

BCIT GYPSUM FIREWALL MOCK-UP DESIGN

BRITISH COLUMBIA INSTITUTE OF TECHNOLOGY

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DESIGN OVERVIEW

Detailing firewalls in wood-frame construction can be a very complex task.

This firewall mock-up shows a constructible, cost-efficient gypsum firewall system at the roof to exterior wall interface that minimizes thermal bridging and makes it easier to achieve high levels of airtightness while meeting building code requirements.

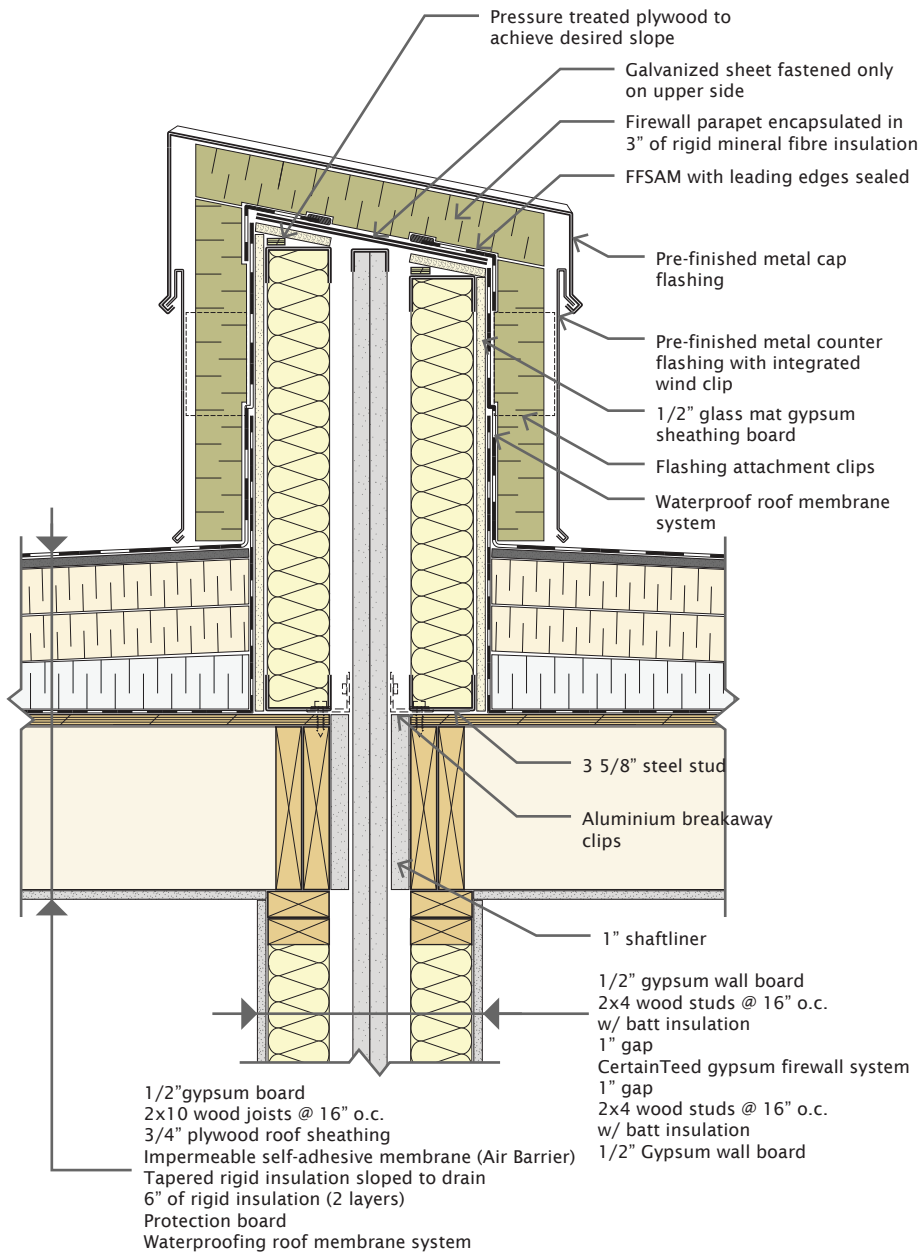
MATERIALS NEEDED

The materials needed to construct this mock-up are:

- Gypsum firewall system with two layers of 1" GlasRoc Shaftliner gypsum firewall sheathing
- 2x2, 2x4, 2x6 and 2x10 wood framing members
- 1/2" and 3/4" plywood sheathing
- 1/2" gypsum board (for interior finishes)
- 3 5/8" steel stud
- 1/2 glass mat gypsum sheathing board (for parapet)
- Spray polyurethane foam
- Smart vapour retarder and compatible acoustic sealant
- Vapour-permeable sheathing membrane and tape
- Mineral fibre batt and rigid insulation
- 3/4" pressure treated plywood (for strapping) and appropriately sized fasteners
- Flat and tapered rigid insulation
- Cladding
- Impermeable self-adhesive membrane
- Two ply SBS roofing membrane and protection board
- Foil-faced self-adhesive membrane and compatible sealant
- Light gauge galvanized sheet metal
- Pre-finished metal flashing
- Weatherproof fire resistant silicone sealant

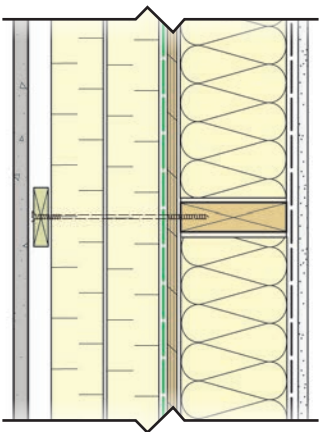
DISCLAIMER

This mock-up design is provided for general information and illustration purposes only. The greatest care has been taken to confirm the accuracy of the information contained herein. However, this mock-up design should not be relied upon for building construction or code compliance. A code consultant should be retained for firewall design and construction, specifically pertaining to the use of combustible materials across the firewall, including membranes and sealants for the air and water barriers. Detailing approaches shown in this design may require approval by a fire safety consultant and/or the authority having jurisdiction. Refer to the specific code language for further information on firewalls.



Completed Firewall Parapet section detail

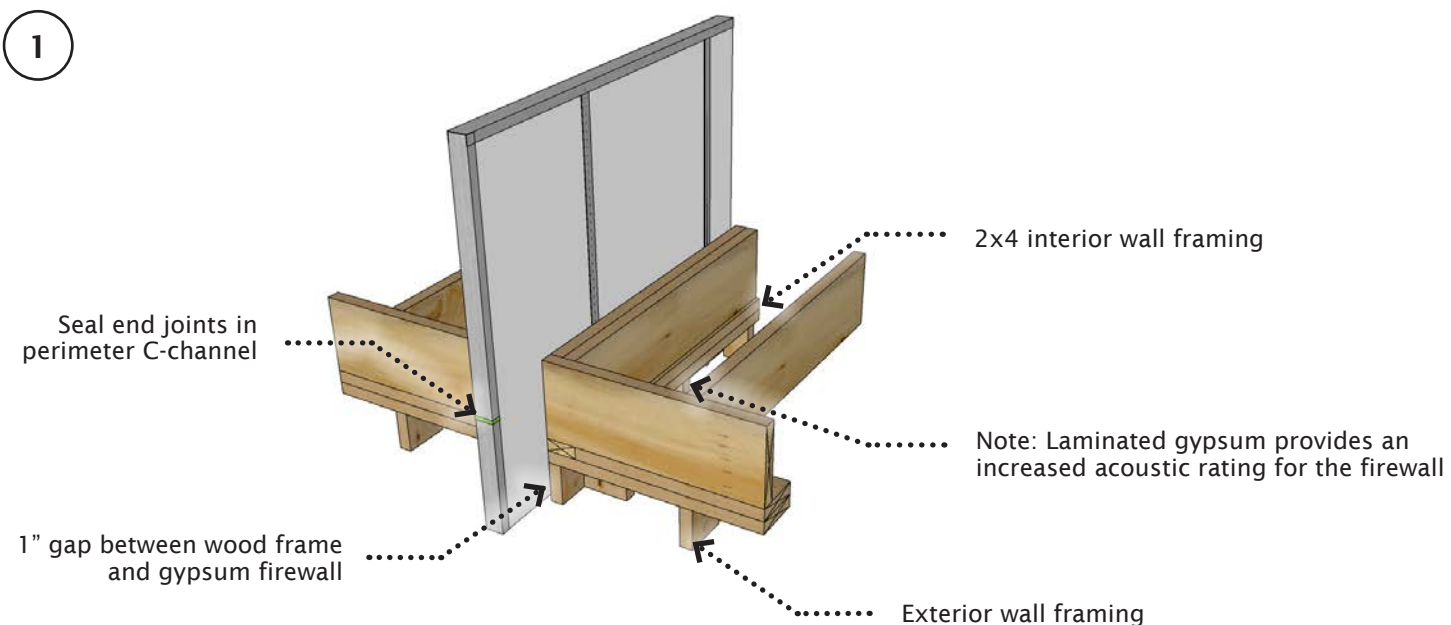
EXTERIOR WALL ASSEMBLY



Split-Insulated Wood Frame Exterior Wall:

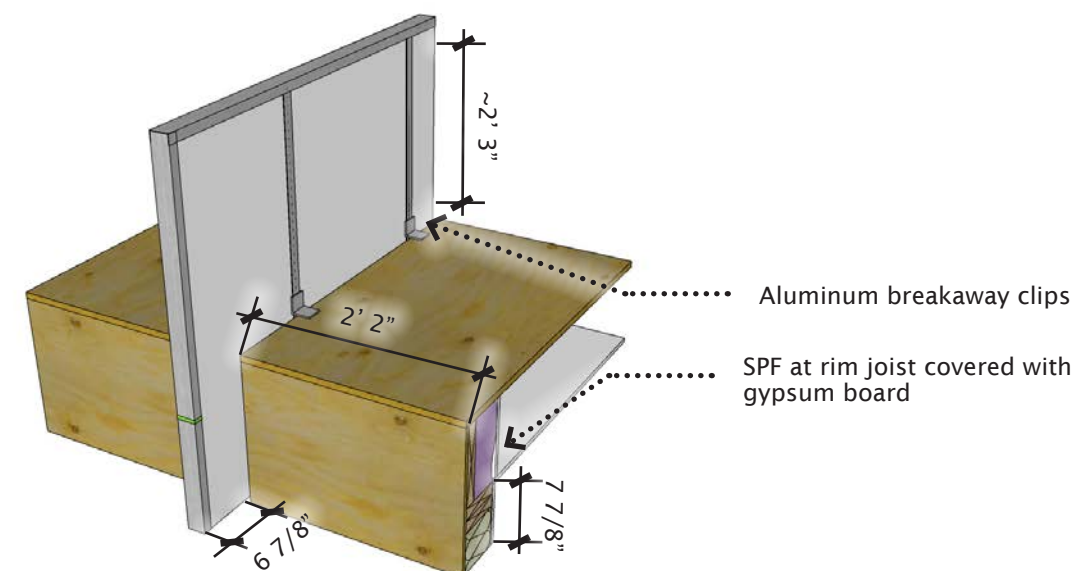
- Cladding
- 3/4" pressure treated 3" wide strapping @ 16" o.c. & rainscreen cavity
- 6" rigid mineral fibre insulation (2 layers)
- Vapour-permeable sheathing membrane, taped and sealed (Air Barrier)
- 1/2" plywood sheathing
- 2x6 wood studs @ 16" o.c. w/ batt insulation
- Interior polyethylene sheet, taped and sealed
- 1/2" gypsum wall board

1



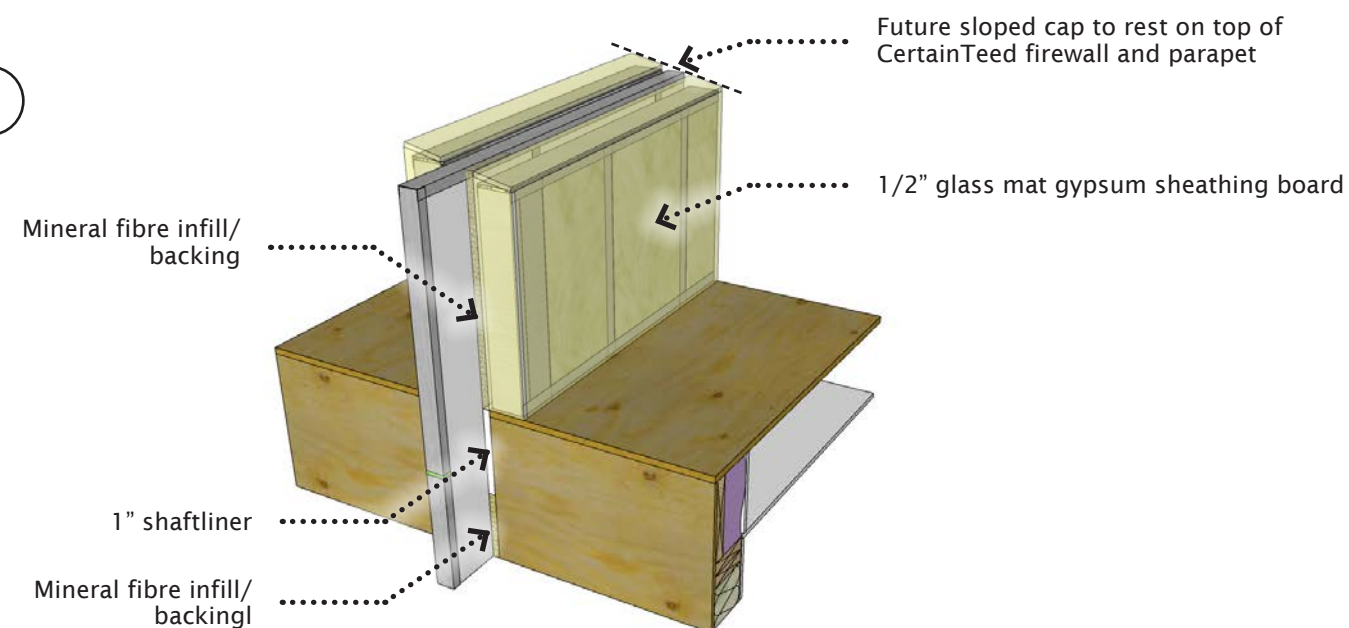
Construct the wood-frame exterior wall and roof framing as shown. When building the 2x4 interior walls either side of the firewall, install polyethylene pre-stripping at the intersection of interior to exterior wall. Install the gypsum firewall leaving a 1" gap between the wood-framing and the firewall. The gypsum firewall must extend horizontally and vertically from the building the full depth of the exterior insulation and the full height of the roof parapet. When constructing the gypsum firewall seal all joints in the perimeter C-channel with weatherproof fire-resistant silicone sealant.

2



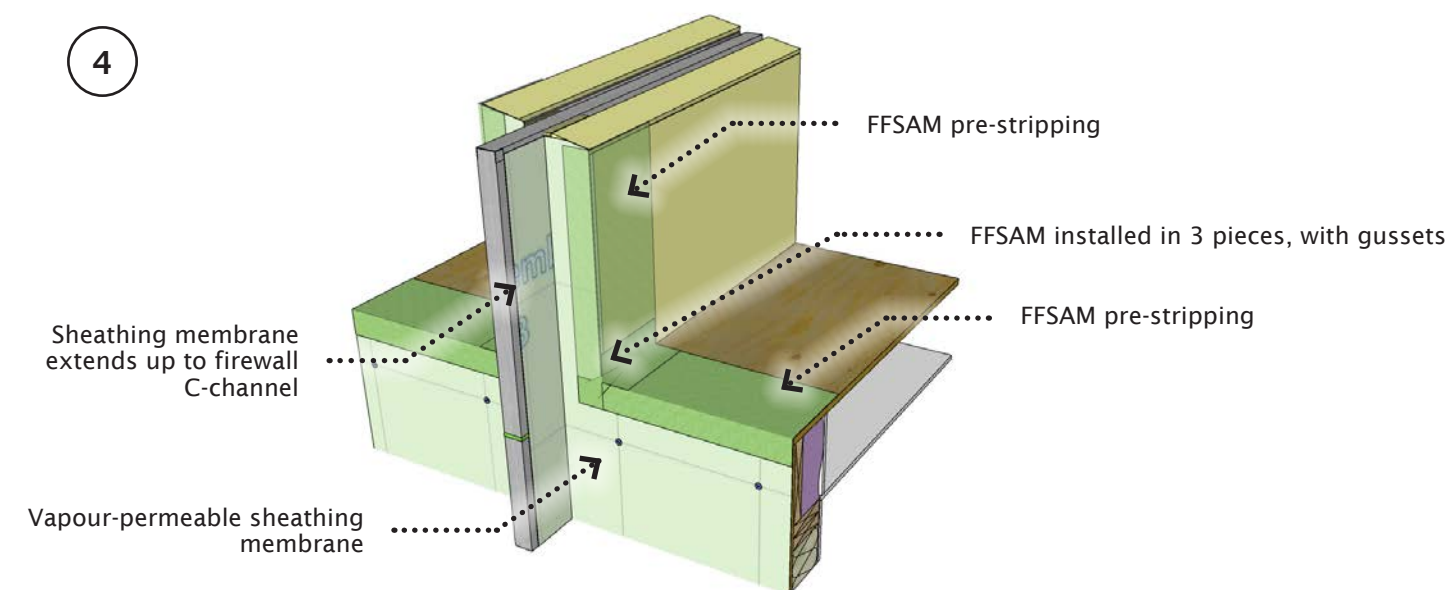
Install the exterior wall and roof sheathing. Secure the gypsum firewall with clips to the top side of the roof sheathing. Apply 6" of spray polyurethane foam (SPF) at the interior of the roof rim joists and cover with gypsum board. At the exterior walls install batt insulation and polyethylene sheet, sealing the polyethylene to the pre-stripping from the previous step. Seal the polyethylene pre-stripping to the gypsum firewall with acoustic sealant. Install batt insulation in the interior walls and install the required interior finishes.

3



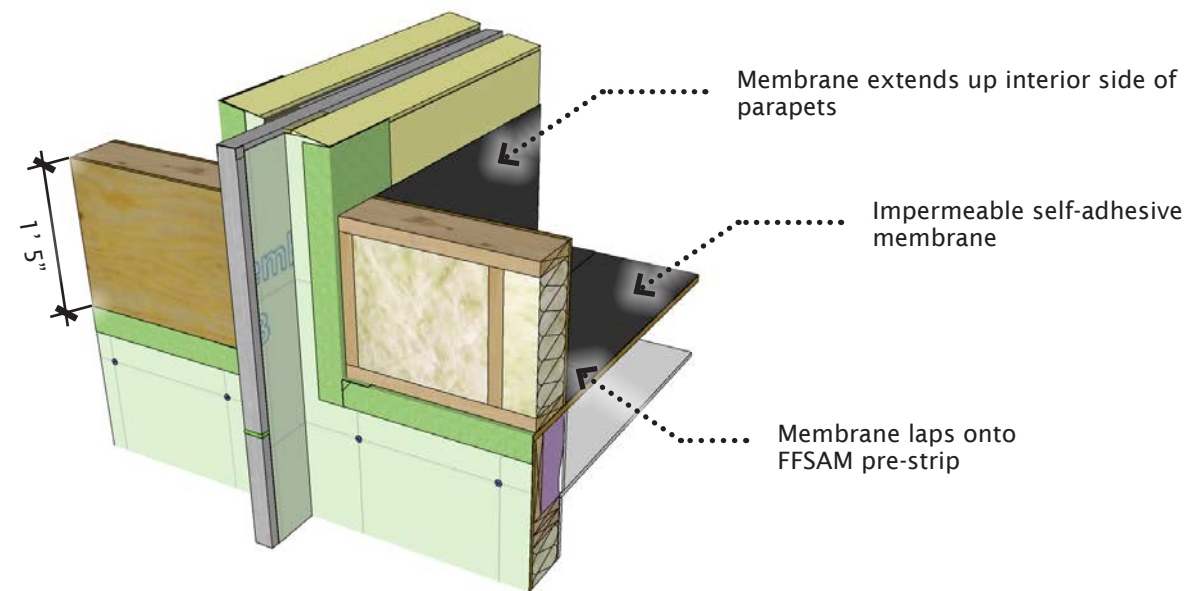
Install the required shaftliner fire blocking between the framing and firewall in the 1" gap at the exterior wall and roof joist locations. Build the firewall parapet framing using 3 5/8" steel stud @ 16" o.c. w/ batt insulation and glass mat gypsum sheathing board. When installing the sloped top of the steel stud parapet framing, ensure the resulting slope touches the top of the gypsum firewall. Install mineral fibre backing in the 1" gap between the gypsum firewall and the steel stud parapet framing.

4



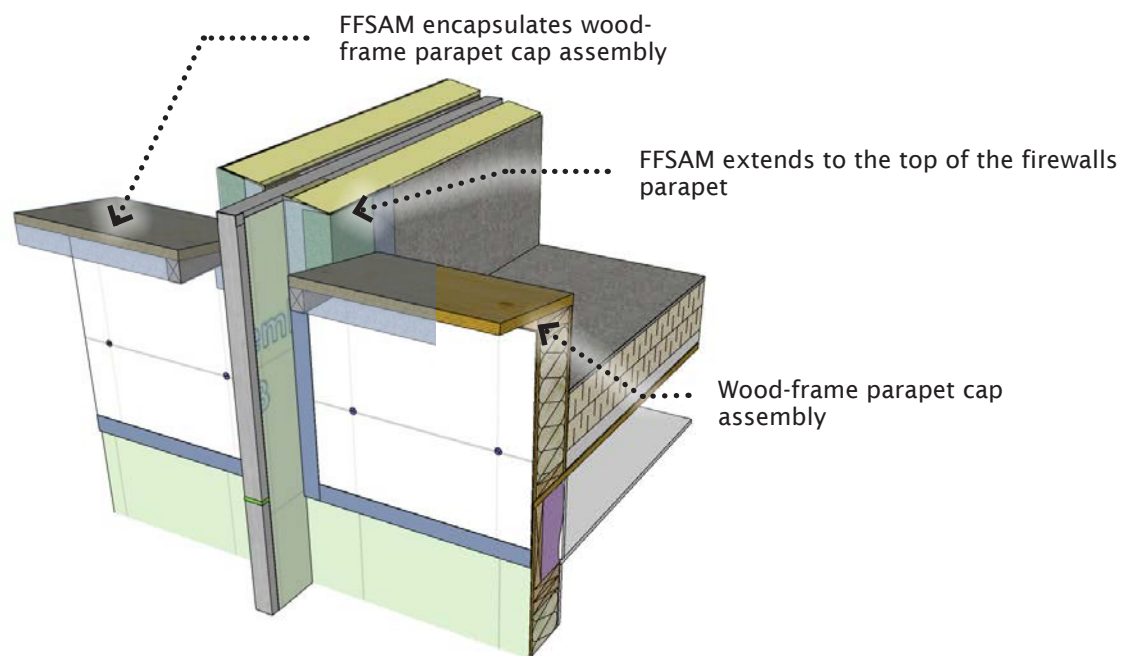
Install vapour-permeable sheathing membrane, taped and sealed at the exterior walls and gypsum firewall. Terminate the sheathing membrane on the gypsum firewall at the edge of the C-channel. Combustible materials like the sheathing membrane can not cross over the gypsum firewall. Apply foil-faced self-adhesive membrane (FFSAM) pre-stripping for air barrier tie-in as shown. The FFSAM pre-stripping should be installed similar to window sill membrane detailing, using 3 pieces including gussets at the corners.

5



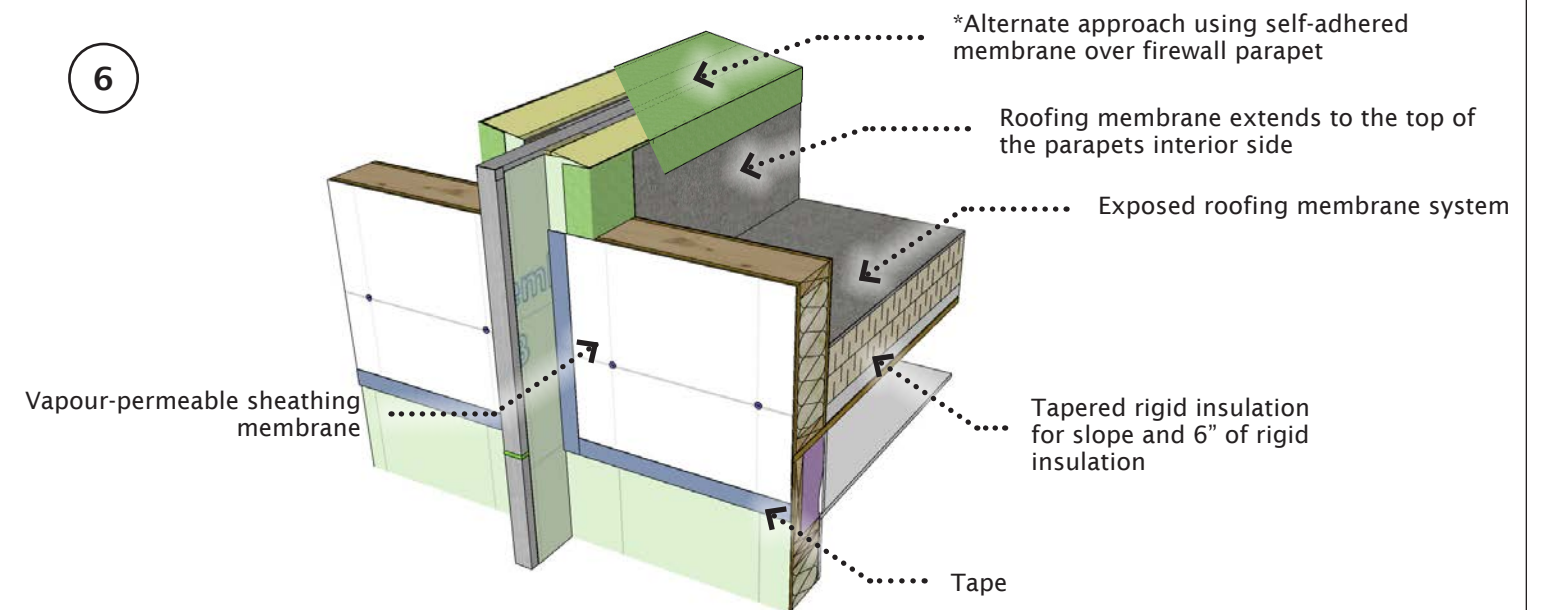
Build the exterior walls parapets using 2x6 wood studs @ 16" o.c. w/ batt insulation and plywood sheathing on both sides. Apply an impermeable self-adhesive membrane on the roof sheathing lapping it onto the FFSAM pre-stripping and extending it up the interior side of the parapets as shown.

7



Build the wood-frame parapet cap framing above the exterior walls using 1" plywood, 2x2 lumber and shims to achieve the desired slope. Apply FFSAM over the parapet cap framing, lapping it onto the SBS roofing membrane on the interior and over where the exterior insulation will go. Extend the parapets cap FFSAM to the top of the firewall parapet.

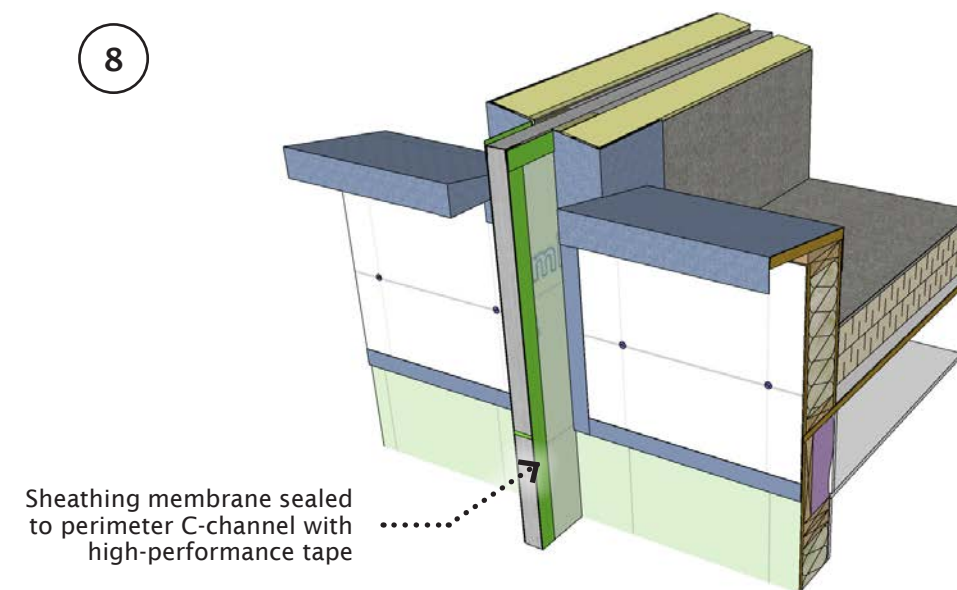
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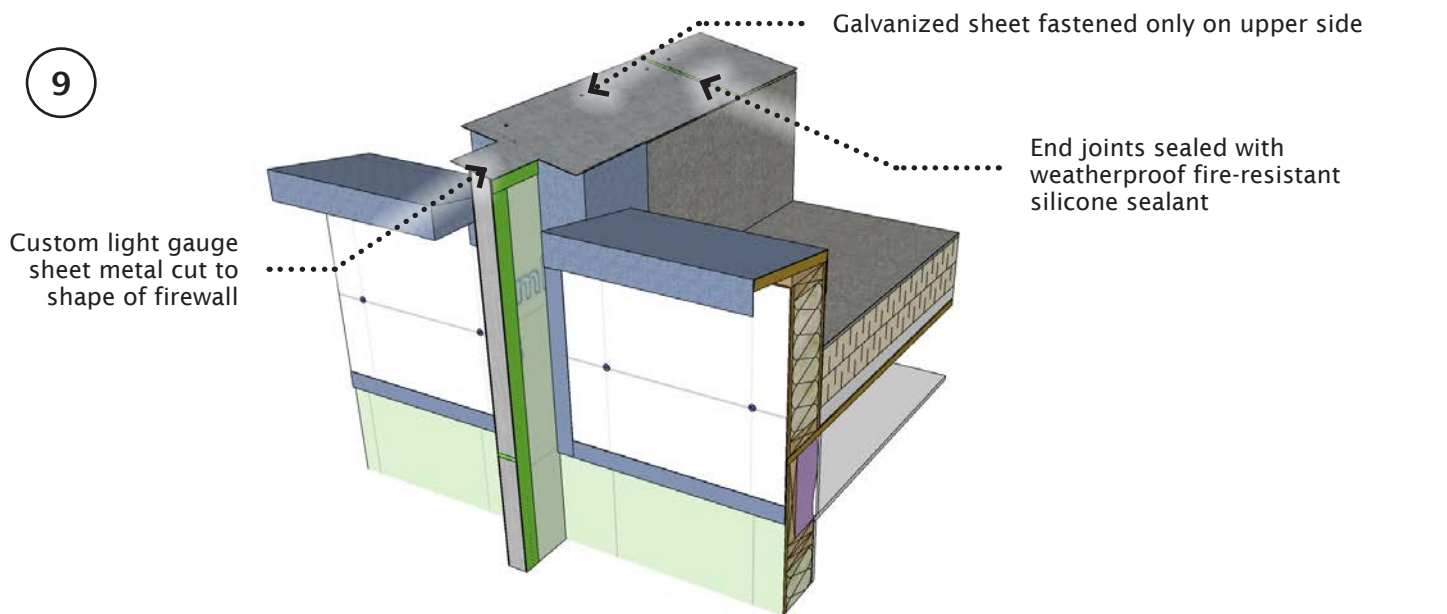
Install vapour-permeable sheathing membrane, taped and sealed at the exterior walls parapets. Install tapered rigid insulation, 6" of polyisocyanurate insulation in 2 layers with staggered joints, protection board and two-ply SBS roofing membrane. Extend the SBS roofing membrane to the top of the parapets as shown.

*Using self-adhered membrane (SAM) over the firewall parapet is an alternate approach to this detail. However this approach would require additional design input from a code consultant.

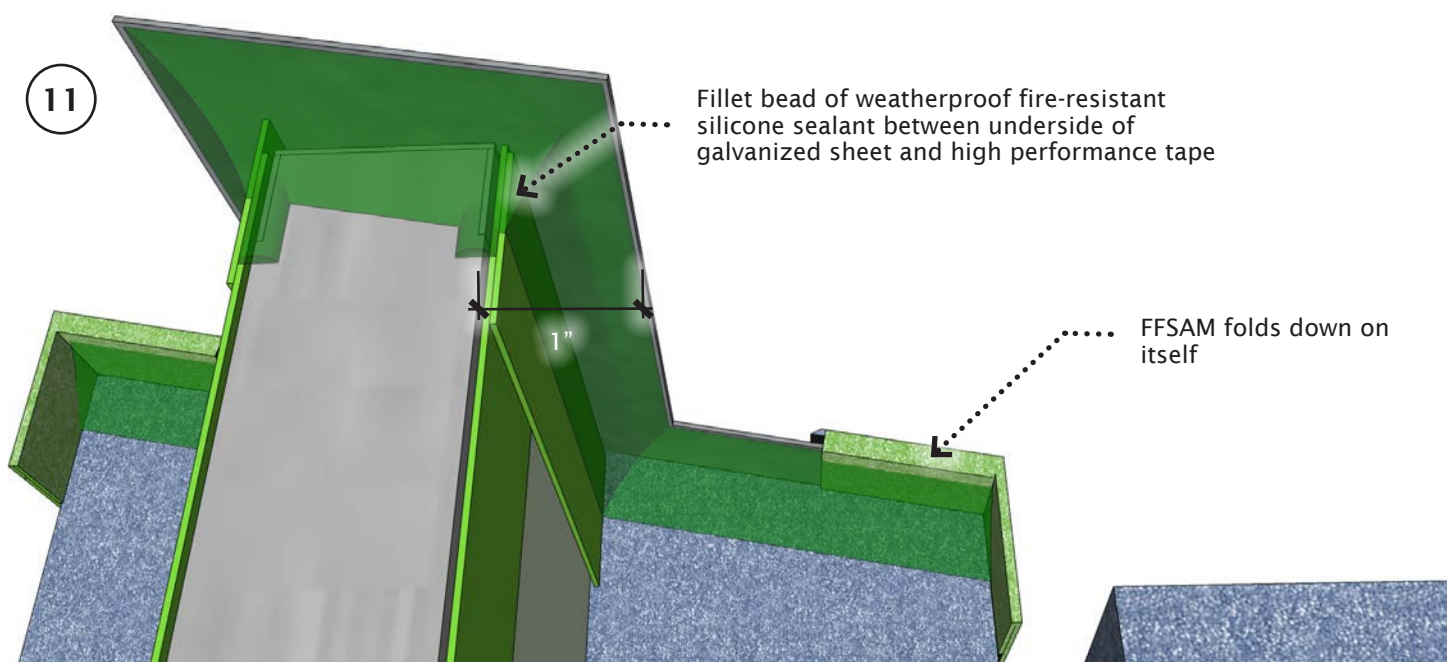
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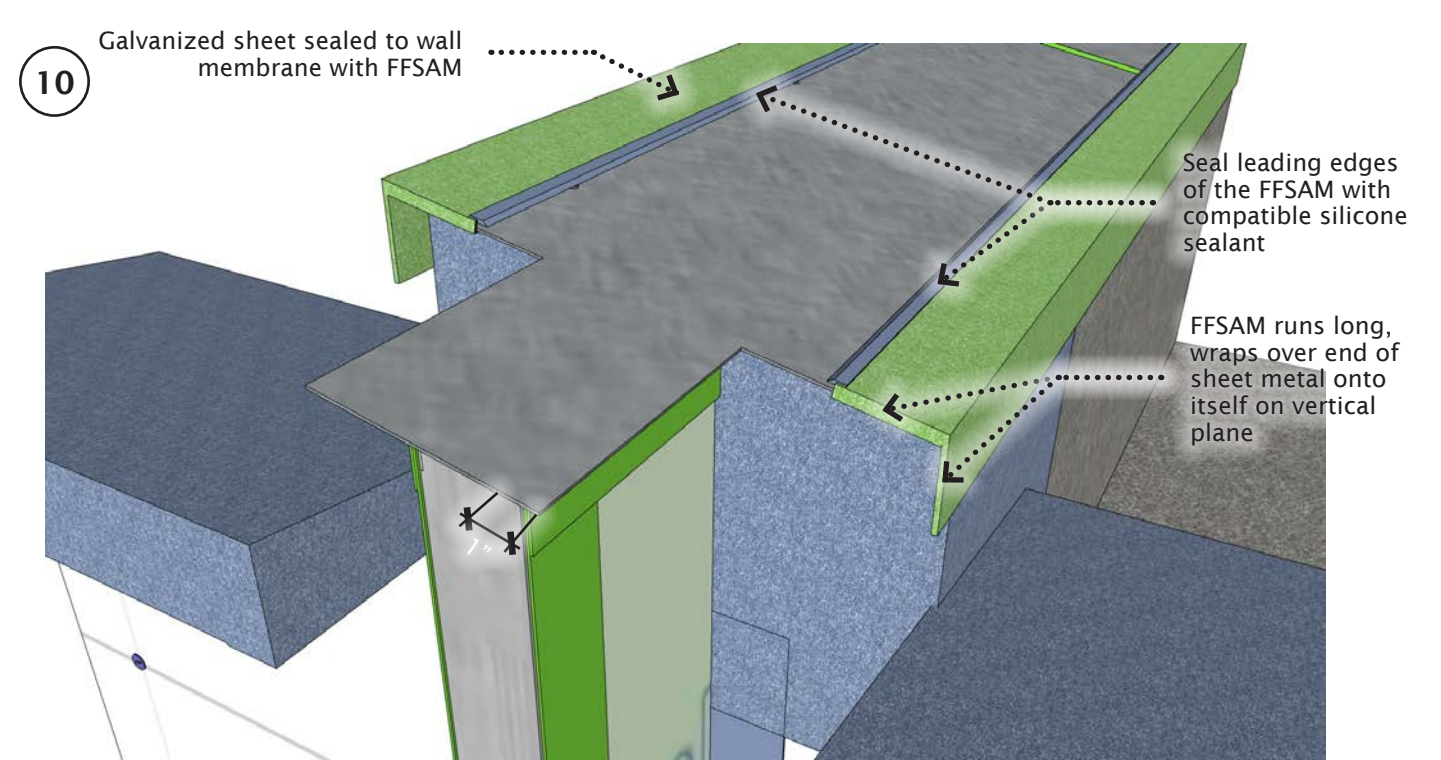
Seal the vapour-permeable sheathing membrane to the gypsum firewall perimeter C-channel with high-performance tape, do not extend tape across C-channel.



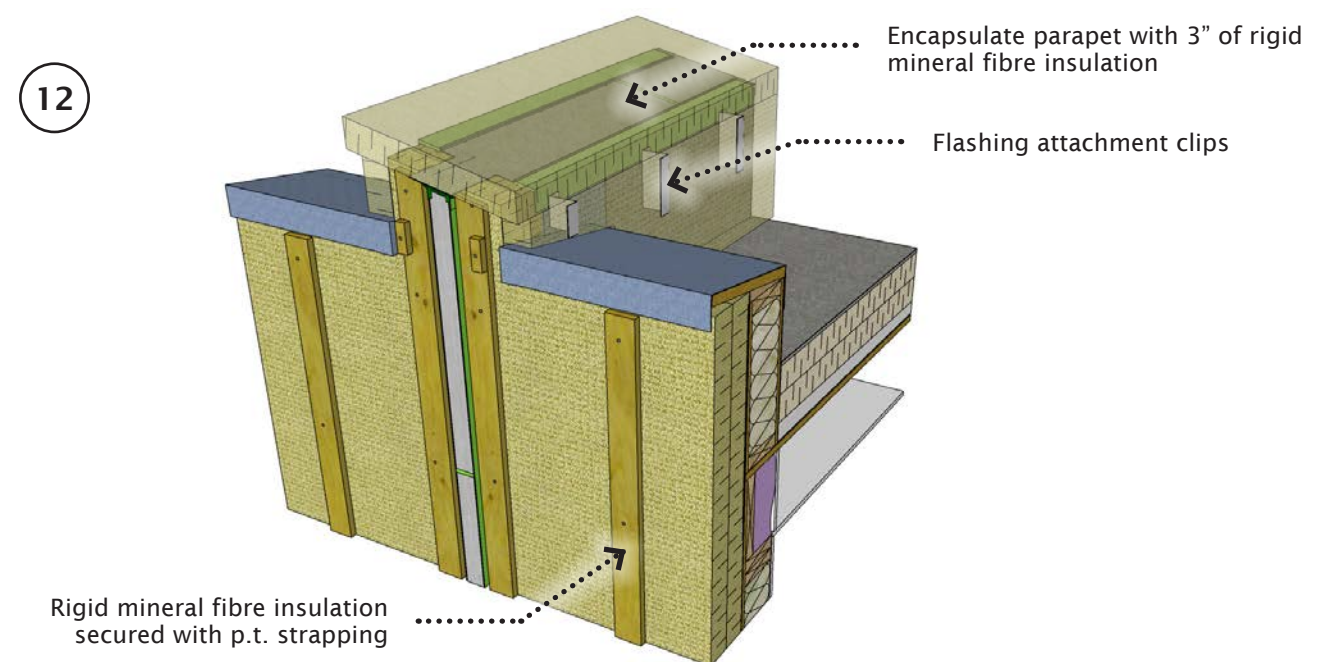
Install custom light gauge galvanized sheet metal cap above the firewall parapet. Fasten the galvanized sheet only on the upper side to allow for movement and to not restrict breakaway action. Seal the end joints between galvanized sheets with weatherproof fire-resistant silicone sealant.



Seal the underside of the galvanized sheet to the high performance tape and FFSAM with a fillet bead of weatherproof fire-resistant silicone sealant.

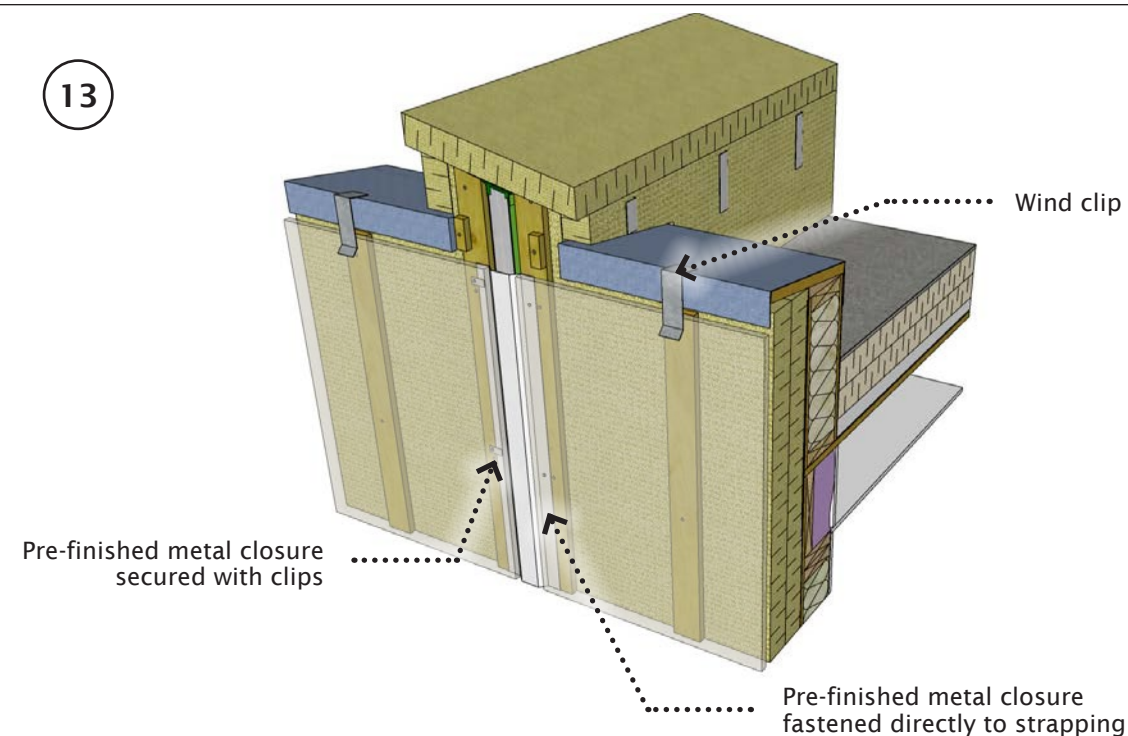


Install the galvanized sheet with a 1" horizontal offset from the firewall parapet and gypsum firewall. Apply FFSAM at the upper and lower edge of the galvanized sheet sealing it to the firewall parapet. Seal the leading edges of the FFSAM with compatible sealant. When installing the FFSAM at the upper edge, extend the membrane to fully cover and seal the fasteners used to secure the sheet. Run the FFSAM long at the end of the firewall parapet and fold it downwards in on itself, see step 11.



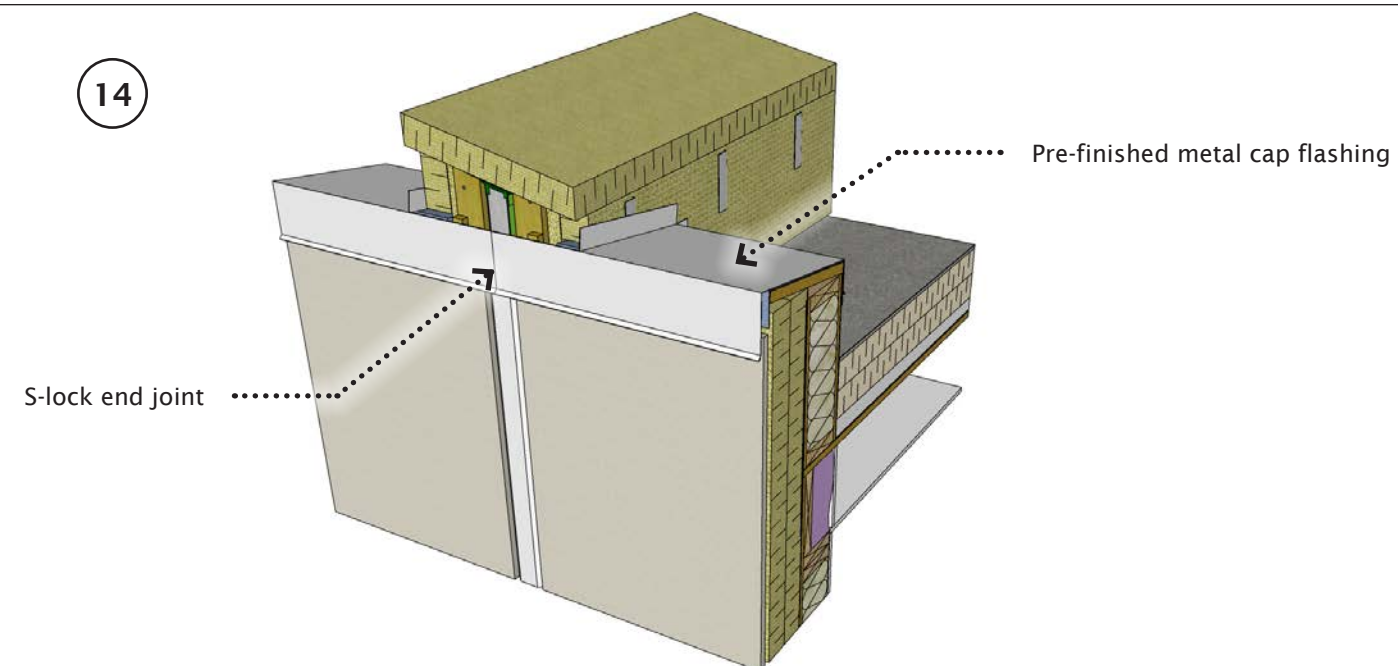
Install 6" of rigid mineral fibre insulation in two layers with staggered joints over the exterior walls, secured with p.t. strapping at each stud. Install clips as shown at the firewall parapet and encapsulate the parapet with 3" of rigid mineral fibre insulation.

13



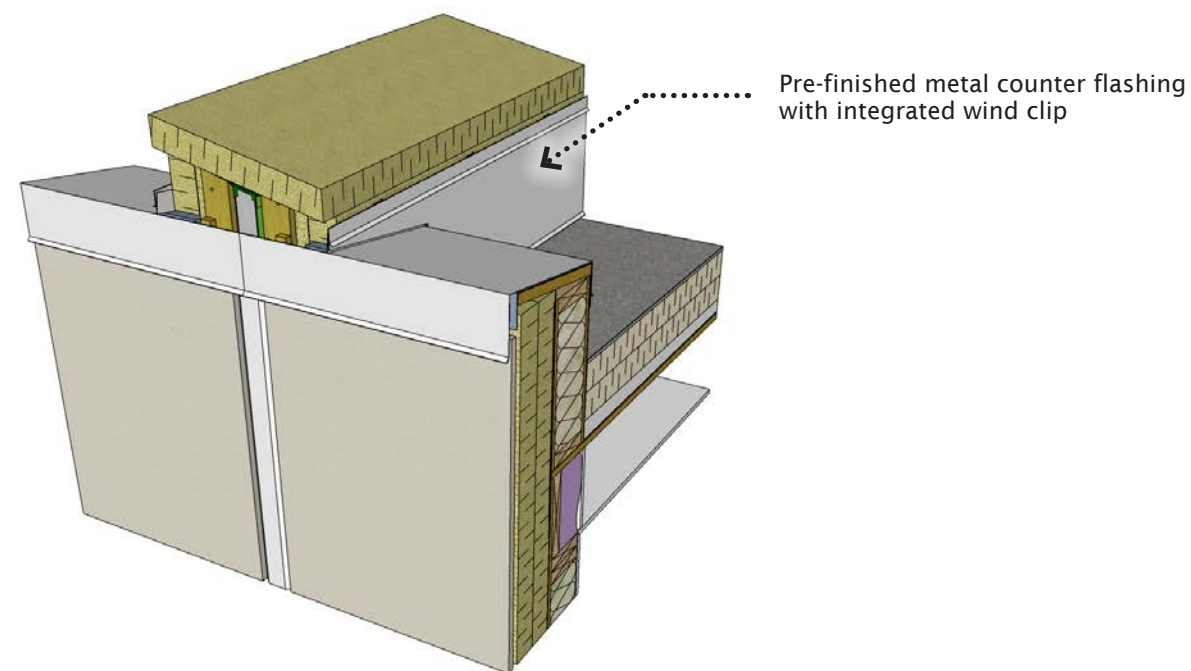
Install a pre-finished metal closure in line with the gypsum firewall. Fasten the closure on one side directly to the strapping and secure the other side with clips to allow for movement and to not restrict breakaway action. Install cladding over the exterior walls with a 3/8" air gap at the top to allow for air movement. Install wind clips above the exterior walls parapet cap assembly as shown.

14



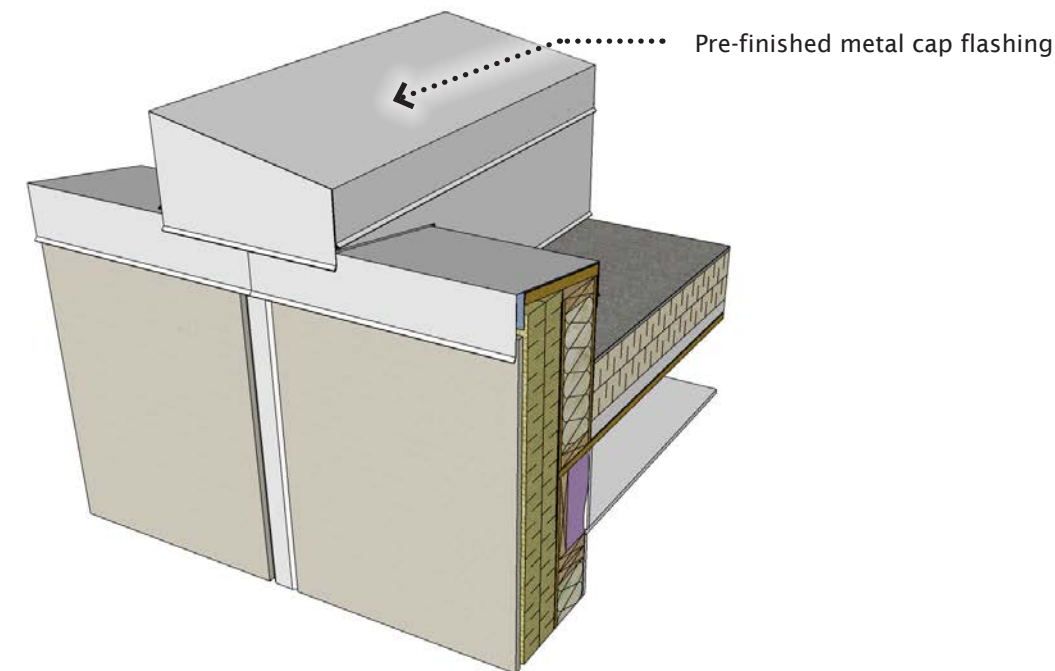
Install pre-finished metal cap flashings over the exterior wall parapets with an S-lock end joint between the two flashings. Locate the S-lock end joint in line with the gypsum firewall to allow for movement and to not restrict breakaway action. Ensure the cap flashings are installed with a drip edge and a 3/8" overhang past the exterior cladding.

15



Install pre-finished metal counter flashing at the firewall parapet with an incorporated wind clip at the top edge and secure it to the clips. The counter flashings drip edge should be minimum 1/2" above the finished roof surface.

16



Install the firewall parapets pre-finished metal cap flashing, attaching it to the wind clips from the counter flashings shown in the previous step.