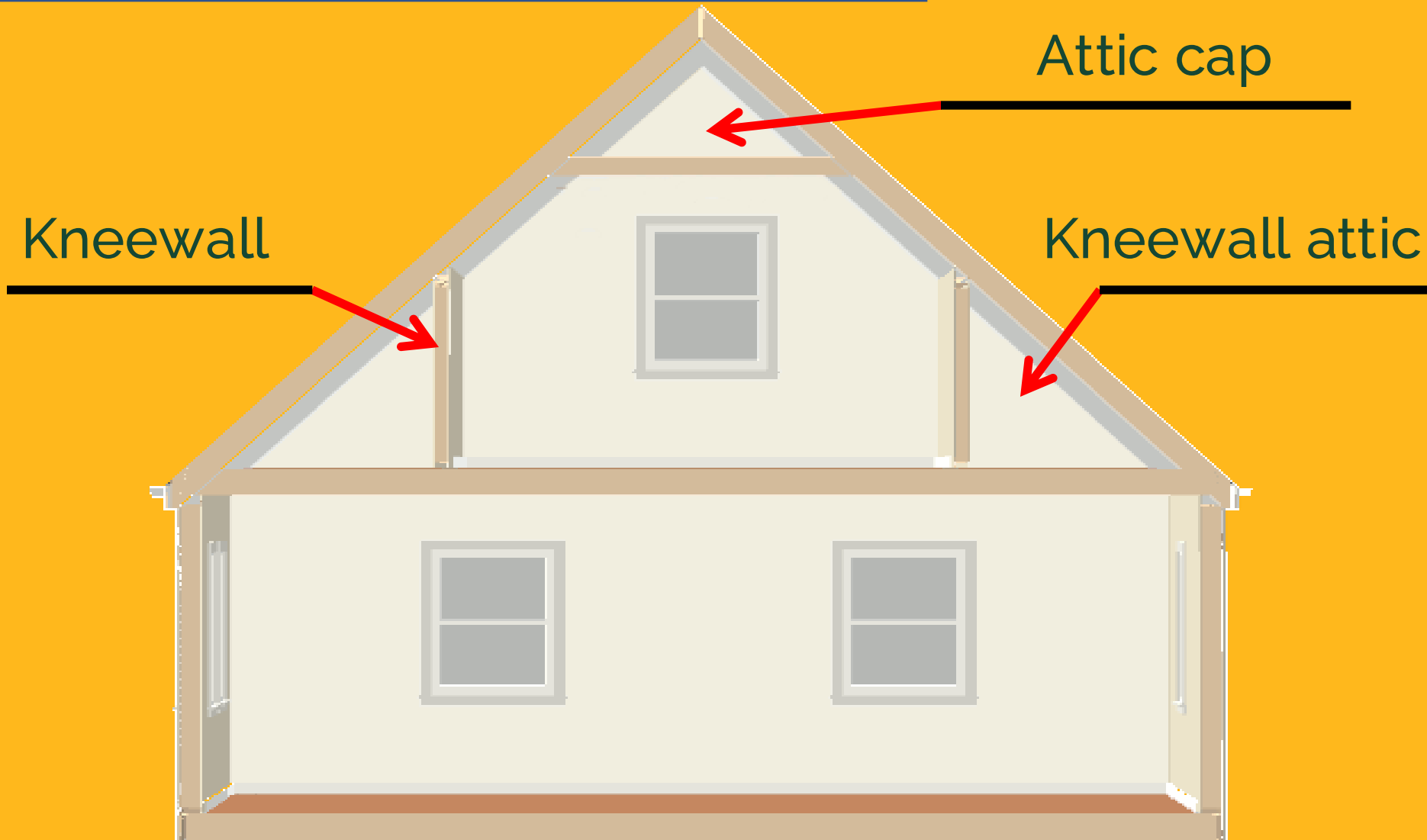
What we will cover:

- An overview of kneewall structures and air-leakage points
- How to air seal kneewall transitions
- Air sealing bottom plates and wall structures in kneewalls

Cross Section



Cape Components



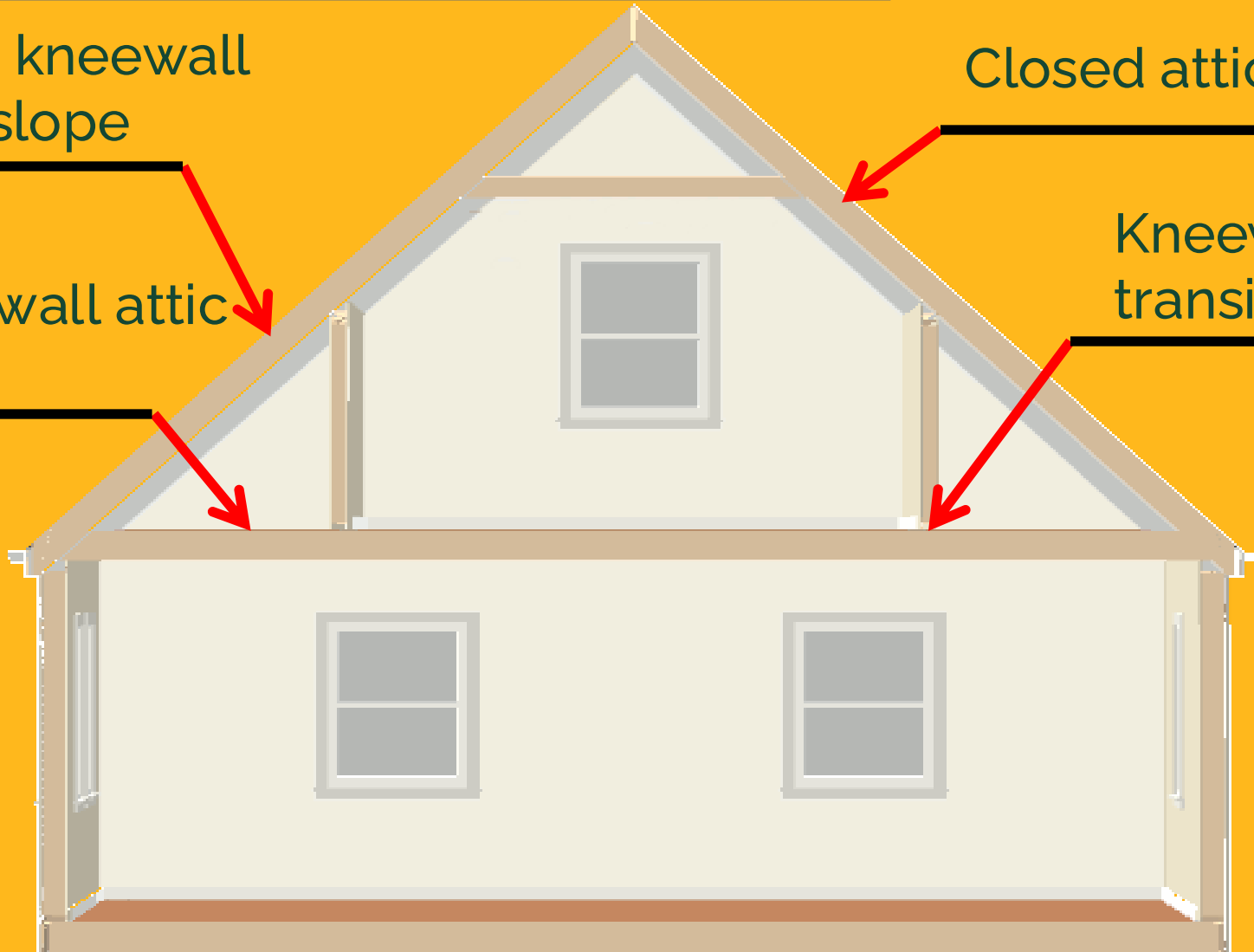
Cape Components

Open kneewall
attic slope

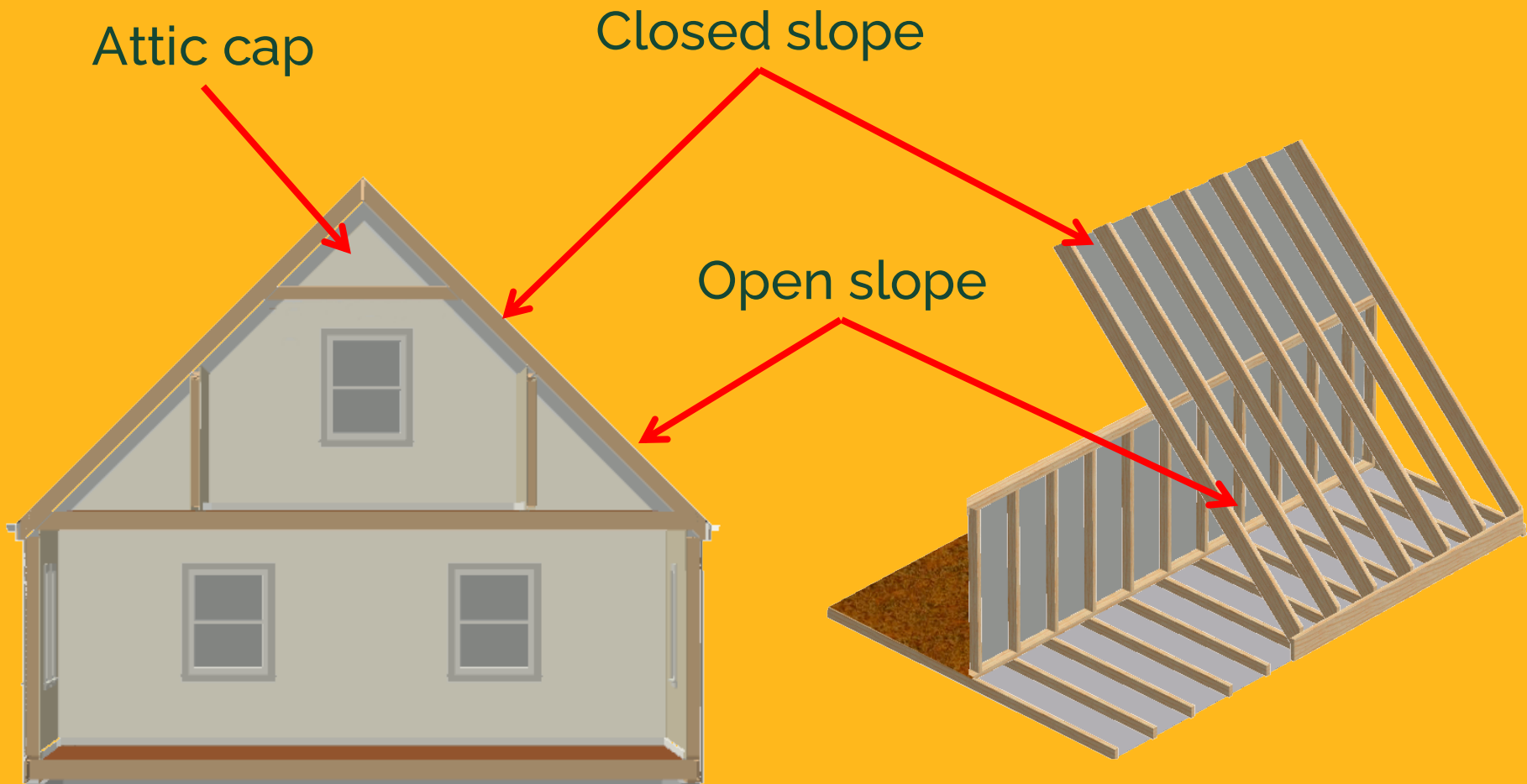
Closed attic slope

Kneewall attic
floor

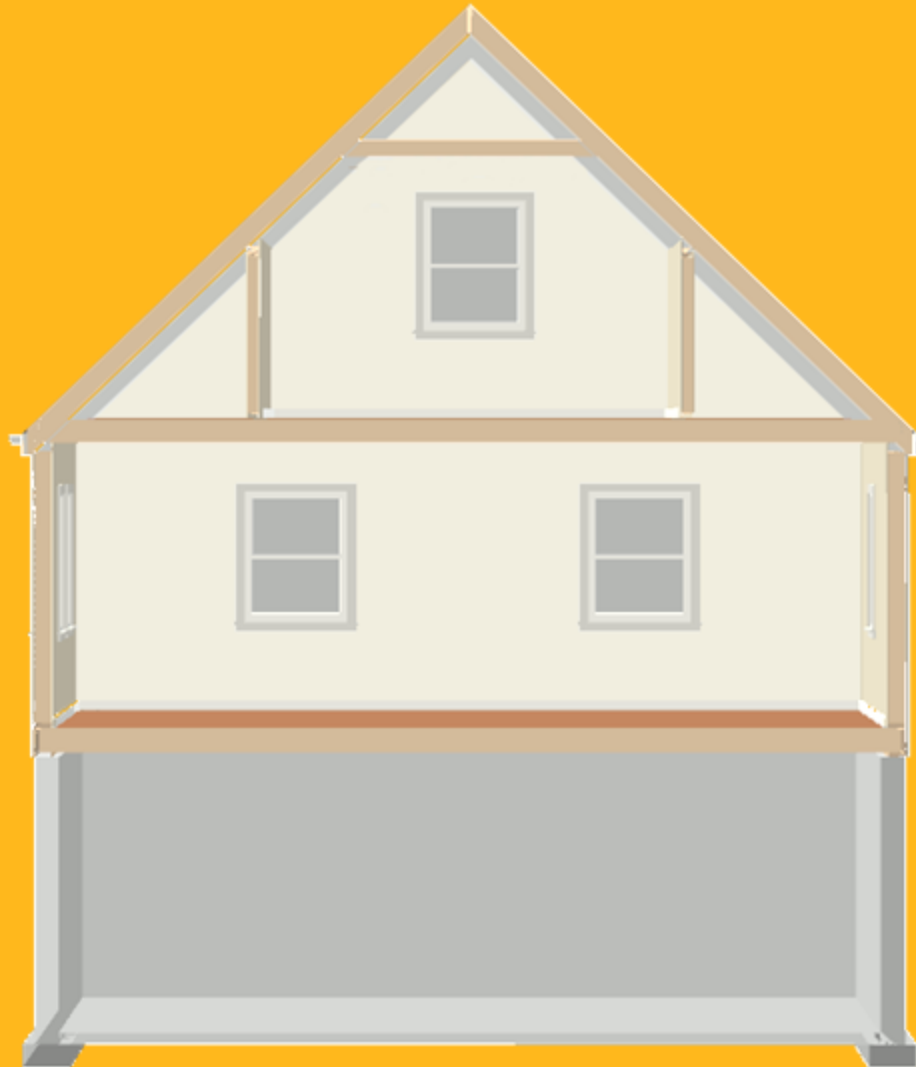
Kneewall
transition



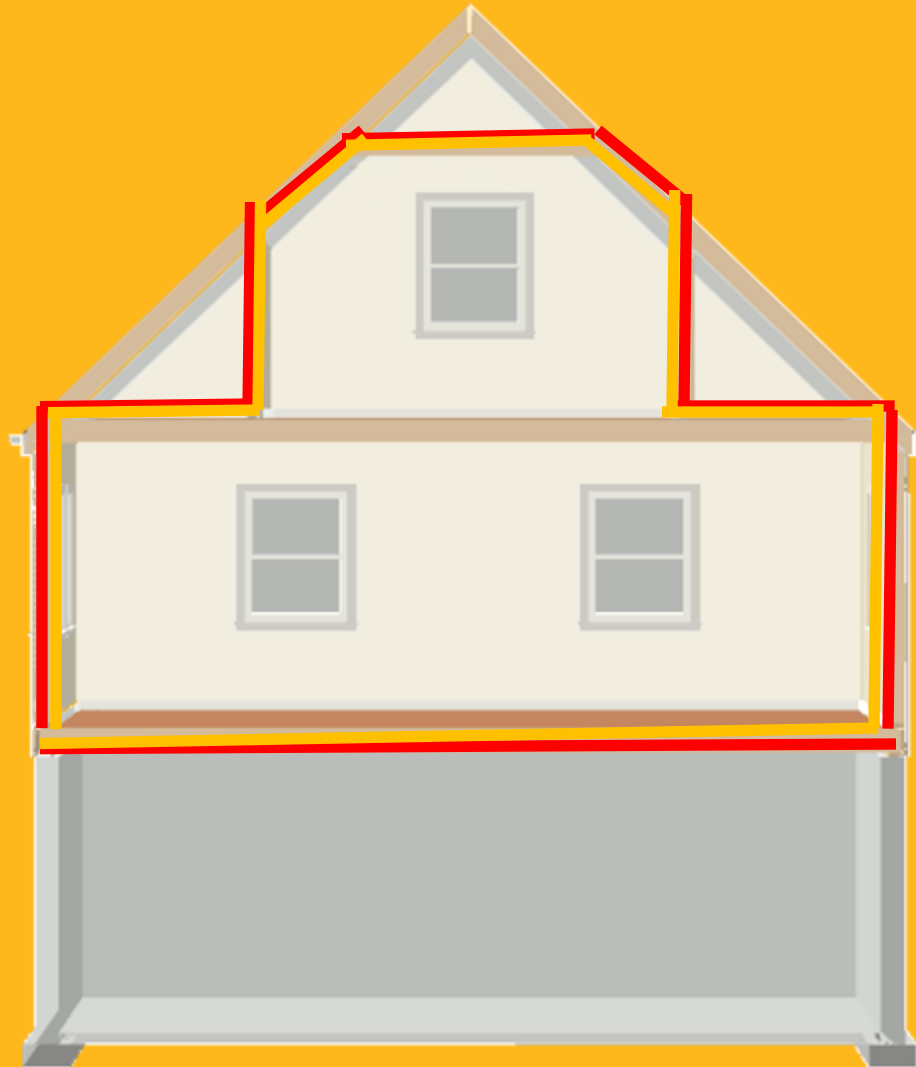
Closed Slopes



Exercise: Thermal Boundary



Thermal Boundary Option 1



Thermal Boundary Option 1



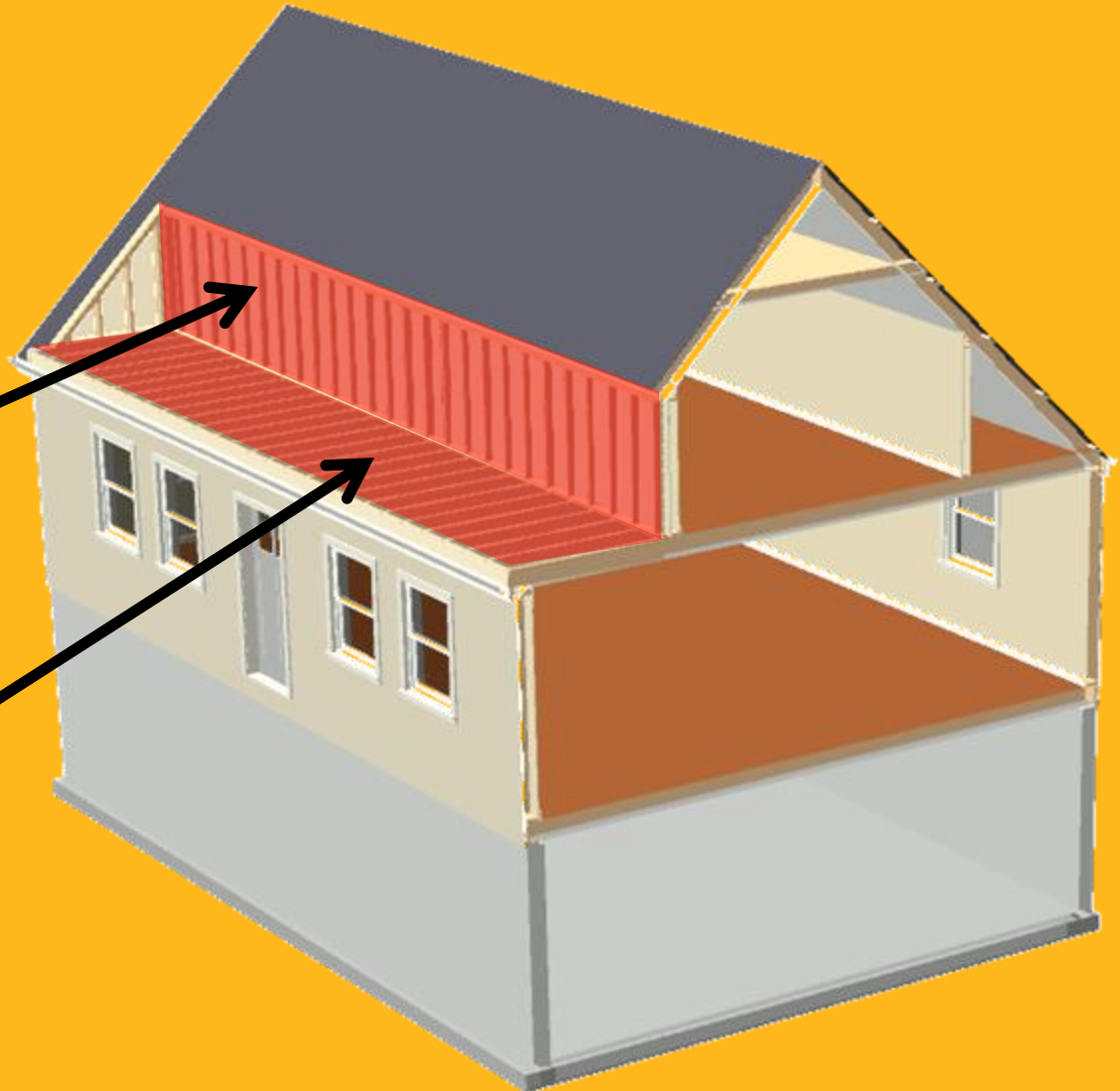
For rebate purposes, closed slopes, built-in dressers, and kneewall access doors are treated as wall area.

Insulating the Kneewall

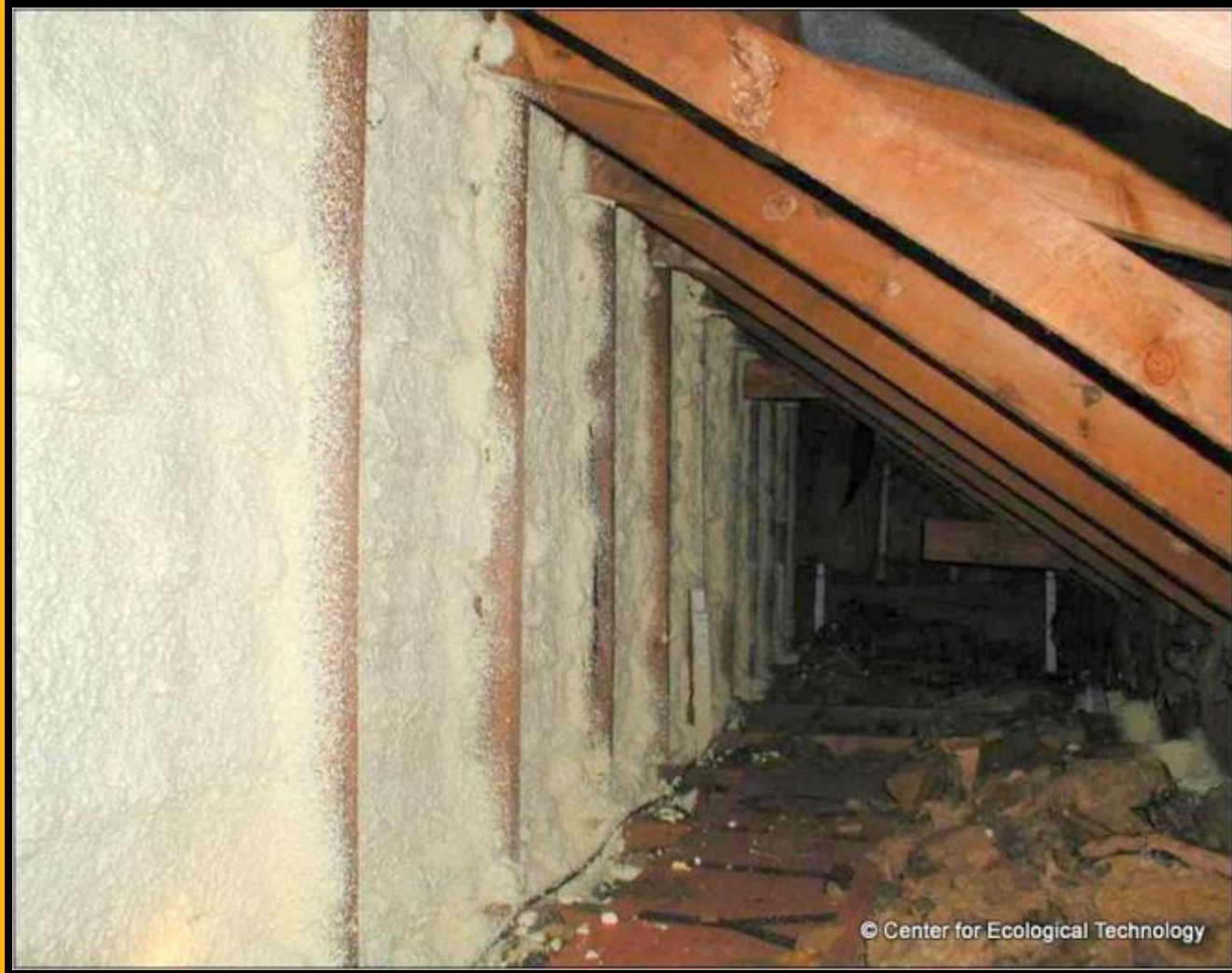
Ventilate the
kneewall attic

Insulate the
kneewall

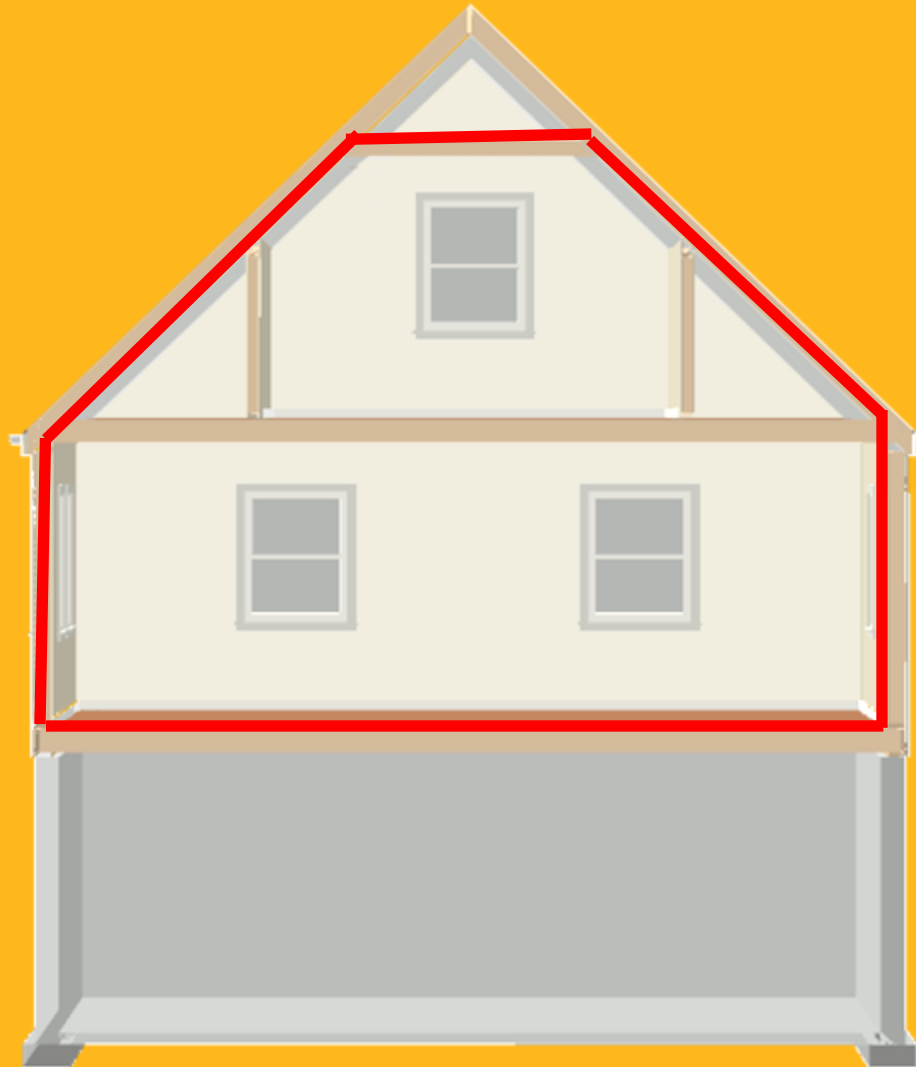
Insulate the
attic floor



Insulating Kneewall



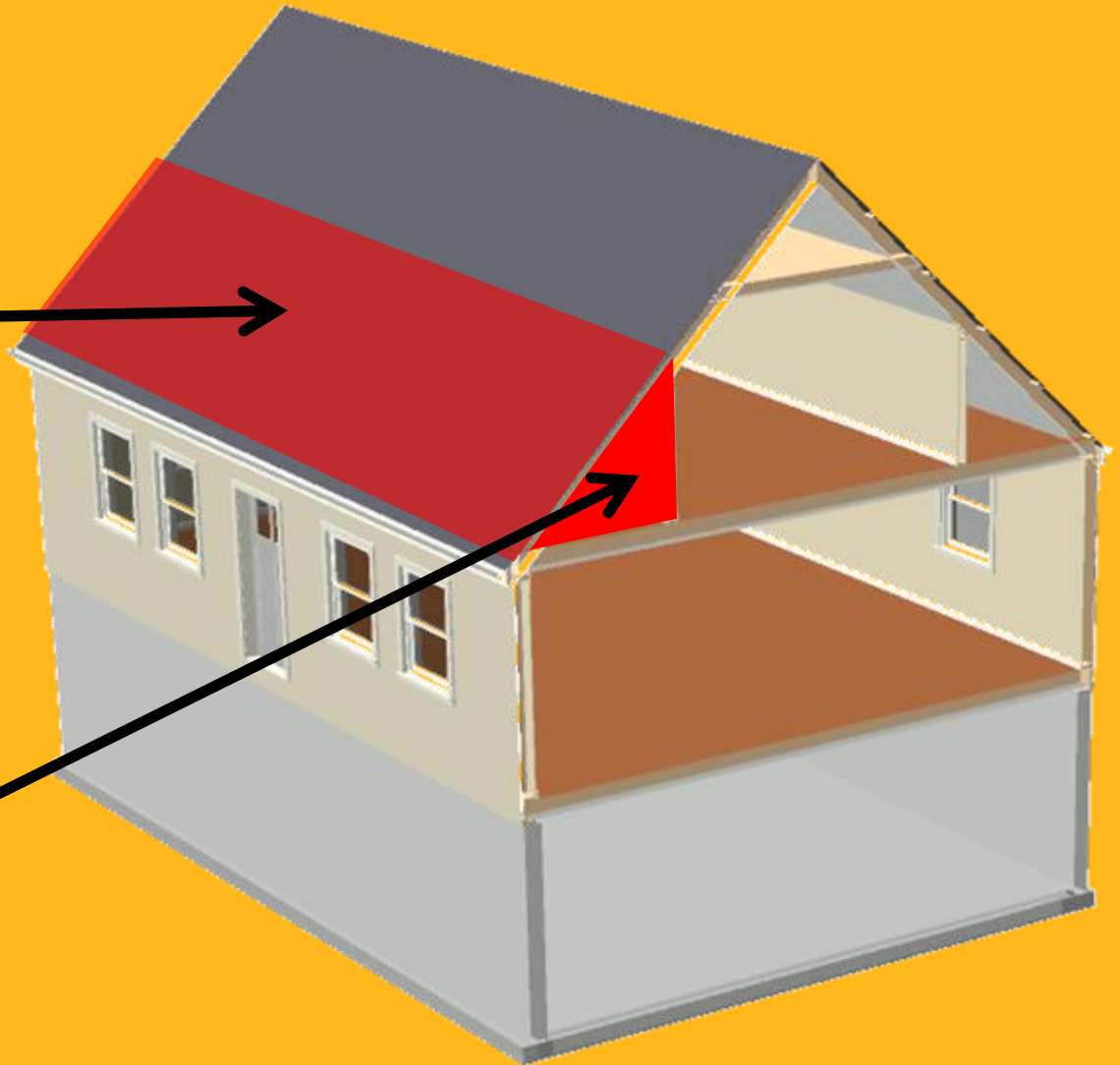
Thermal Boundary Option 2



Encapsulating Kneewall

Insulate the
open slope

Insulate the
gable end

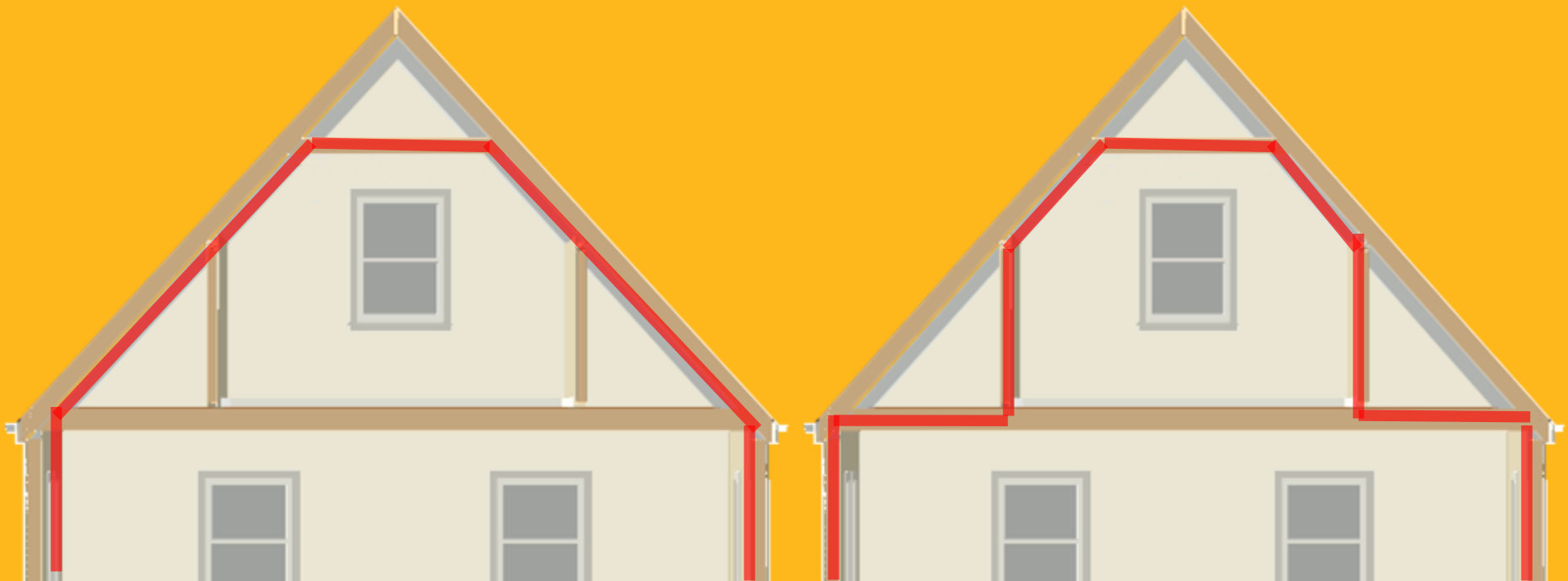


Encapsulated Kneewall



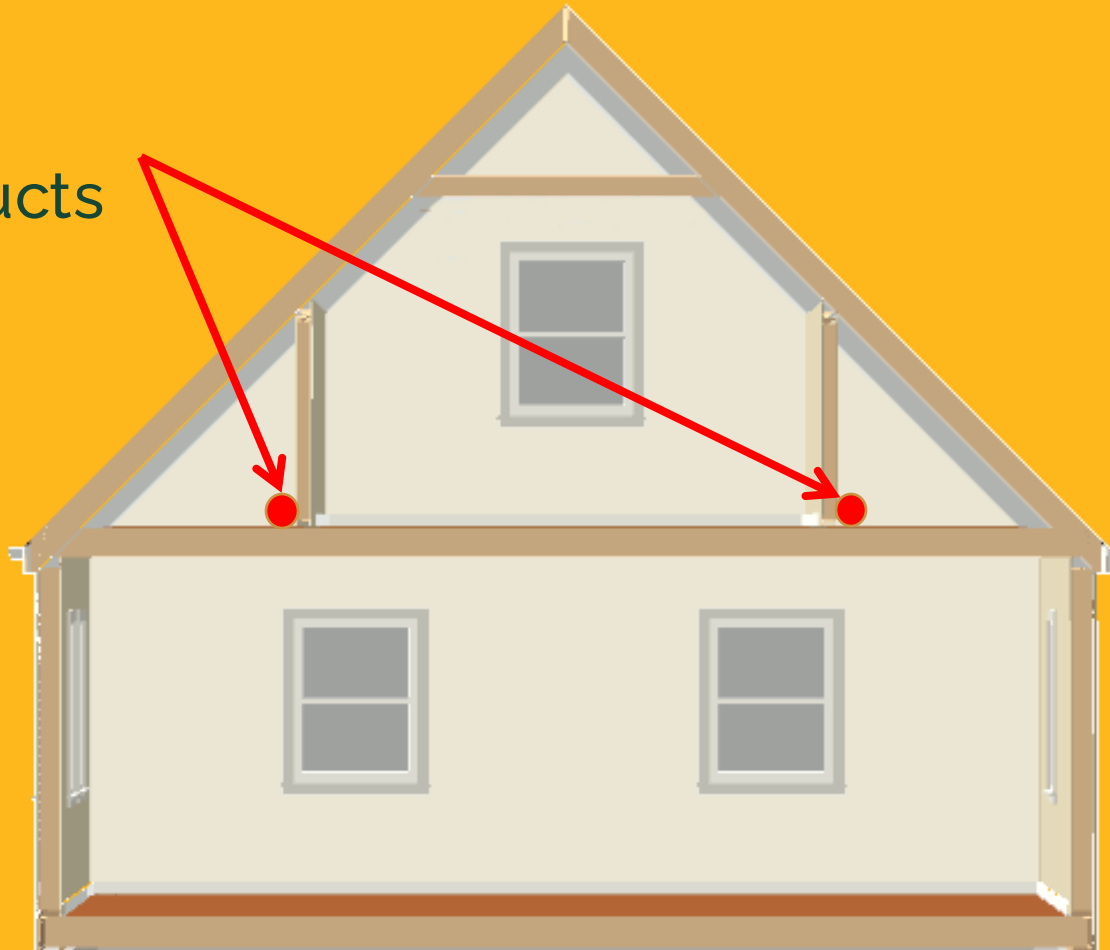
Kneewall Attics

Compare these approaches



Kneewall Strategies

Heating
pipes/ducts



Dormers



Dormers

Attic cap

Unused
dormer
cavity

Kneewall
attic



Dormers

Shallow
attic

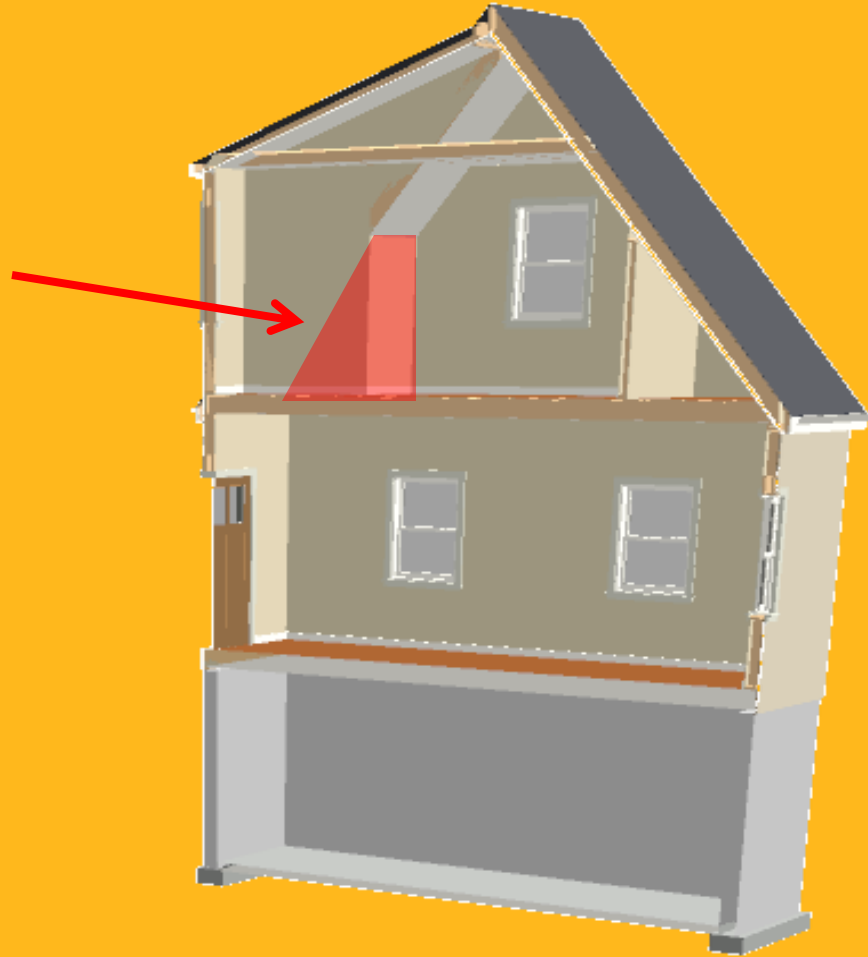
Exposed
dormer walls in
kneewall attic

Restricted
kneewall
area



Dormers

Unused dormer
cavity as it
appears from
the living space



Insulating Kneewall Attic

Kneewall
transition



Insulating the Kneewall

Ventilate
the attic
space

Insulate
the
kneewall

Insulate
the floor

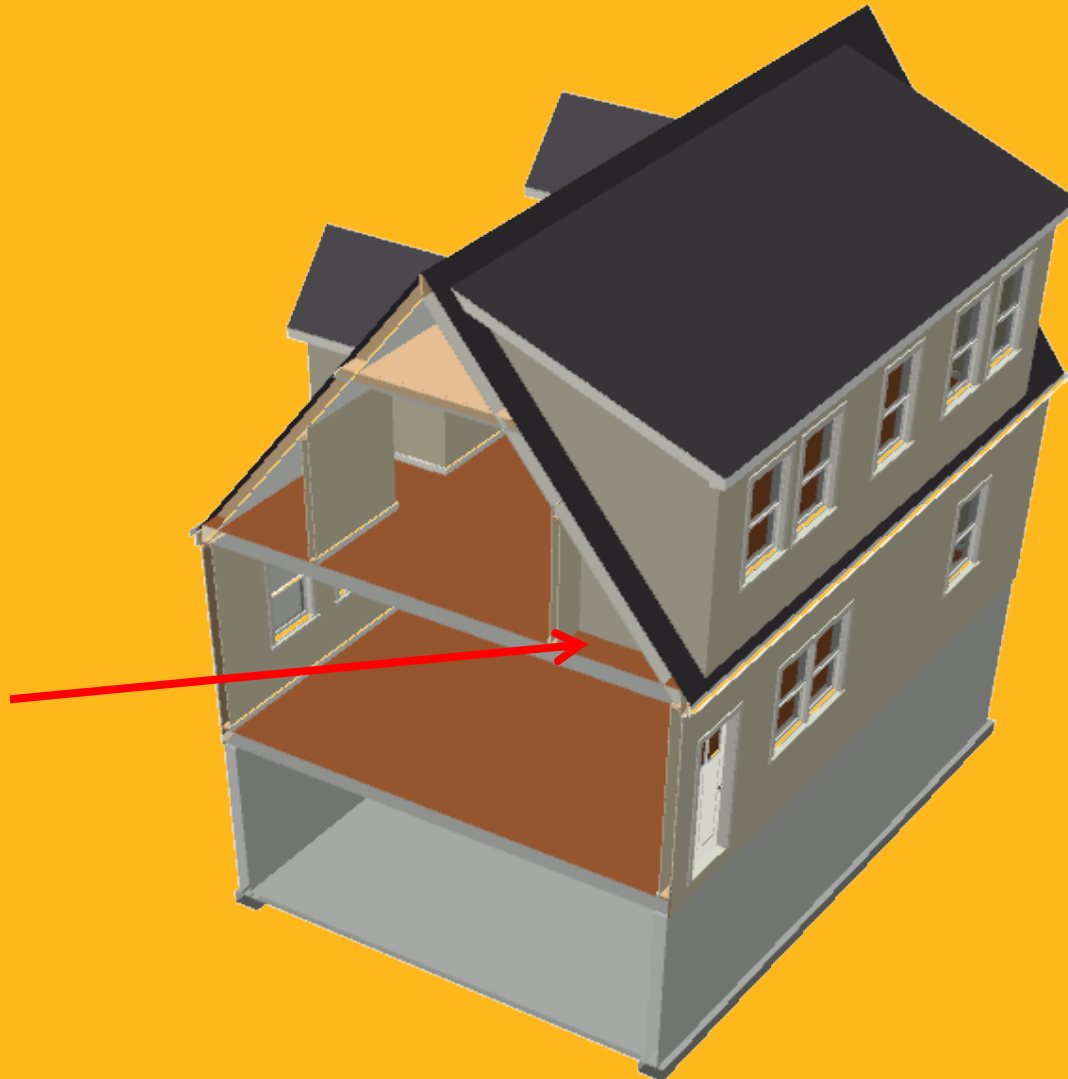


Insulating Open Slope



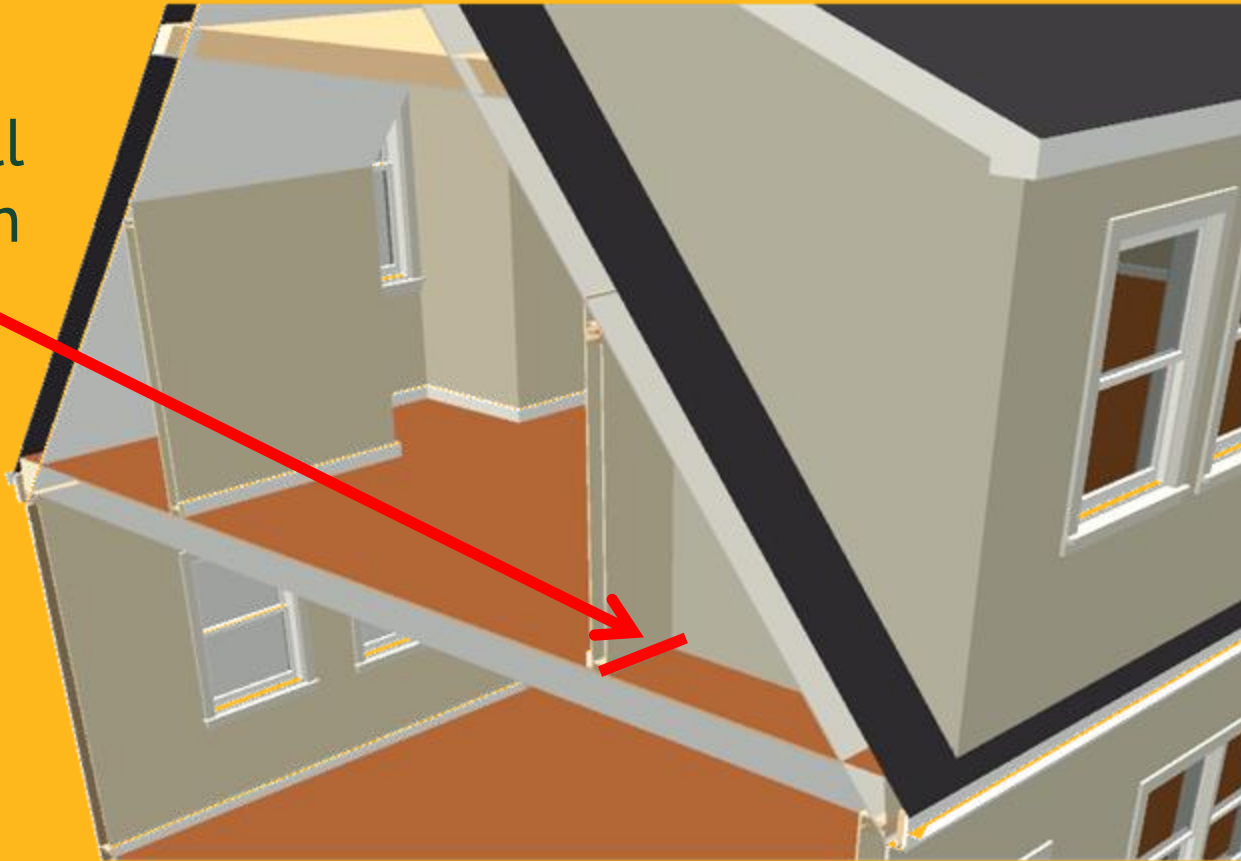
Rear Dormer

Unused
dormer
cavity

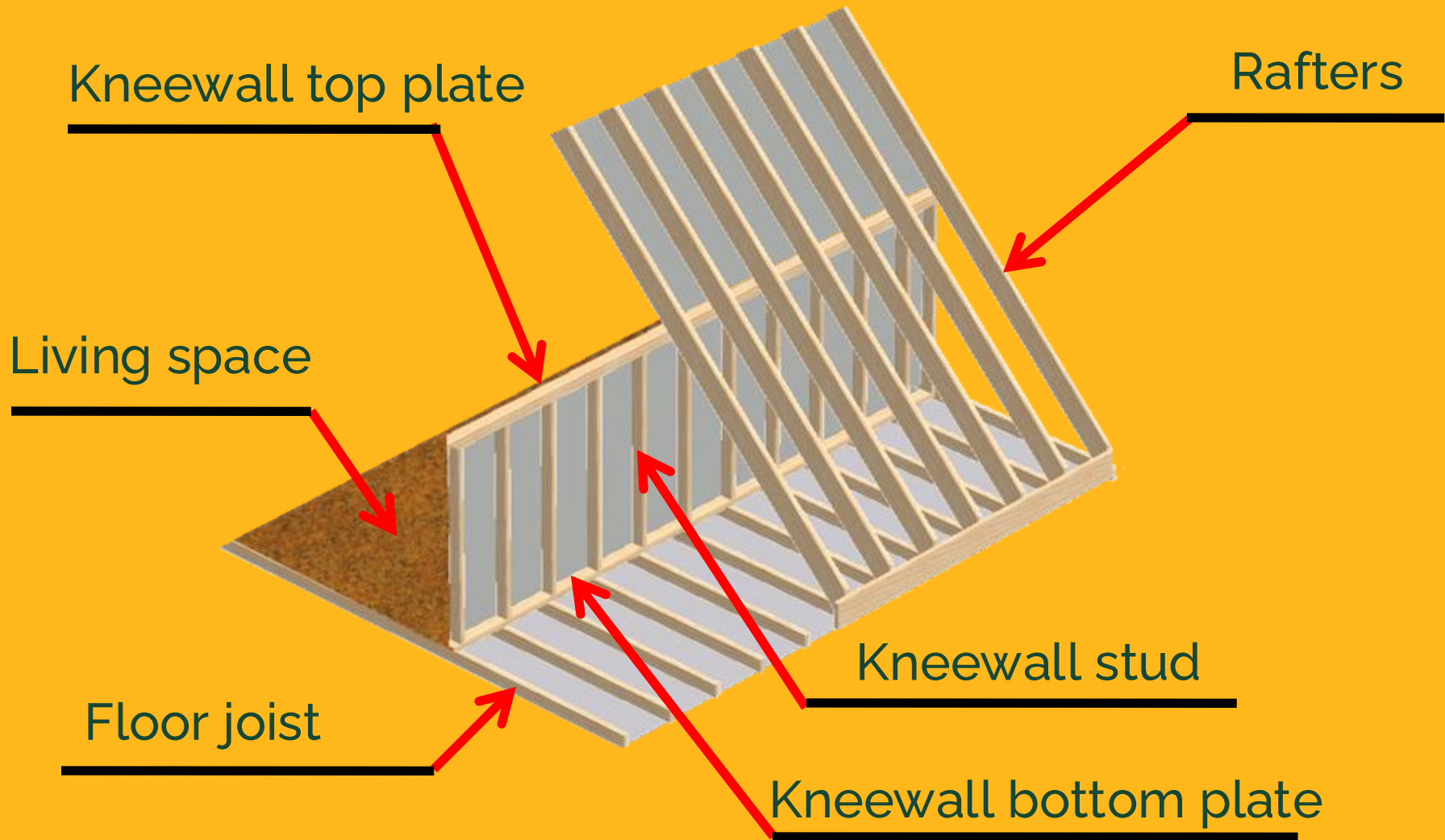


Rear Dormer

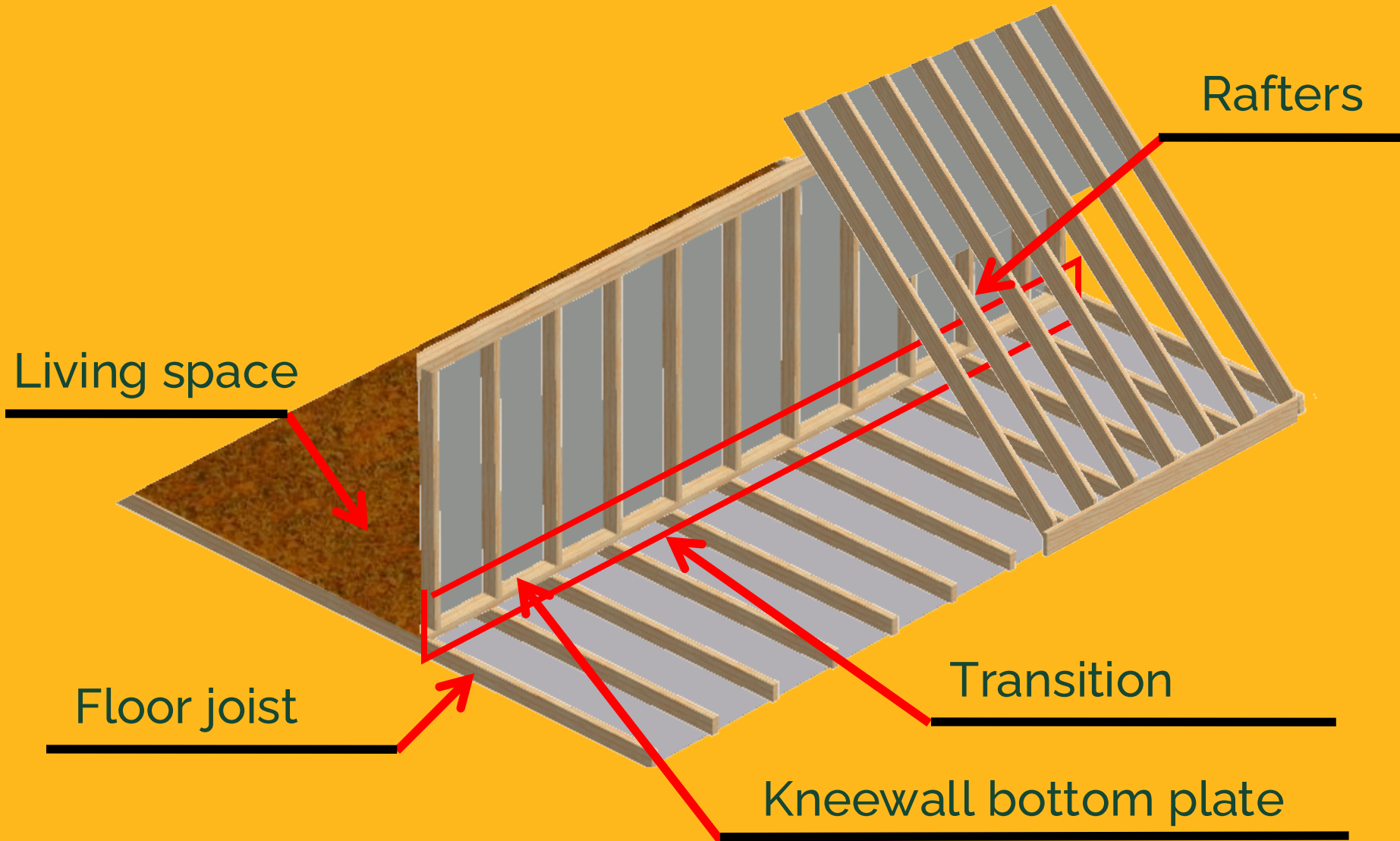
Kneewall
transition



Kneewall Components



Kneewall Transition



Kneewall Transition – Sealing and Insulating

- Expose approximately an 18-inch attic joist area under the kneewall.
- (Option 1) Cut and friction fit or fasten ABM to span the joist cavity directly under the kneewall, lining it up with the gypsum board of the conditioned room above.
- (Option 1) Seal all edges of ABM with sealant, taking care to seal the hard-to-reach top edge.

Kneewall Transition – Sealing and Insulating

- (Option 2) Roll up a fiberglass batt and friction fit it to fill the floor joist cavity under the kneewall to provide a backing for spray foam
- (Option 2) Spray foam full cavity height and width against the backing.
- Install insulating sheathing over kneewall framing.

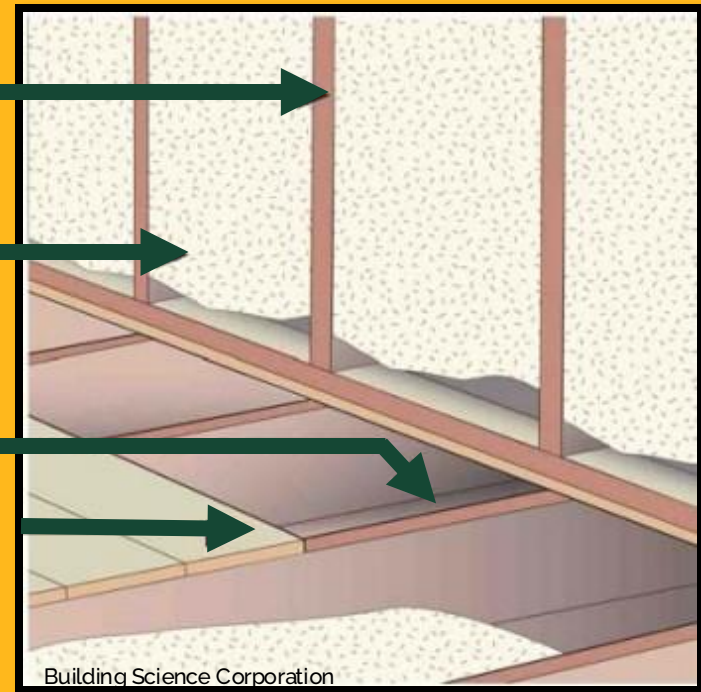
Kneewall Transition

Kneewall framing

Insulation pulled back to
expose cavity

Open cavity

Subfloor cut back to expose
open cavity



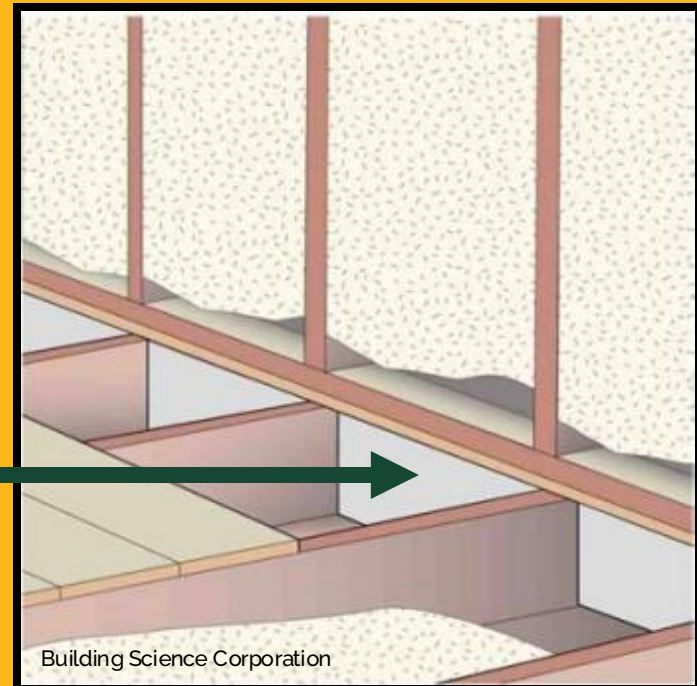
Task - Control air leakage between the conditioned floor spaces and unconditioned attic space.

Kneewall Transition



Kneewall Transition

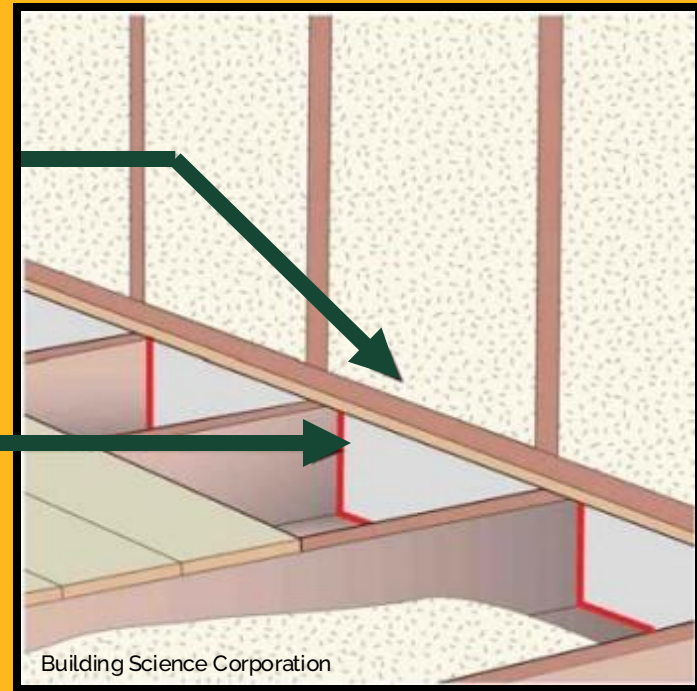
Solid wood blocking
or rigid foam board



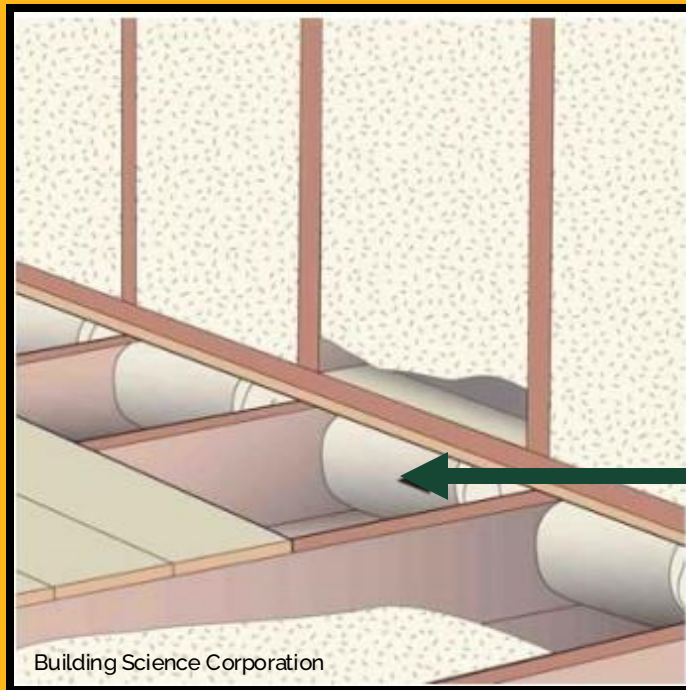
Kneewall Transition

Replace insulation in cavity

Continuous bead of
sealant around entire
perimeter of enclosure

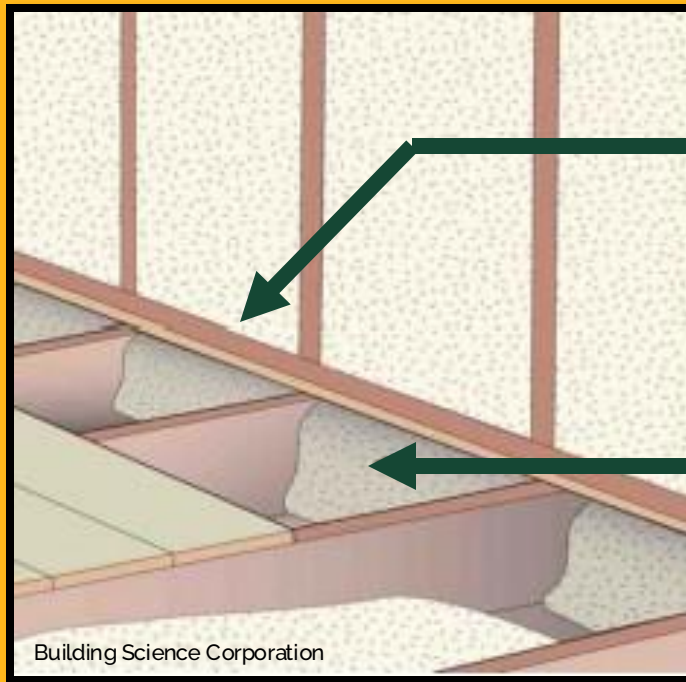


Kneewall Transition



Fiberglass insulation as
backing for spray foam

Kneewall Transition



Replace insulation
in cavity

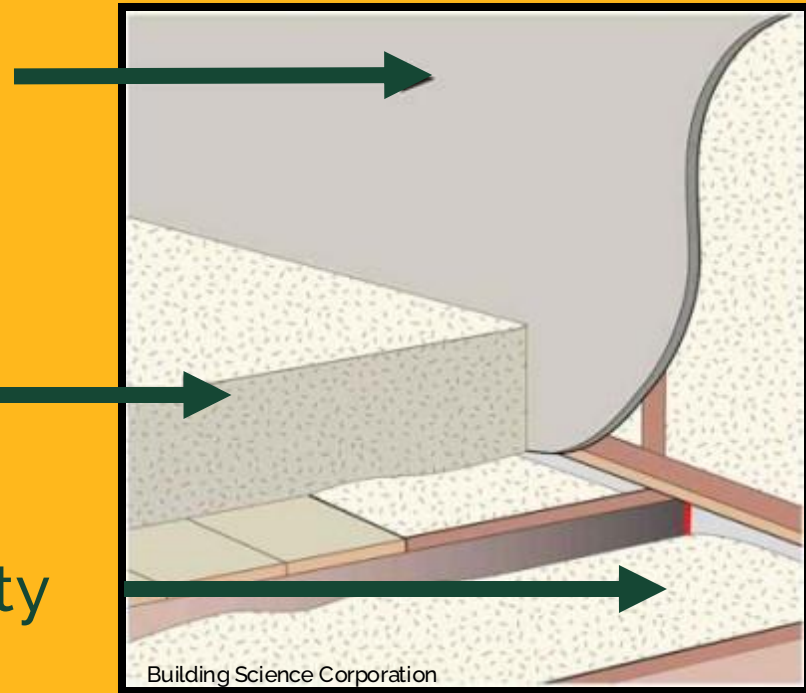
Spray foam covers
fiberglass insulation
backing

Kneewall Transition

Add insulating sheathing
to kneewall framing

Additional Insulation

Replace insulation in cavity



Kneewall Transition

Insulating Kneewall Transitions with Foamboard



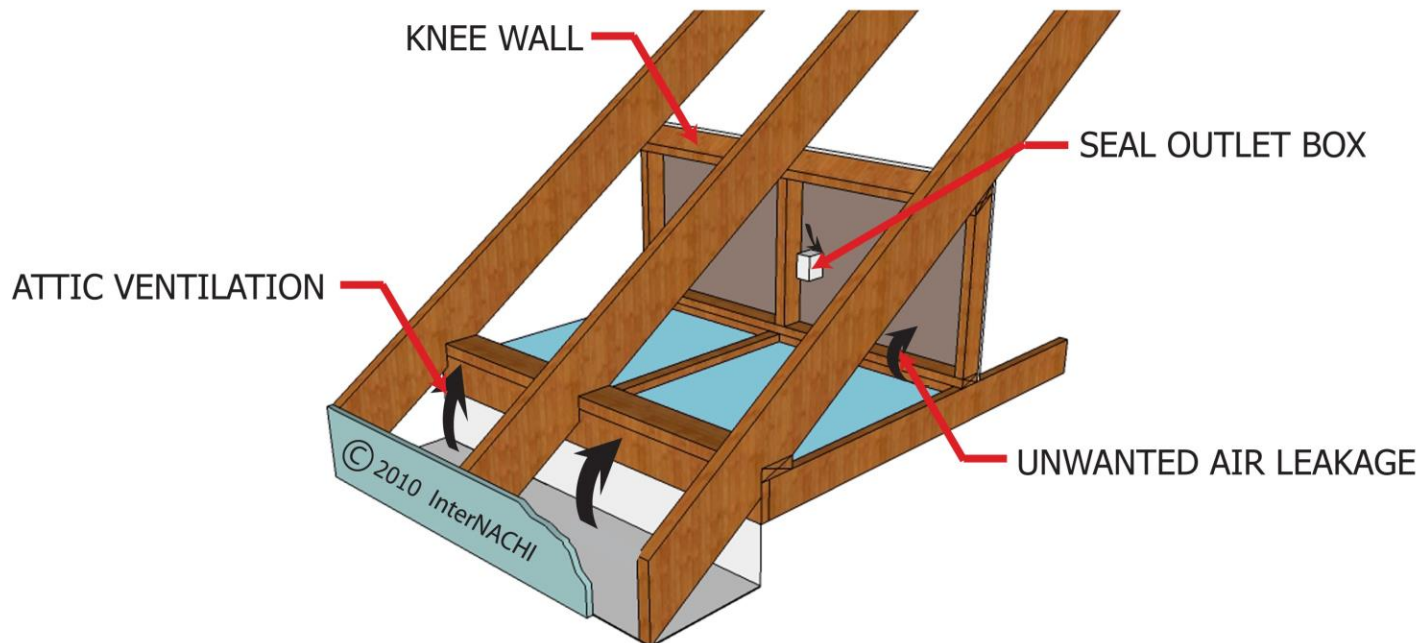
Kneewall Transition

Insulating Kneewall Transitions with Foamboard



Air-sealing Kneewalls

ATTIC KNEE WALL

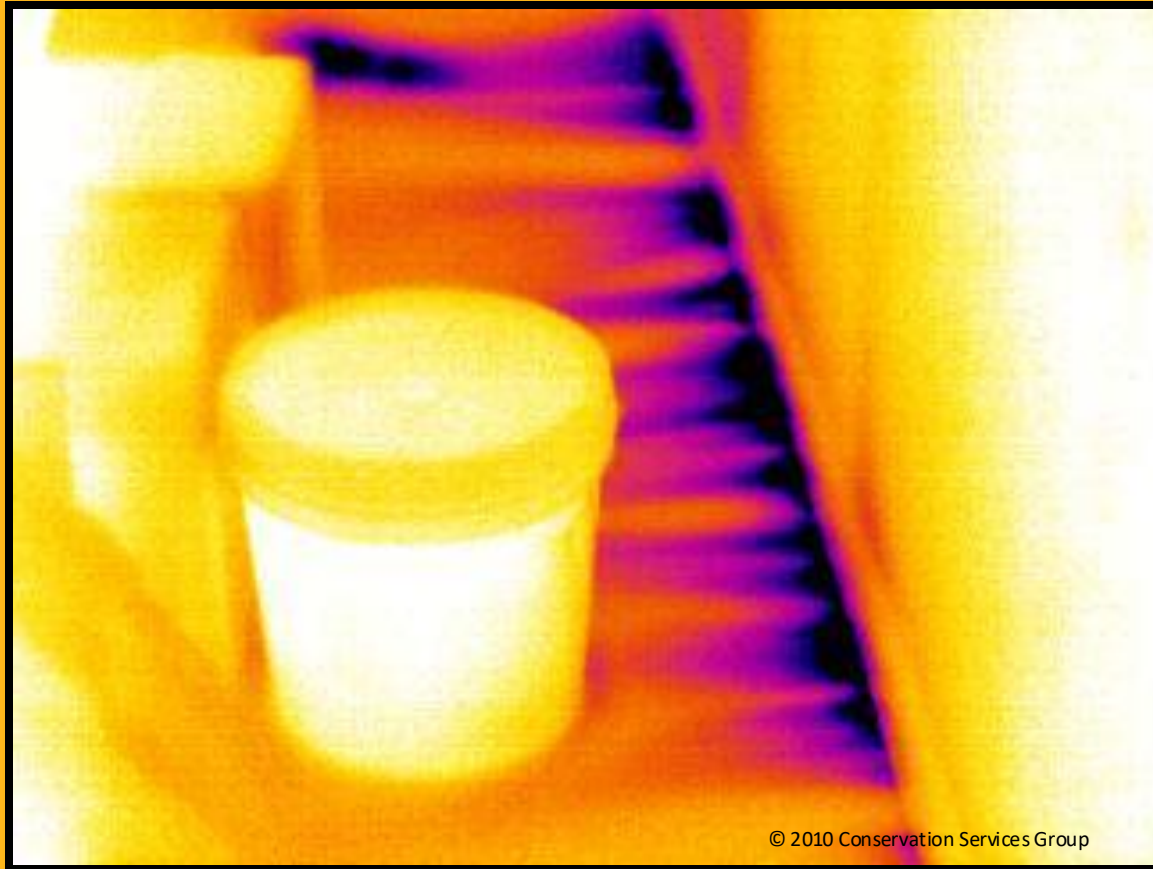


Bottom Plates

Another area of air infiltration in a knee wall is the bottom and top plates



Bottom Plate Leakage



Temporary Access

- Installed when permanent access to the area is not required.
- Typically, lower cost than installing a permanent access



Temporary Accesses



Kneewall Built-Ins



Insulating Built-Ins



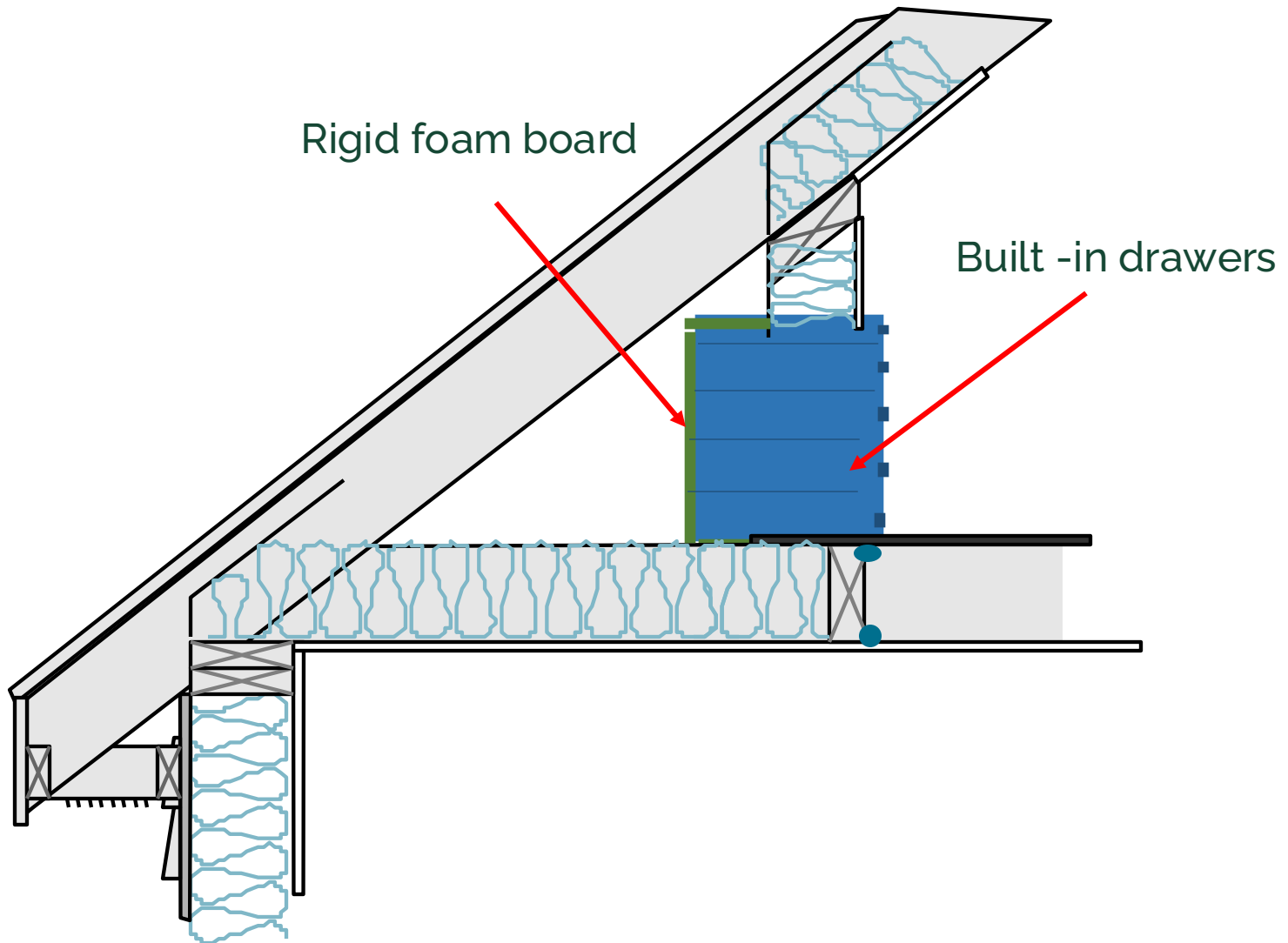
Air Sealing Built-ins



Air Sealing



Insulating Built-ins



Kneewall Built-ins



- Built-ins are common in kneewalls
- Built-ins can be a major source of air leakage
- If the thermal barrier is at the kneewall, not the attic slope, built-ins must be enclosed, sealed, and insulated
- Always check with the homeowner before removing items from a built-in

Insulation Materials & Techniques



Fiber glass
batts

Dense packed
cellulose

Rigid foam
board

Two-part
foam



Dense-Packed Cellulose



Fiberglass Batts



Rigid Foam Board



Rigid Foam Board



Rigid Foam Board



Two-Part Foam Technique

- No vent chutes are needed
- Apply directly to the underside of the roof decking

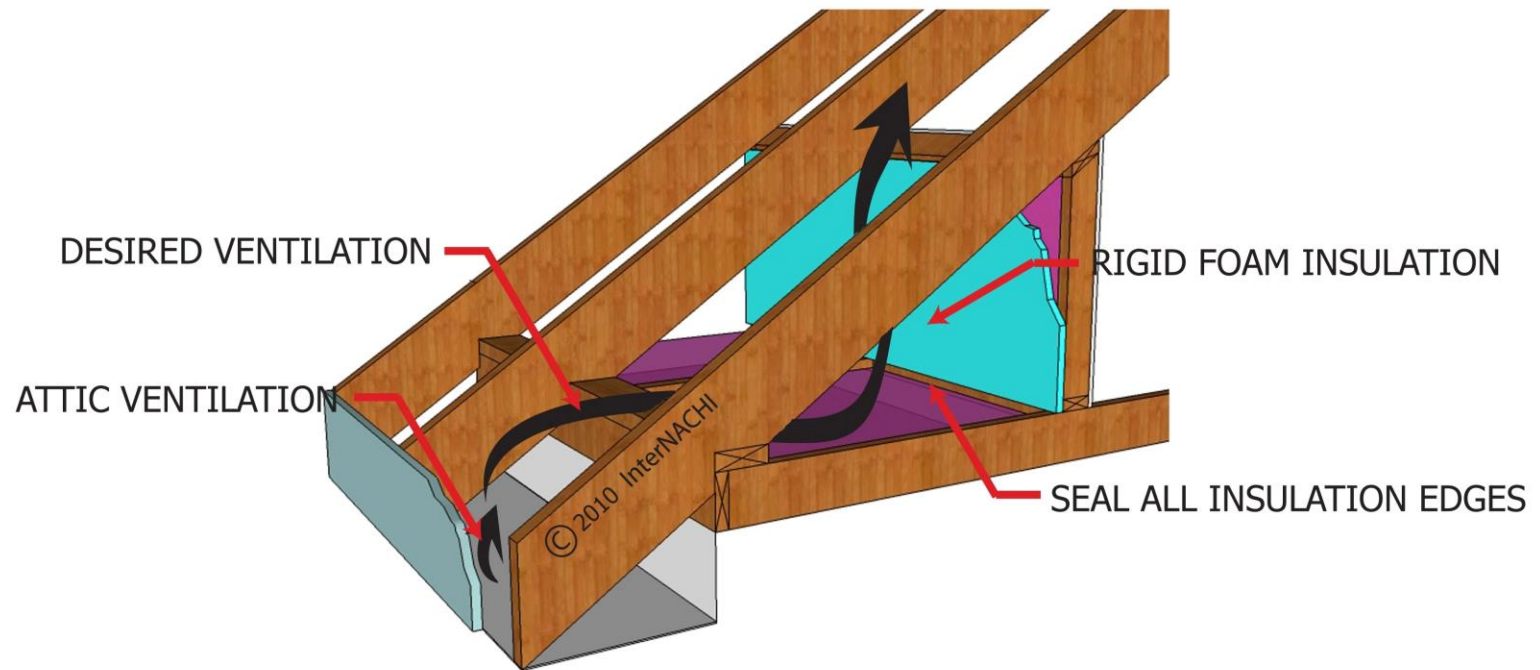


Two-Part Foam Technique



Kneewall Ventilation

ATTIC KNEE WALL VENTILATION



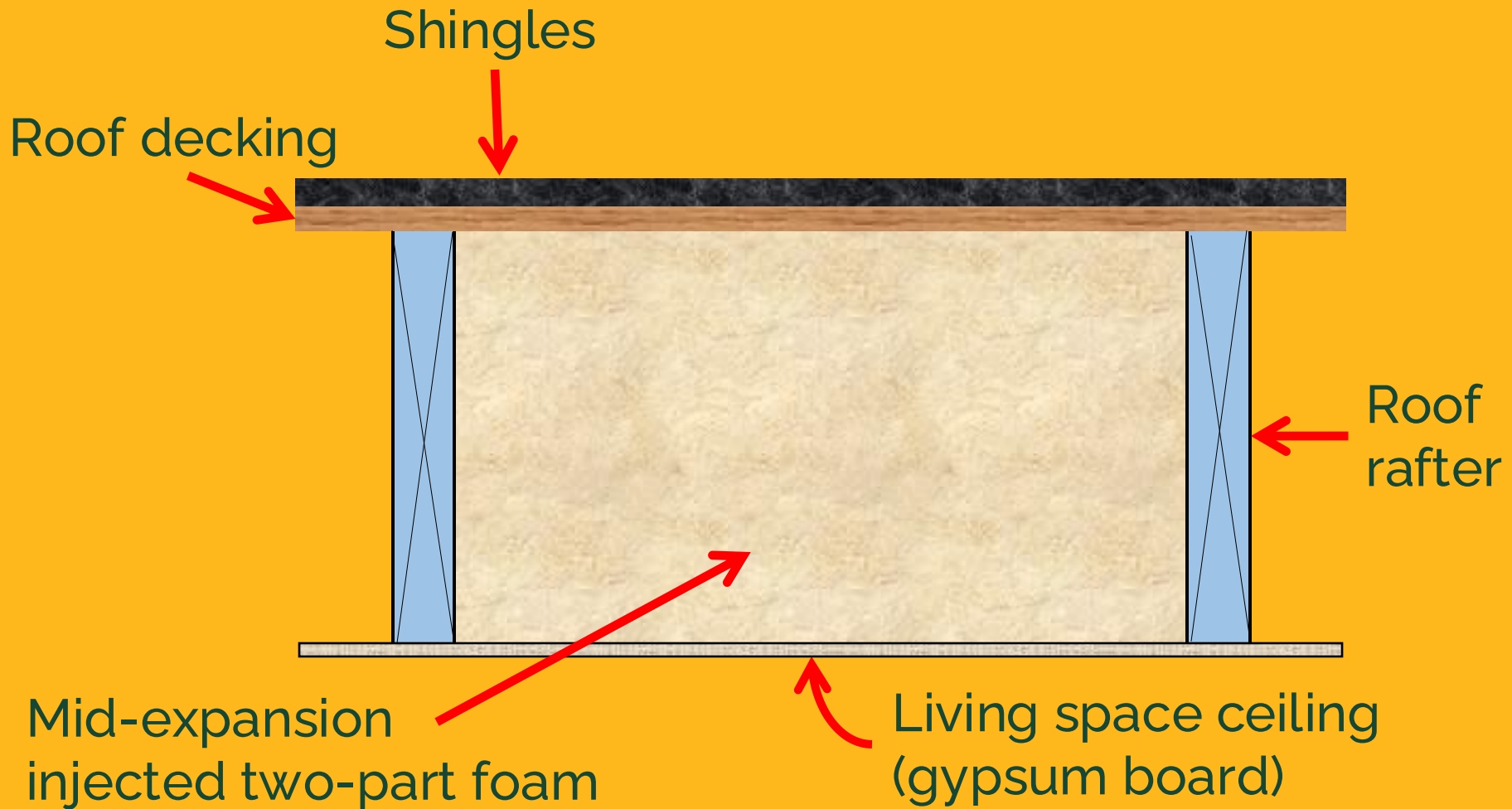
Insulation applied directly to the underside of a roof must be either:

- Air-impermeable foam for at least the first 40% of the R-value on the cold-in-winter side

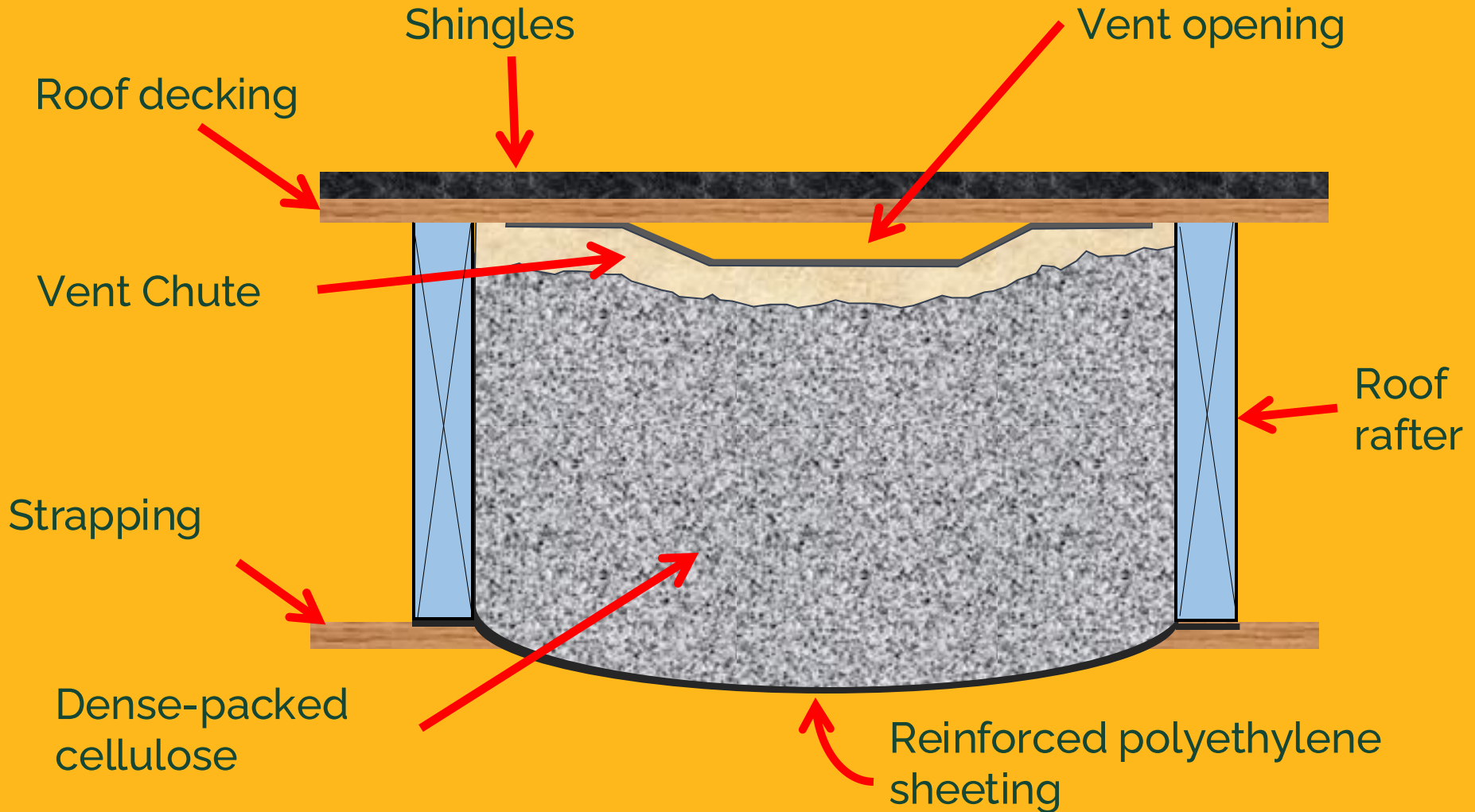
OR

- Vented between the roof decking and the insulation

Two-Part Foam in a Closed Slope



Cellulose and Baffle in Closed Slope



Summary



- Kneewall attics can either be included or excluded from the thermal boundary.
- A kneewall attic outside the thermal boundary must be ventilated.
- Several materials can be used to properly insulate kneewall areas.
- Insulation materials must be properly installed to perform optimally.
- Dormers can create complicated geometry but must be fully air sealed and insulated to properly weatherize the home.

Creating Kneewall Accesses

- You may need to create access to kneewall areas to seal and insulate
- Temporary access is often quicker
- Permanent access may be required
- The most common leakage point in a kneewall is the transition

Program Requirements

- Eligible rebates can only be applied to insulation installed at the attic floor and kneewall
- Closed slopes are measured as wall area

Questions

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