



Installation Guide

JUNE 2005 NOTE:

Sealing, caulking, and filling voids between panels can be best done with a single material: Dow Enerfoam. If Dow Enerfoam is not available, SIPs can be installed using construction sealant and expanding foam.

Transporting SIPs panels

SIP panels are often delivered via tractor and full-length trailer. Because of the size and weight of the truck, an improved roadway surface with sufficient overhead clearance (approximately 13') is required. A turn-around area may also be required under certain circumstances.

The off-loading of panels is the responsibility of the owner / contractor.

Panels are stacked and bundled on pallets according to size. These bundles can be large and unwieldy. Because of their length, height, and width, the common forklift truck or tractor with forklift is sometimes not adequate for the job of unloading a truck. For many shipments, a large capacity forklift with 5' or longer forks or fork extensions will be necessary to safely unload. When notified of the shipment of the delivery truck, be available and prepared for the arrival of the truck. Most trucking companies will charge an additional per hour fee if unloading time exceeds two hours.

The Bill-of-Materials and Bill-of-Lading are part of the shipment documents. As material is unloaded, check to confirm the delivery of all items itemized on the Bill-of-Materials. If panels or other material on the Bill-of-Materials are not included with the shipment, or have been damaged during shipment, note those item(s) on the Bill-of-Lading. Signing the Bill-of-Lading without notes indicates that all materials listed have been received in full and in good condition.

Lifting & rigging of SIPs panels

When a crane is to be used to lift a panel into position, care must be taken in rigging the panel to avoid crushing the edges of the OSB with slings.

Use a fixture, with attachment point(s), which screw onto the panel. These fixtures are available for loan or can be fabricated, simply contact the factory for details. Use normal caution when lifting panels, keep all personnel clear of the overhead load. Always use one

or two tag lines to control the orientation of the panel. Avoid lifting panels under windy conditions.

Suggested tool list

In addition to those tools typically found at a residential construction site, the following will be needed:

- Power nailer
- Power stapler (optional)
- T-30 Torx head bit for use in a drill motor
- "Hot knife" adjustable electric foam cutter
- Ratchet come-a-long with nylon straps and end hooks
- 12" long drill bit (3/16", 1/4")
- Plunge router with bit
- Electric hand planer
- Panel lifting fixture or lifting eye
- Beam saw (optional)
- Circular saw
- Hand saw

Additional SIPs accessories

- 2x dimensional lumber for bracing, spline material, sill, top plates, window and door bucks.
- 8D gun-driven ring shank nails or 14 gauge x 1 1/2 gun-driven staples for fastening panels to plates and splines.
- 16d ring shank nails for fastening plates.
- Panel screws (1 1/2" longer than thickness of panels) for fastening panel-to-panel, and panel-to-plates, etc.
- Ribbed Washers (1/4" I.D., 2" OD) for use under panel screws (as needed).
- Construction sealant, EPS compatible for wood-to-wood seal.
- Low expansion expanding foam for filling voids and sealing EPS.

Storing SIPs panels

Once panels are unloaded, use blocking to keep panels elevated and flat. Tarp panels to protect from precipitation and keep panels elevated above standing water. Keep OSB spline material dry and flat. Dimensional lumber to be used for plates and splines should also be kept dry. Wet lumber will swell and become difficult to fit into panel recesses. If necessary, store construction sealant and expanding foam in a heated enclosure to keep it above the minimum storage and working temperature.

SIPs panel numbering

When the panel layout plan is made, the panels are numbered beginning at the back, right-hand corner of the print, unless noted on the print. Individual panels are then numbered sequentially in a clockwise direction.

As panels are manufactured they are numbered (marked) to indicate the panel location in the building. The sequence-of-assembly will generally correspond to the number sequence on the panels. For example, wall panels will be marked 1, 2, etc.; floor panels 1F, 2F, etc.; and roof panels 1R, 2R, etc. Panel numbering should be followed so that panels are installed in their correct location.

Sill plates

The sill plate is 2x lumber, which attaches to the building structure and fits into the recess at the base of the panel. Sill plates must underlay SIP panels the entire length of a panel run. To install, clear construction debris and apply a bead of construction sealant to the floor the entire length of the plate.

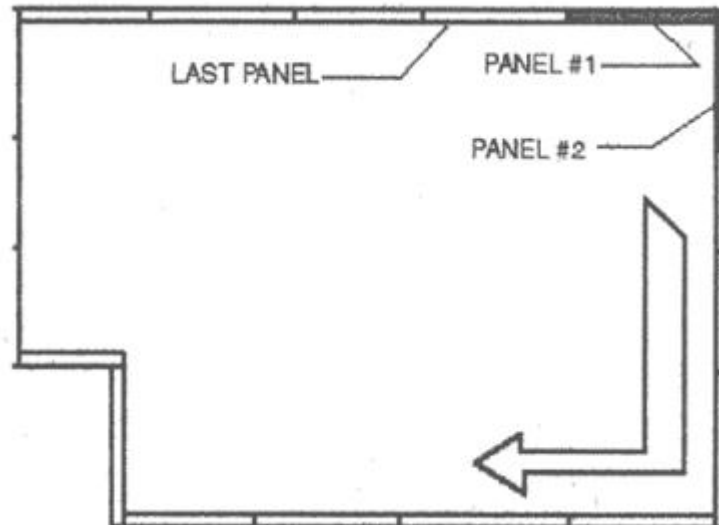
For a wall panel to carry its design load, the edges of both OSB sheets must be in full contact with the structure of the building. The placement of the sill plate determines the location of the panel. Accurately position the plate 7/16" in from the outside face of the wall plane. This will allow the outside, as well as the inside, OSB skin of the panel to bear on the sub-structure. Fasten the sill plate with 16d nails. Where possible, drive nails into the 2x framing below the floor. To prepare for the installation of panels #1 & #2, install sill plates so there is a 1/2" space between them at the corner.

Secondary sill & top plates

In addition to taking measures to protect panels from moisture following shipment and while awaiting erection, practices must be followed that will protect panels from moisture for the life of the structure. When a wall is mounted to concrete always use a treated secondary sill plate and a sill seal material. In addition, always maintain a minimum 8" distance between soil and panel.

Warning:

The EPS core of the panel can be destroyed by most solvents and petroleum based products. Use only water-based construction sealants and EPS compatible expanding foam.



Installing Wall Panels

Prior to installing panel #1, install the 2x end plate into the end of the panel. The panel OSB and the end spline will form the outside corner. Refer to [Sheet 104](#). Use construction sealant as noted on the drawing and nail or staple the end plate in position. Measure electrical chase location(s).

Locate the chase locations on the installed sill and drill through. Apply a continuous bead of expanding foam to the top of the sill plate and continuous beads of construction sealant along the upper edge of each side of the sill. Lift the panel onto the sill; adjust its location, level, and brace. Make sure that the horizontal wire chases are located on the bottom of the panel when installed. Locate panel #2; note its dimensions and the location(s) of electrical chases. Confirm that the installed sill plate is long enough and drill wire chase locations. Refer to detail drawing [Sheet 104](#), which illustrates two alternative methods of making a corner connection. Use SIP screws to attach panel corners together up the vertical edge of the overlapping panel into the butting panel. 2x lumber should be inserted to ensure a square and ridged corner for continuing panel erection. Before attaching Panel #2 to panel #1, check both panels with a level. Use construction sealant on all wood-to-wood connections and expanding foam on all EPS to plate connections. When both panels are in place, nail or staple both first and second panels 6" on center along their sill and end plates. If # 14 panel screws are used, space screws 12" on center. Before installing #3 and subsequent panels, determine which type of panel-to-panel connection will be used. See fastener schedule; some projects may require different fastener locations and sizes.

The insulated spline connection

If the insulated spline connection will be used, cut sufficient spline stock to make two continuous splines that extend from the top of the sill to the bottom of the top plate (the top plate is installed after the panel is installed). Apply expanding foam to the inside edge of both sheets of OSB on both panels. Insert the splines into panel #2. Apply a continuous

bead of expanding foam along the end of the EPS foam in panel #2. Apply continuous beads of expanding foam to each side and a bead of expanding foam to the top of the sill plate under panel #3. Frequently it will be necessary to install a secondary plate(s) in order to achieve a specific wall height. This secondary plate(s) can be located either as an additional sill plate (useful in situations where a treated 2x plate is needed to protect the wall panel from a concrete floor) as an additional top plate, or in some circumstances both secondary sill and top plates may be required. If additional plates are used, they should be at least as wide as the overall panel width and allow both OSB skins to fully bear the load supported by the panel.

Trimming the last panel of a run

The last panel of a run of panels will generally need to be trimmed to length. To do this, temporarily install the final panel (X), level and brace. Then temporarily install the first panel of the new intersecting run (A), positioning the panel so that it is abutting panel X. Using a level, level panel A and mark the intersection line of the two panels on panel X. Remove both panels. Trim panel X back to the intersection line with a saw and form a cavity in the EPS with a "hot knife". Install the end plate in panel X. Complete the corner connection using either of the connections detailed in [Sheet 104](#).

Installing SIP Roof Panels

When installing SIP roof panels it will benefit the installer to do as much prep work as possible while the panels are still on the ground. This includes installing sub fascia, splines, SIP screws, or blocking out any openings in the roof. When applicable, multiple panels can be assembled on the ground together and lifted as an assembly.

When lifting any panel, make sure the method of lifting can safely handle the weight of the assembly being lifted. SIP lifting plates by PorterCorp can be used to fly the panels from the ground to where they will be installed on the roof. The lifting plate is a steel plate that is anchored to the outside face of the SIP with multiple course thread wood screws and provides a solid point to attach straps.

Pay close attention to squaring up the first panel on any roof plan to ensure that as adjacent panels are installed the roof will remain true and square.

It is especially important with the roof panels that the panel connections are well sealed to prevent any air leakage as this may cause long term problems with the integrity of the panels, not to mention a loss of efficiency of the panel system. Construction details provided with each job show how to best seal the SIP assembly. Construction sealant, single and two component expanding foam, and vapor barrier tape are the typical methods of sealing SIP joints.

After roof panels are installed, make sure that all panels are fastened to the beams, trusses, and bearing walls of the structure. Usually, roof panels are fastened 12" on center with SIP screws and washers. Also, make sure all panel to panel joints are fastened as required on

both the inside and the outside. (See fastener schedule on accompanying installation drawings.)

When the roof panels are completely installed, fastened, and any gaps are filled with expanding foam, roofing should be applied as soon as possible. It is a good idea to get roofing felt onto the roof panels the same day that they are installed.

Field cutting SIPs panels

If field cutting of panels is necessary, it can be done using tools commonly available to the builder. A circular saw, reciprocating saw, and handsaws can perform all cuts required in an installation.

Because of the thickness of panels, it is usually necessary to saw both faces of the panel followed by hand sawing the core EPS. When many cuts are required, contractors find that a deep cutting beam saw, such as the Prazi or Linear Link panel saw, is a useful addition to the toolbox. Once panels are cut, the EPS foam must be trimmed back to prepare cavities for splines or plates, for this operation an adjustable electric "hot knife" is required.

Installing Headers & field cut openings

Headers are generally designed at the time the panel layout drawings are made. Header design load charts and other technical information can be obtained by contacting PorterCorp at (616) 399-1963. Field cut openings may be made in wall panels as noted in [Sheet 403](#).

Maximum width for a field cut opening is determined by the loads on the wall. Please contact PorterCorp for advice when field cutting openings. If an unusually high point load is being carried by the panel above the opening the maximum span may have to be reduced or a header installed. If there is a question regarding the load carrying capacity of a field penetrated panel, an engineering analysis should be conducted. Penetrations will be necessary to install vent stacks, chimneys and other penetrations through SIP roof panels. Small penetrations of 6" or less can be made without 2x blocking, providing they are well sealed. See [Sheet 404](#). Insulate any voids between the object and EPS with expanding foam.

Protecting SIPs from moisture

Vapor barriers – While not normally needed in moderate climates and normal conditions, vapor barriers are needed in humid climates, very cold climates, and rooms with higher than normal inside humidity. Rooms containing hot tubs and swimming pools will require additional vapor barrier protection. Consult local building codes for specific vapor barrier requirements.

The builder must also seal-off all openings and fill all voids in the thermal shell of the building. The sealing of panel built homes is important for two reasons:

- **The first is thermal efficiency, one of the major advantages of SIP construction. By sealing all panel junctures to eliminate unwanted air infiltration, heating, cooling and air exchange can be precisely controlled and energy requirements reduced.**
- **The second has to do with the leakage of humid air into voids ("dead air" spaces) adjacent to panel OSB skins. The presence of humid air and dropping temperatures can result in condensation. Condensation can cause deterioration of panels.**

To achieve the maximum long-term value that SIP buildings can provide, the builder must use construction sealant and expanding foam throughout the building process. Connections and junctures, as well as gaps around doors, windows, and other penetrations must all be thoroughly sealed. Experience has indicated that thermal and vapor sealing at roof ridges and valleys is particularly important and warrants extra attention. It is recommended that roof ridges be filled with expanding foam to fill the ridge juncture (please note construction detail). Also, when electrical work is complete, all electrical boxes and wire chases should be sealed. For sealing wood-to-wood connections, use construction sealant. For sealing adjacent to EPS, expanding foam is recommended.

A vapor barrier shall be installed at the interior of the ridge juncture of the panels. A rubber laminate material or other vapor barrier can be used for this seal. See [Sheet 302](#). There should be no wrinkles or voids that allow vapor drive to enter the ridge juncture.

In addition to the vapor barrier at valleys and ridges, we recommend the installation of an air-to-air heat exchanger that is operated by a humidistat. Humidity must be kept at less than 40% relative humidity.

SIPS wiring

The process of wiring a SIP home includes pulling wire through 1 ½" diameter vertical and horizontal chases that are cored through the EPS before the panel lamination process. These chases always extend from edge to edge both vertically and horizontally.

Horizontal chases are included at the 16" level (for receptacles) and at the 44" level (for wall switches and counter receptacles). Vertical chases allow wire runs vertically through the wall panel to access wall switch locations and at other locations as needed to provide vertical wiring options for the electrician. Layout of chase locations is done at the time the panel layout drawings are made. Once panels are manufactured, chase locations can easily be located, as they are marked with 1" wide lines on the interior OSB surface.

As structural panels are installed, the builder must drill sill and top plates, and 2x connection splines (if used), to provide open chase ways for the electrician. When the electrician comes to the building site, he will review the electrical plan and wire run options

to determine which chases to use. Many buildings retain traditionally framed interior walls and floors, which give additional flexibility in wiring. Wiring is simplified if major horizontal wire runs take place in the basement, using horizontal panel chases for local runs only.

When a building has an open ceiling plan, locate lighting, fans, etc. to make wire runs as easy as possible. Wiring can be run from an interior wall or can be run along an exposed overhead beam. Panel chase ways can also be included in roof panels, to allow internal wiring from wall panel to ceiling mounted lighting or fans.

When horizontal wire circuits must continue from one wall to another intersecting wall, it is necessary to use vertical chases to exit the wall and then to enter the intersecting wall. Vertical chases are placed near wall intersections to allow for this exiting and entry of wiring.

When no precut panel chase is available, there are various options available. A 1" wide slot may sometimes be cut in the interior OSB skin into which wire can be placed. Because the OSB is structural, there are limits to slot length and location. A slot should not extend all the way to the edge of a panel but should stop 6" short of the edge. A vertical slot should be no longer than 48" and a horizontal slot should be no longer than 12" in each panel. Wire should be placed deep enough (see your local electrical code) into the EPS to be out of reach of drywall screws. Once wire has been placed in the slot, expanding foam should be applied to fill the opening. If there is any question about reducing the structural integrity of the panel, please consult a structural engineer or PorterCorp.

Wiring can also be run behind roof support secondary framing members (see [Sheet 301](#)), baseboards, and moldings.

Commercial flush mounted raceways, such as wire mold can be used.

Conduit which conforms to local code restrictions can be used.

Standard "Romex" type wire, labeled as NM-B, of sufficient wire gauge size as required for the anticipated maximum amperage loading, is recommended for use in panels.

Recommended sequence for wiring is to locate receptacle, switch, and other box locations. Boxes should be offset from the wire chase location so the box will not block the chase following installation. Make the openings in the OSB and EPS necessary to accommodate the boxes, removing only enough insulation to allow box to be installed. Pull wiring required for circuits. Insert the ends of the pulled wire into the boxes and mount the boxes using surface type fasteners.

Once mounted to the OSB, carefully seal around the box using low expansion foam. Use expanding foam to fill both used and unused chases at the top and bottom of panels and wherever chase openings are accessible.

Consult local building and fire codes to see if additional restrictions apply.

Site Built Plumbing Chase

To protect plumbing from freezing temperatures it is advisable to enclose runs in an interior chase. For an example, see [Sheet 601](#). Do not run plumbing in exterior walls.

In the case of a cold vent line, a small in-wall chase can be built. This style chase must be well insulated using a high expansion type foam product. It is also advisable to provide plating or other material to cover and protect the vent line from damage.

HVAC Notes

In the event plumbing or HVAC ductwork is to be run along a SIP wall, a chase can be built that will both conceal and protect the run. See [Sheet 601](#). Wherever possible, ductwork can be routed through the stick-built (interior) sections of the home.

To help prevent, and to reduce the spread rate of, fire, the inside surface of SIP panels which face living areas must have ½" or thicker gypsum board OR equivalent installed. Code requires a 15 minute thermal barrier on the inside surface of panels in residential structures. Local code requirements vary and may require additional fire prevention measures.

PorterCorp also manufactures a one-hour rated panel which carries the UL Classification Mark and is listed as Design Co. U532. This panel is a 6 1/2" (5 5/8" EPS core), Type A (7/16" OSB face both sides). To meet the one-hour rating, the panel has Type C gypsum on both sides and 2x6 lumber splines.

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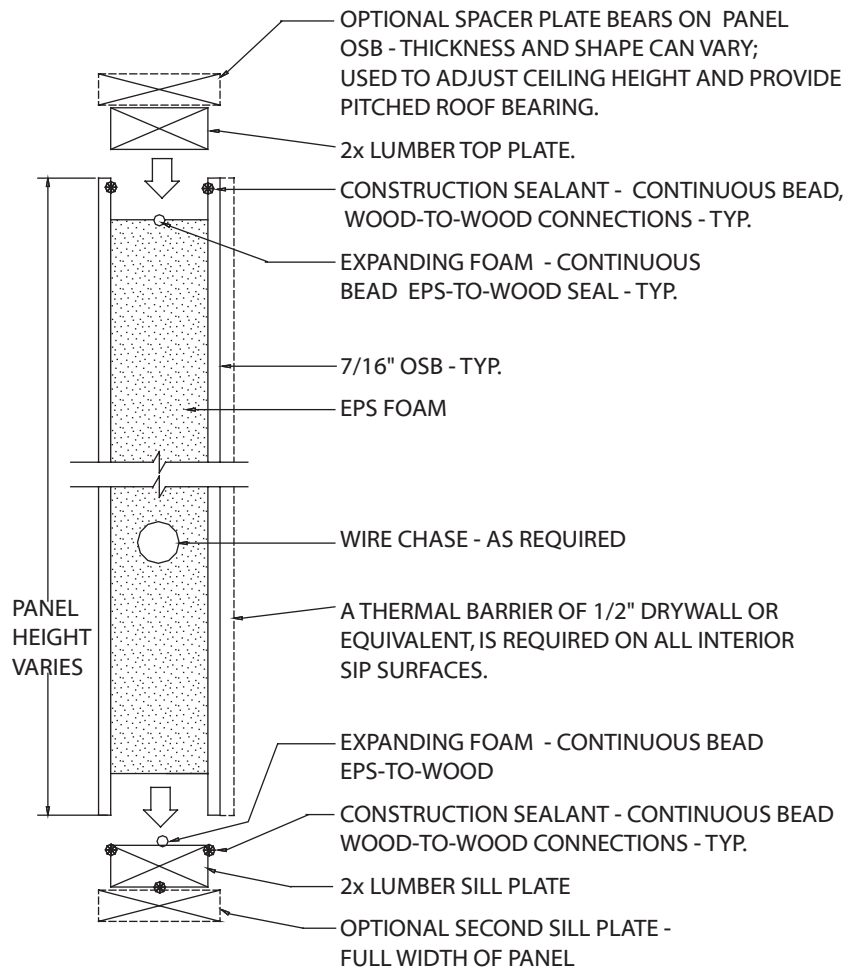
501 Elevation of Typical Electrical Installation in Wall Panels
502 Section of Wall Panel Showing Vertical Wiring Runs

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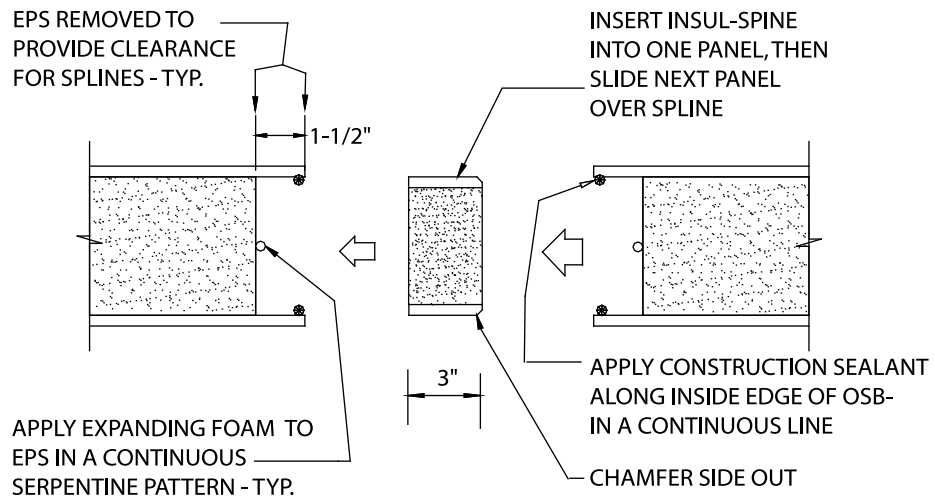
**Panel - Typical Section
Vertical Section**

"TYPE A" STRUCTURAL INSULATED PANEL (SIP)

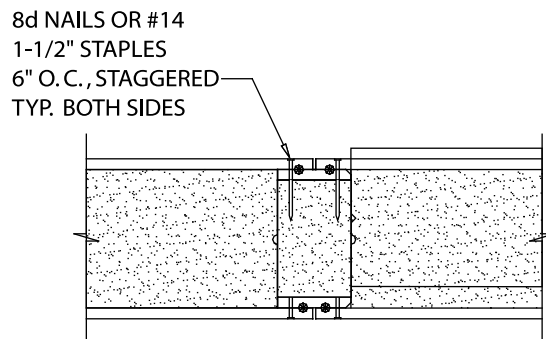


Panel to Panel Connection - Insulated Spline Horizontal Sections (Standard Connection)

PANELS BEFORE ASSEMBLY

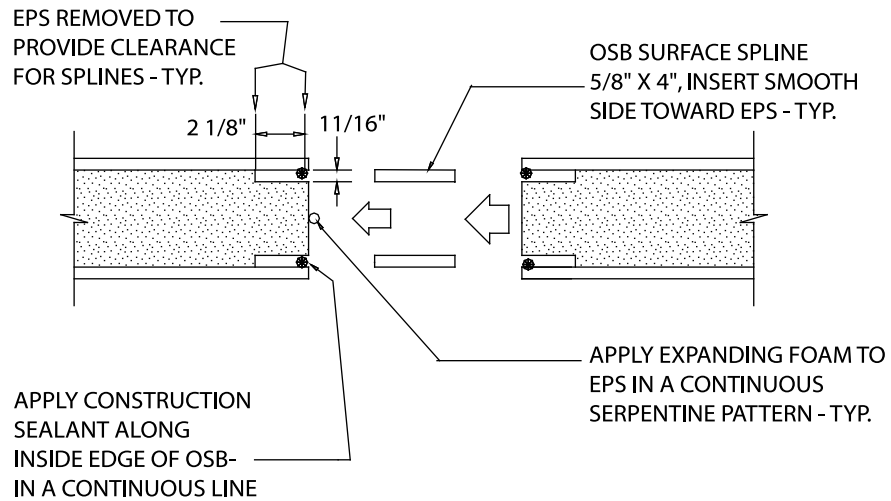


PANELS ASSEMBLED

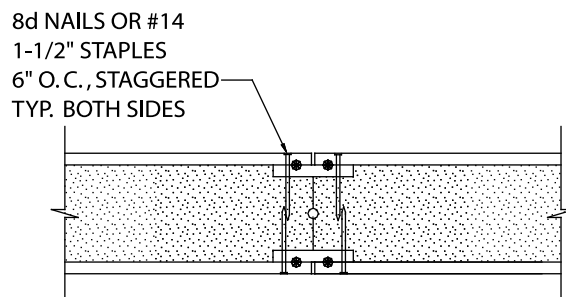


Panel to Panel Connection - Surface Spline Horizontal Sections (Optional Connection)

PANELS BEFORE ASSEMBLY

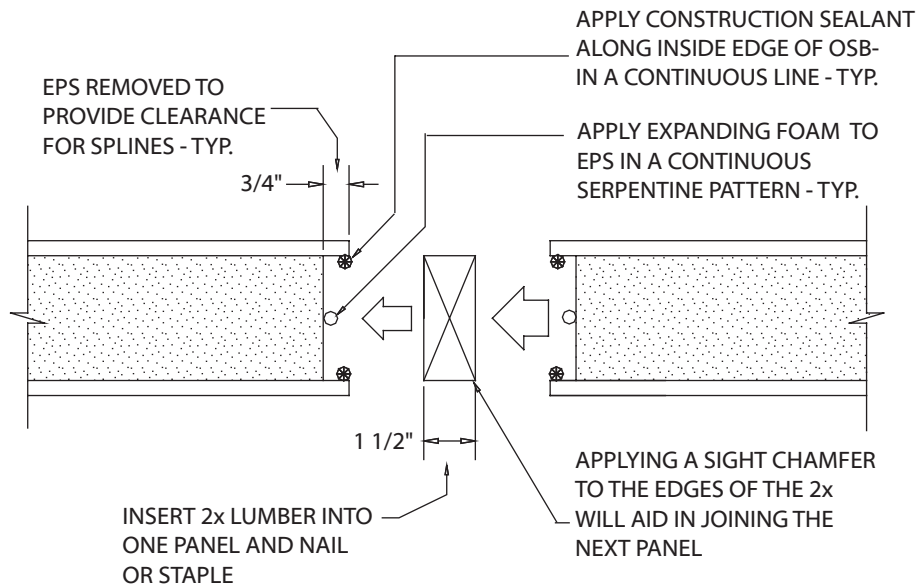


PANELS ASSEMBLED



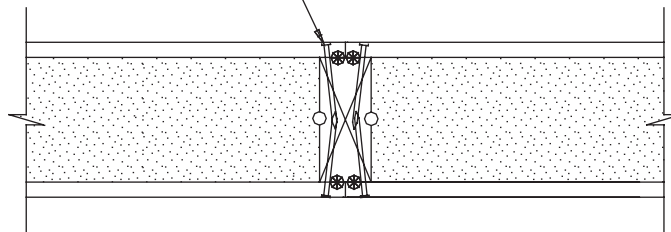
Panel to Panel Connection - With 2x Lumber Horizontal Sections

PANELS BEFORE ASSEMBLY



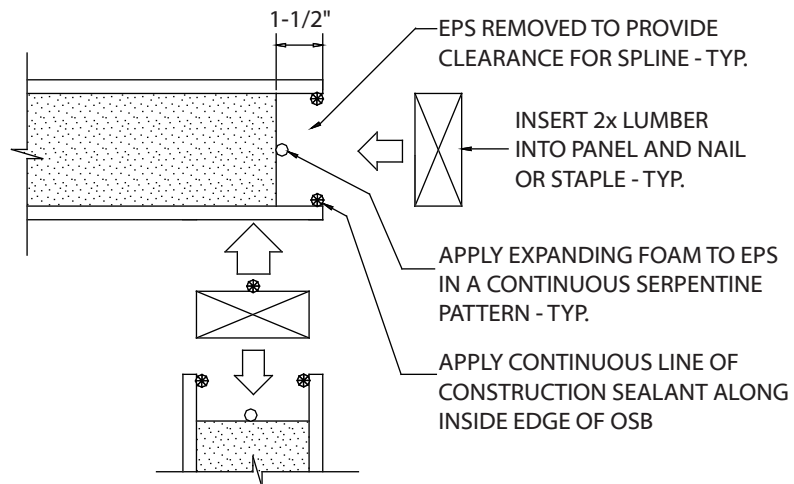
PANELS ASSEMBLED

8d NAILS OR #14
1-1/2" STAPLES
6" O.C., STAGGERED
TYP. BOTH SIDES

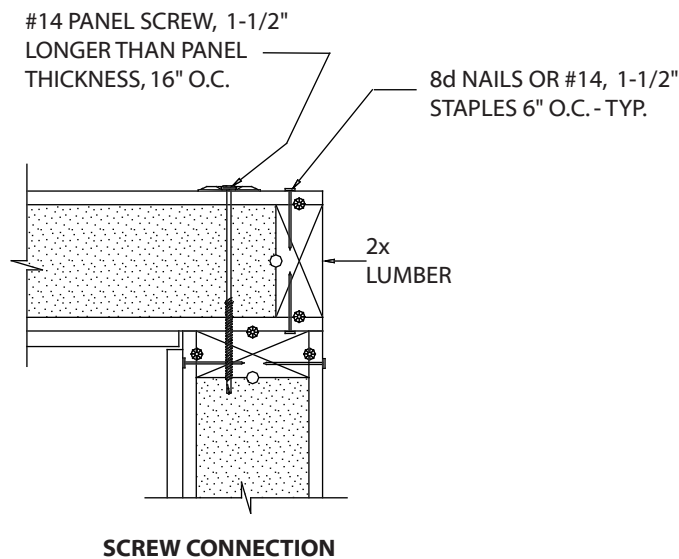


Panel to Panel Corner Connection Horizontal Sections

PANELS BEFORE ASSEMBLY

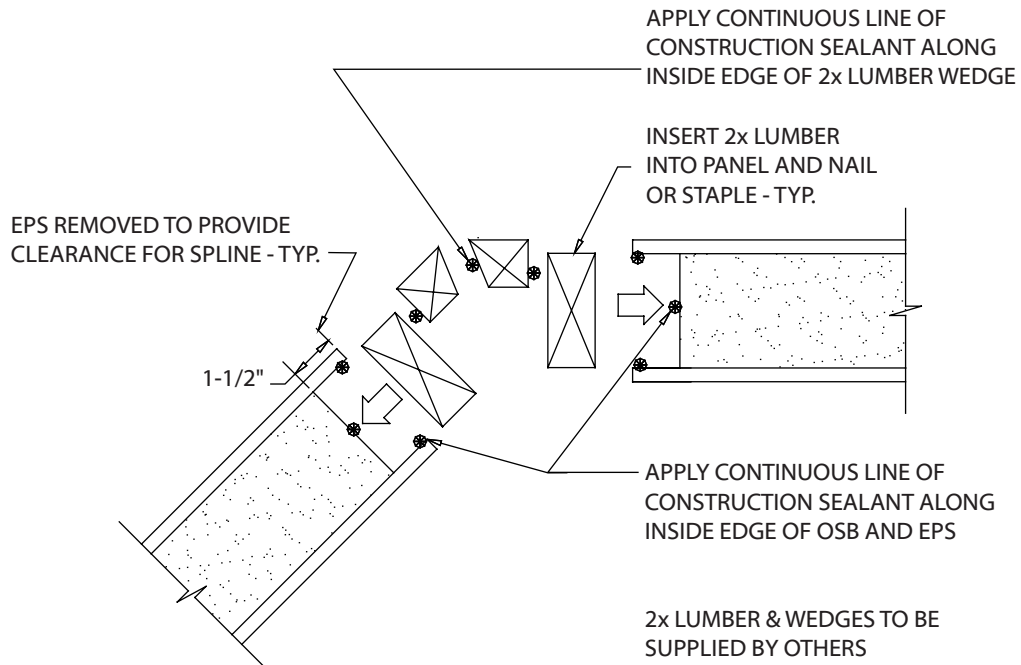


WALL PANELS ASSEMBLED

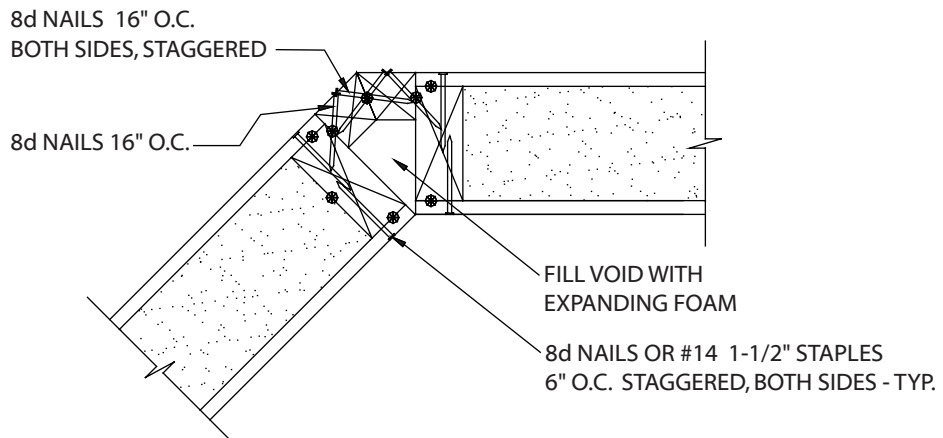


Panel to Panel Angled Connection Horizontal Sections

PANELS BEFORE ASSEMBLY

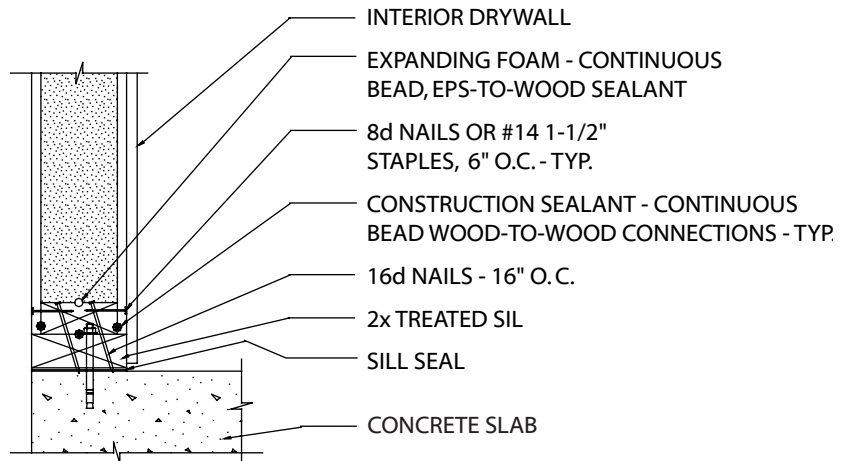


WALL PANELS ASSEMBLED



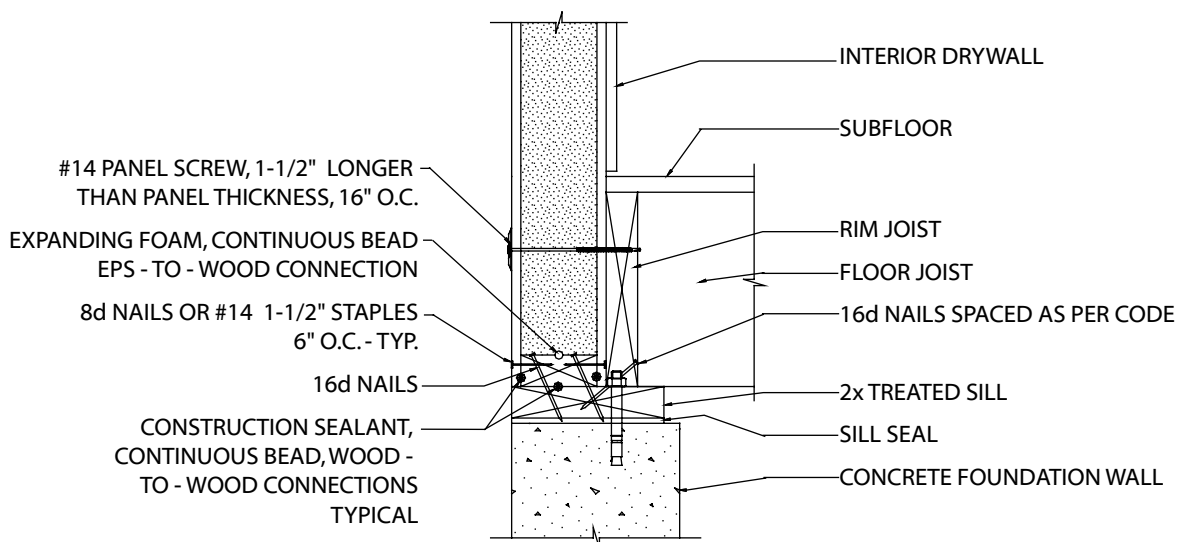
Wall to Floor Connections Vertical Sections

PANEL ON SLAB



NOTE: MAINTAIN A MINIMUM OF 8" FROM GRADE TO PANEL OSB

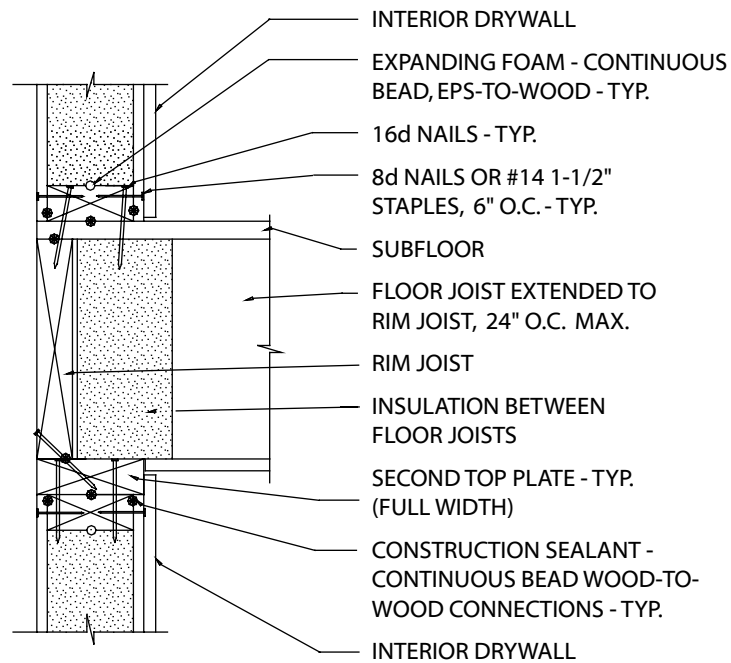
PANEL ON SILL PLATE WITH RIM JOIST



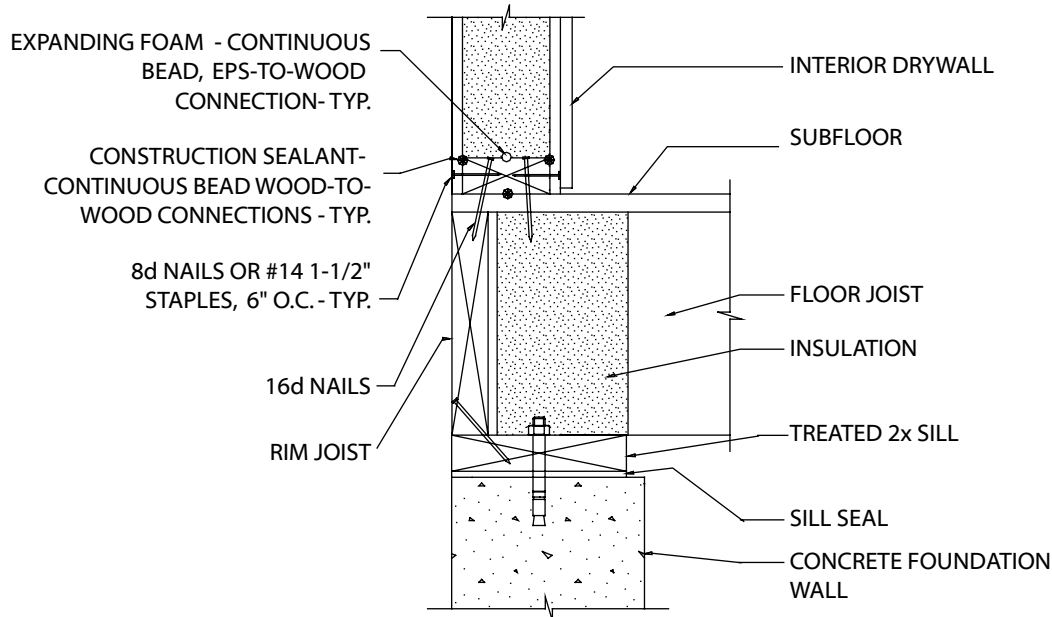
NOTE: MAINTAIN A MINIMUM OF 8" FROM GRADE TO PANEL OSB

Wall to Floor Connections Vertical Sections

BEARING WALL TO FLOOR JOIST - MULTI STORY

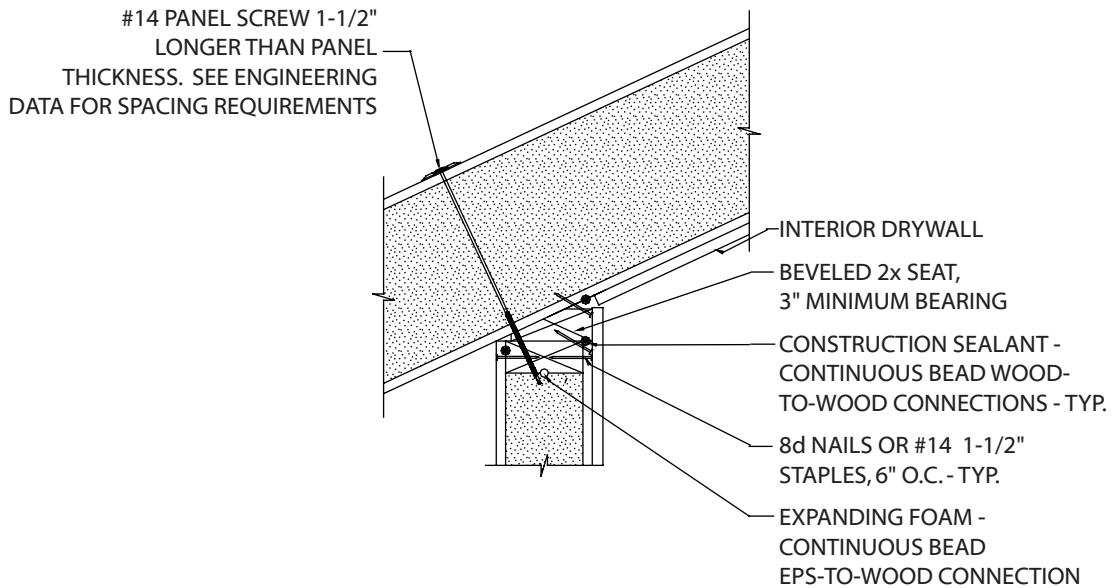


PANEL ON SUBFLOOR

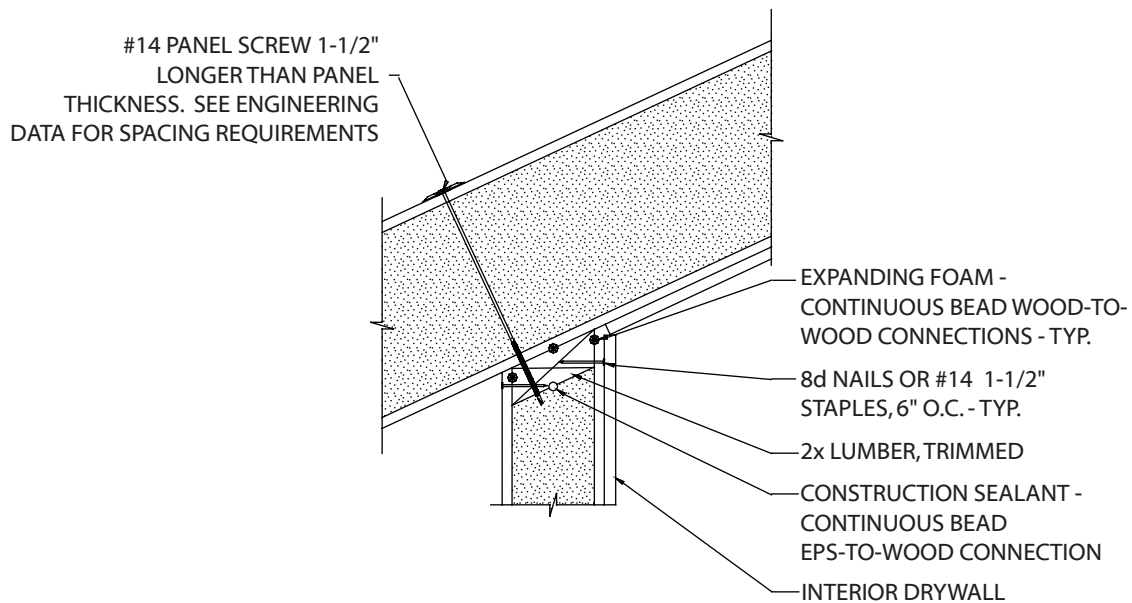


**Roof to Wall Connections
Vertical Sections**

PITCHED ROOF WITH BEVELED SEAT

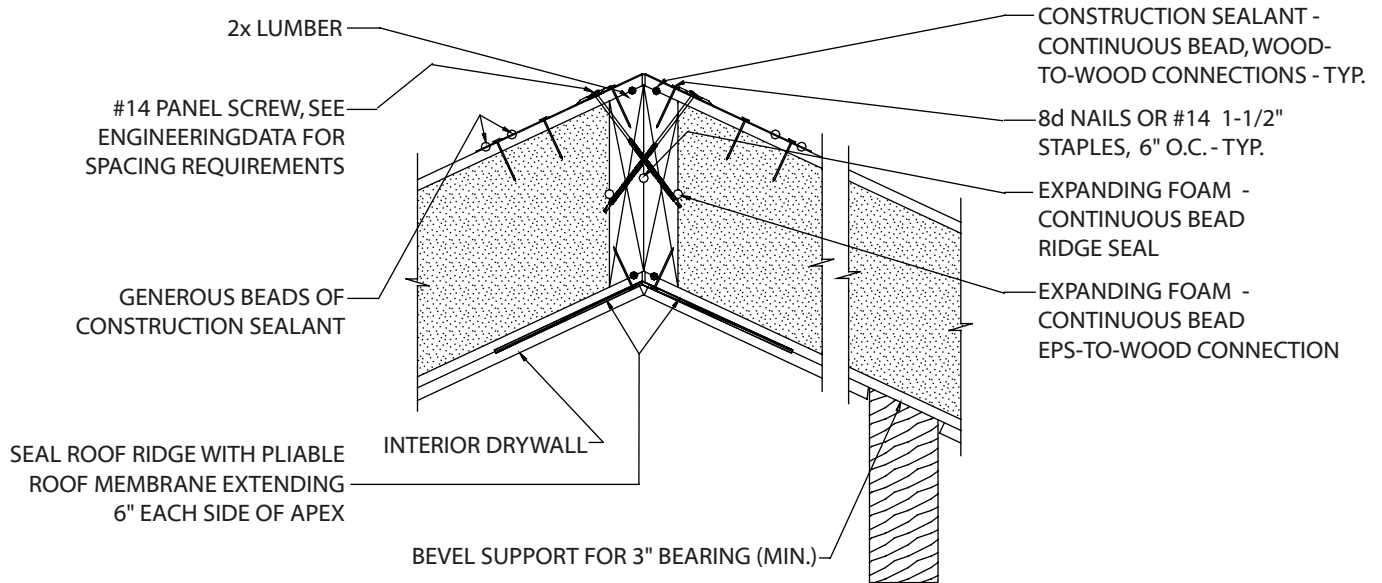


PITCHED ROOF WITH CANTED PLATE

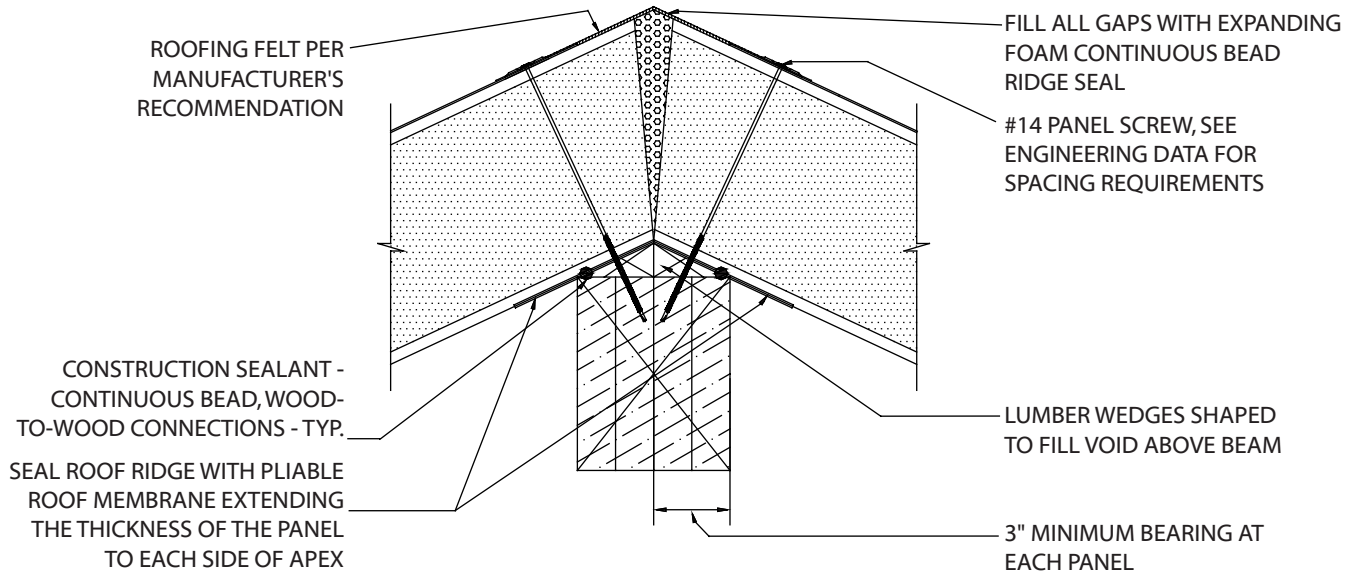


**Roof to Wall Connections
Vertical Sections**

CANTILEVER ROOF RIDGE CONNECTION WITH SOLID BLOCKING

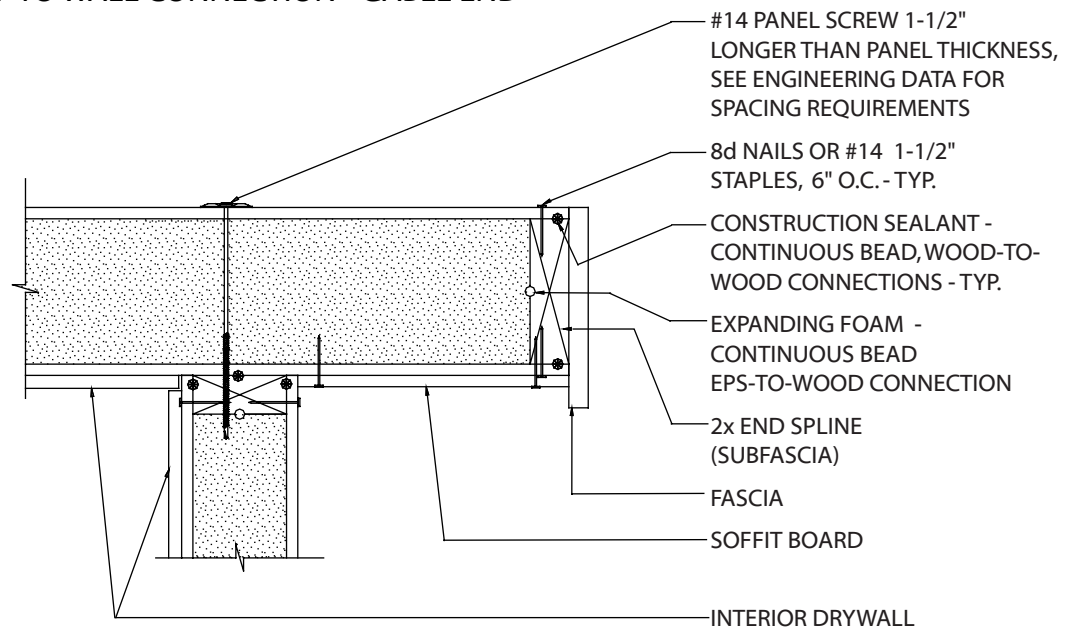


ROOF RIDGE CONNECTION WITHOUT SOLID BLOCKING

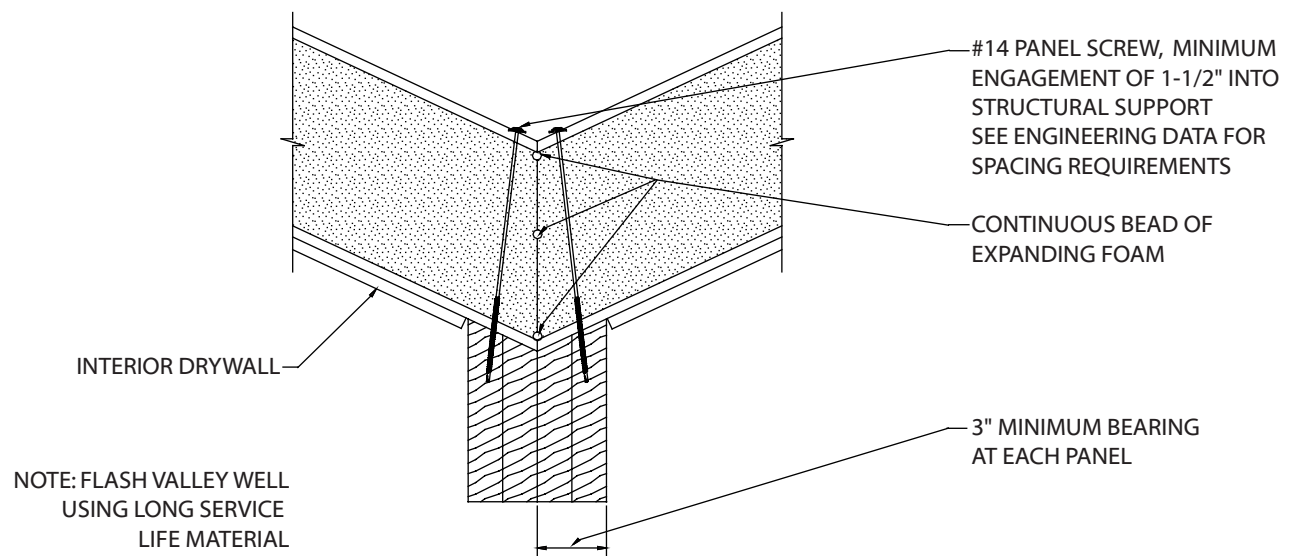


Roof to Wall Connections Vertical Sections

ROOF TO WALL CONNECTION - GABLE END

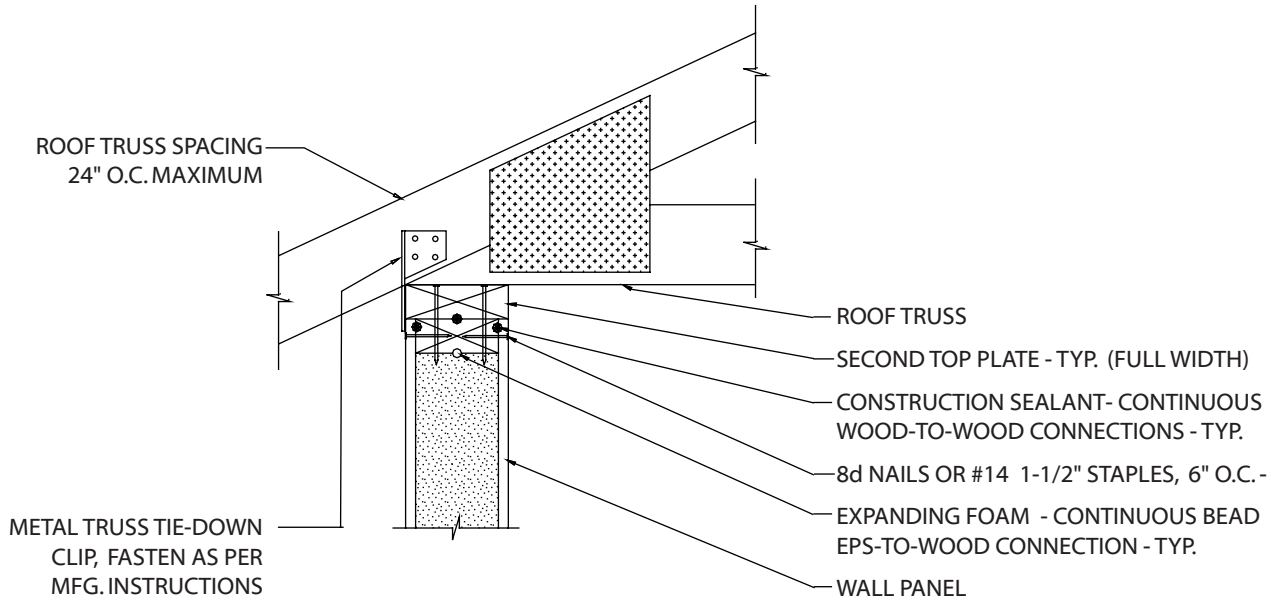


ROOF VALLEY CONNECTION

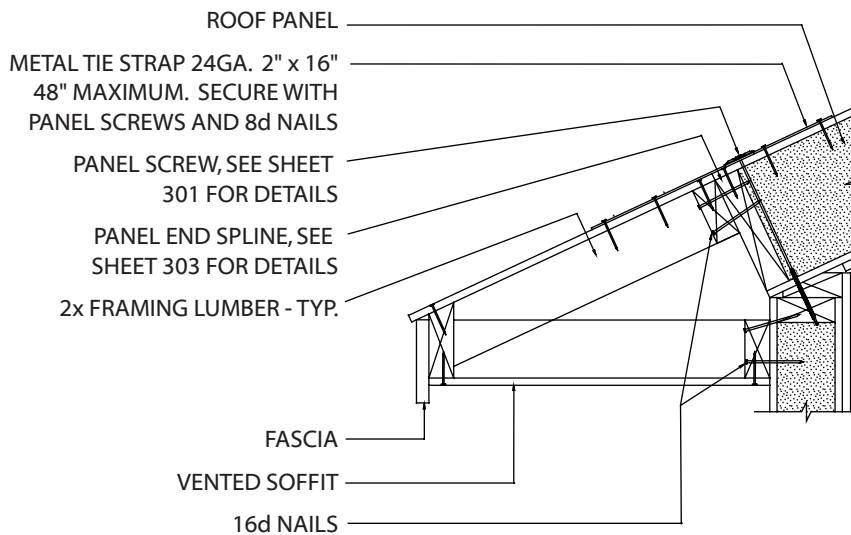


Roof to Wall Connections
Vertical Sections

ROOF TRUSS - TO - WALL CONNECTION

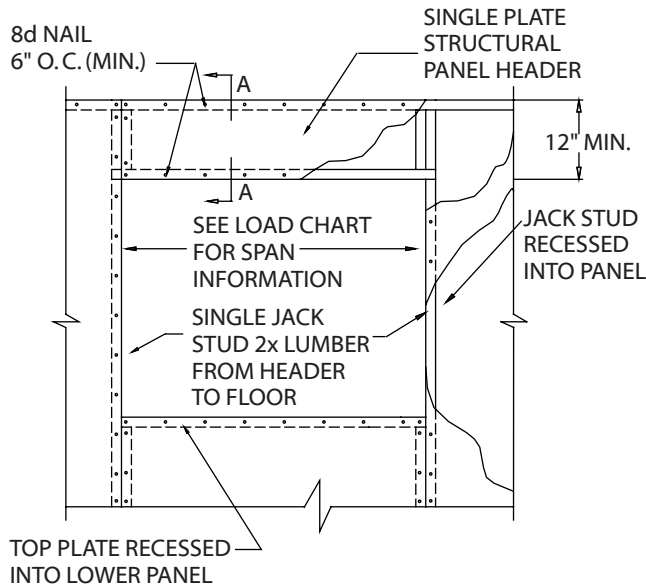


FRAMED ROOF EAVE



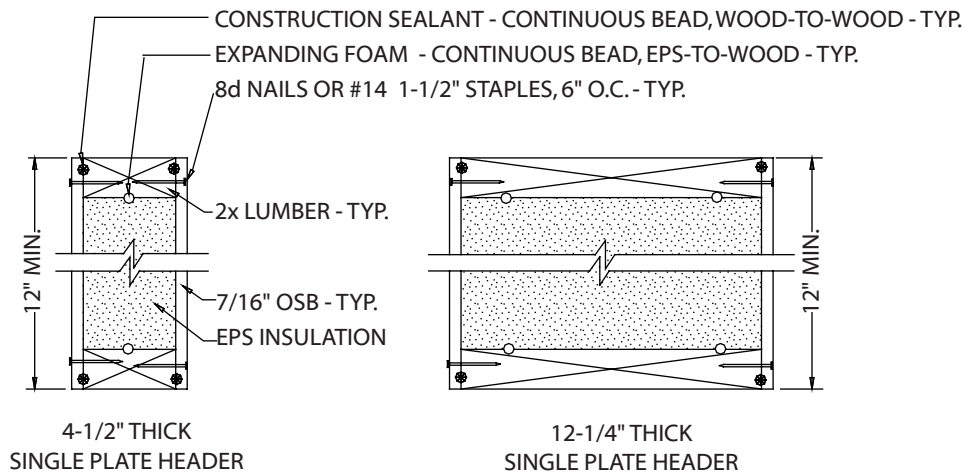
Headers

Single Plate Insulated Headers - 4-1/2" and 12-1/4" Thick



ASSEMBLY SEQUENCE

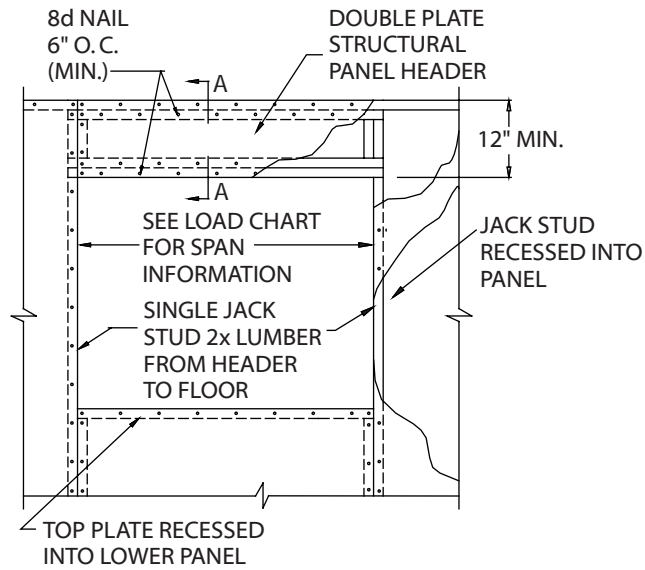
1. ASSEMBLE HEADER WITH LUMBER PER INSTRUCTIONS.
2. INSTALL ADJACENT PANELS WITH LUMBER PER INSTRUCTIONS.
3. LOWER HEADER INTO POSITION FROM ABOVE.
4. FASTEN BY NAILING THROUGH PANEL SKINS WITH 8d RING SHANK, 6" O.C.



SECTION A - A

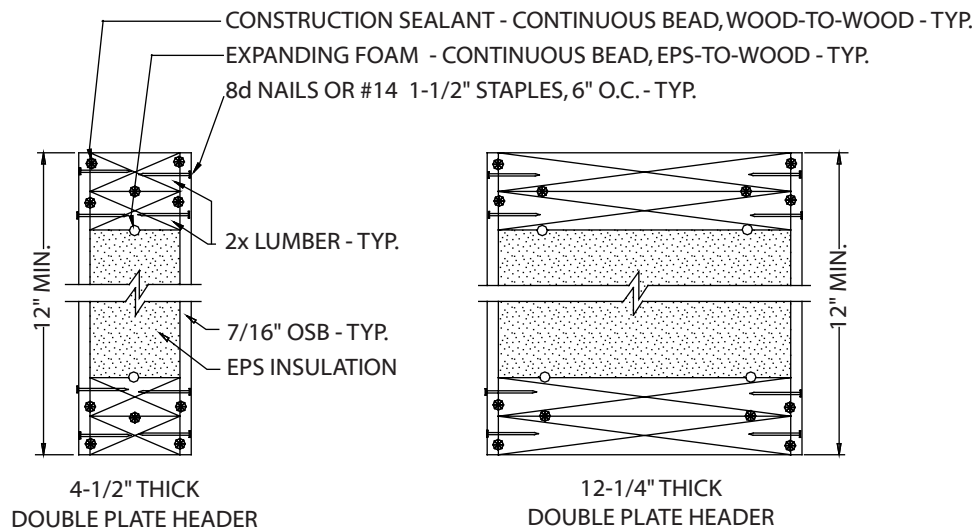
Headers

Double Plate Insulated Headers - 4-1/2" and 12-1/4" Thick



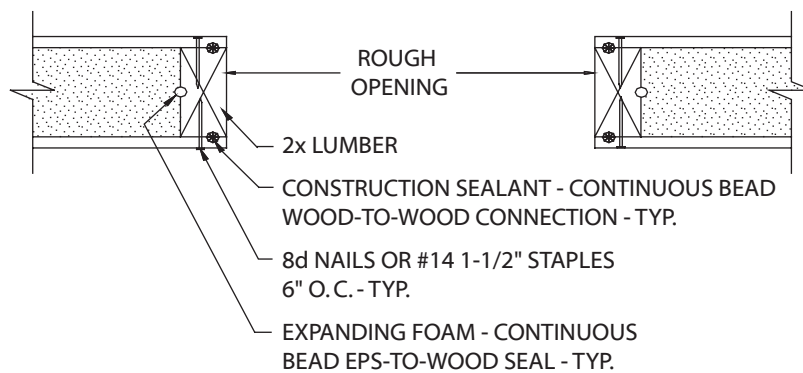
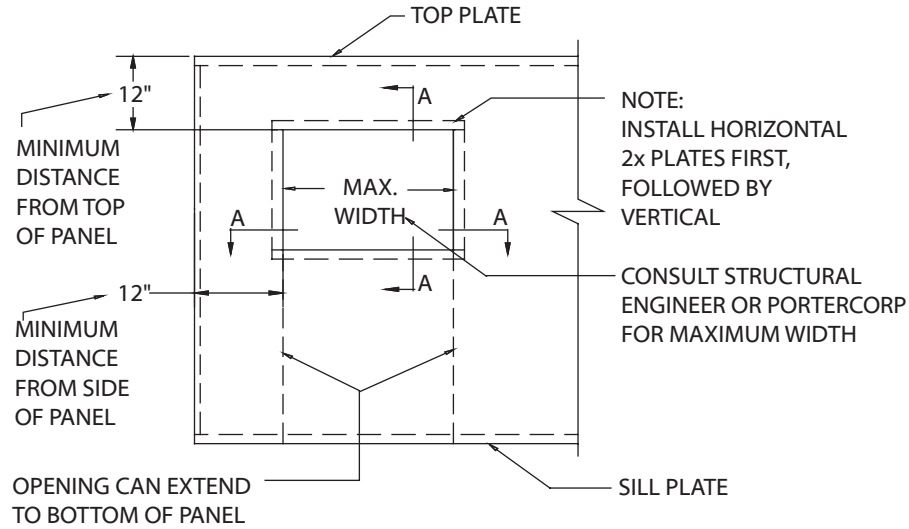
ASSEMBLY SEQUENCE

1. ASSEMBLE HEADER WITH LUMBER PER INSTRUCTIONS.
2. INSTALL ADJACENT PANELS WITH LUMBLER PER INSTRUCTIONS.
3. LOWER HEADER INTO POSITION FROM ABOVE.
4. FASTEN BY NAILING THROUGH PANEL SKINS WITH 8d RING SHANK, 6" O.C.



SECTION A - A

Headers Reinforcement of Field Cut Openings in Wall Panels



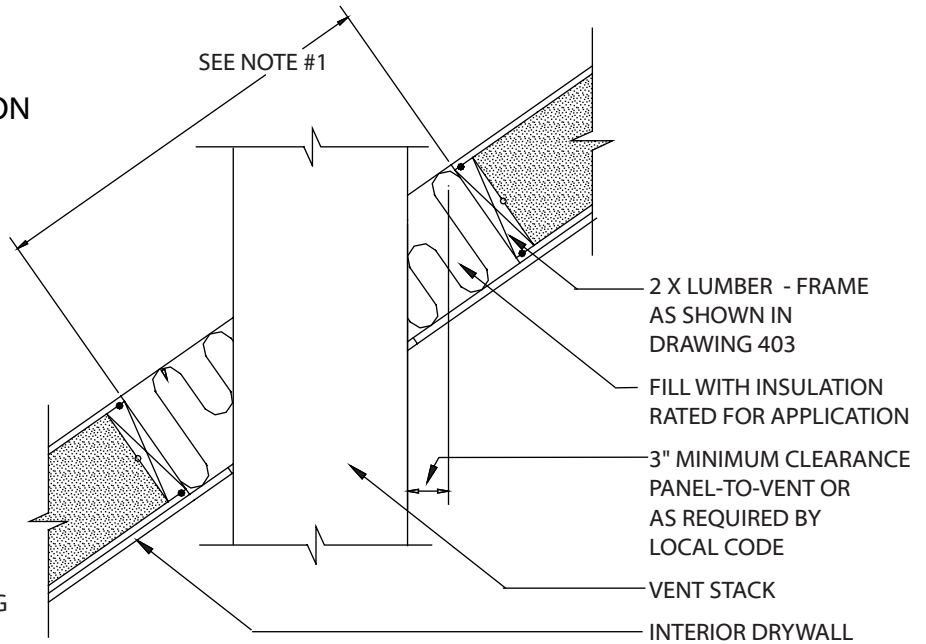
SECTION A - A

Headers - Roof Penetrations

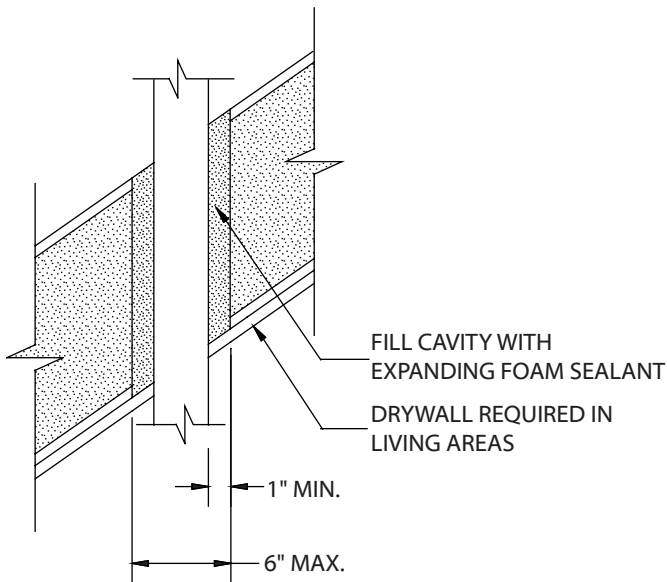
FRAMED ROOF PENETRATION

NOTE #1: THE OPENING SIZE, LOCATION AND DESIGN ROOF LOADING MUST BE EVALUATED WHEN PENETRATING ROOF. MAXIMUM SIZE TO BE DETERMINED BY ENGINEERING REVIEW.

NOTE #2: PROTECT PENETRATION AREA WITH TIGHT FITTING FLASHING OVER VENT STACK

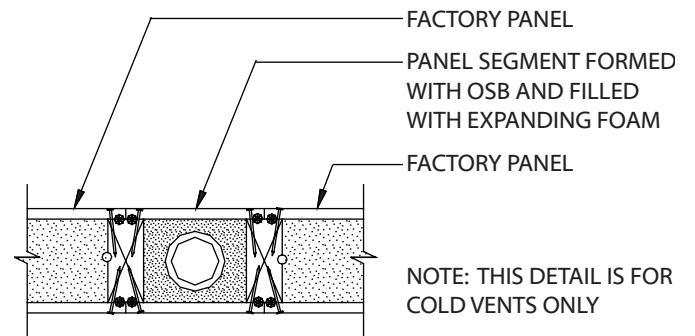


UNFRAMED ROOF PENETRATION



VERTICAL SECTION

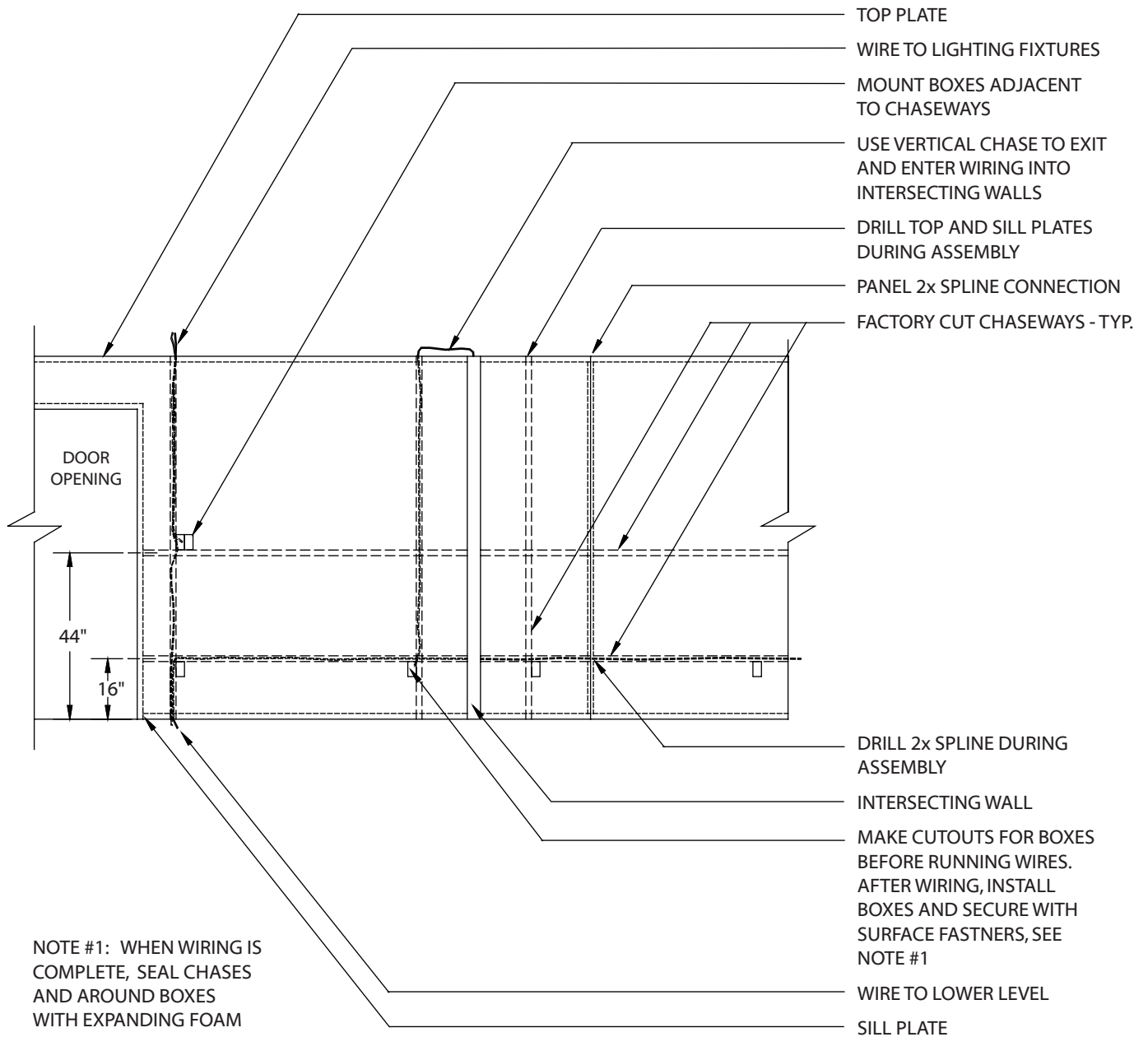
IN-WALL CHASE



HORIZONTAL SECTION

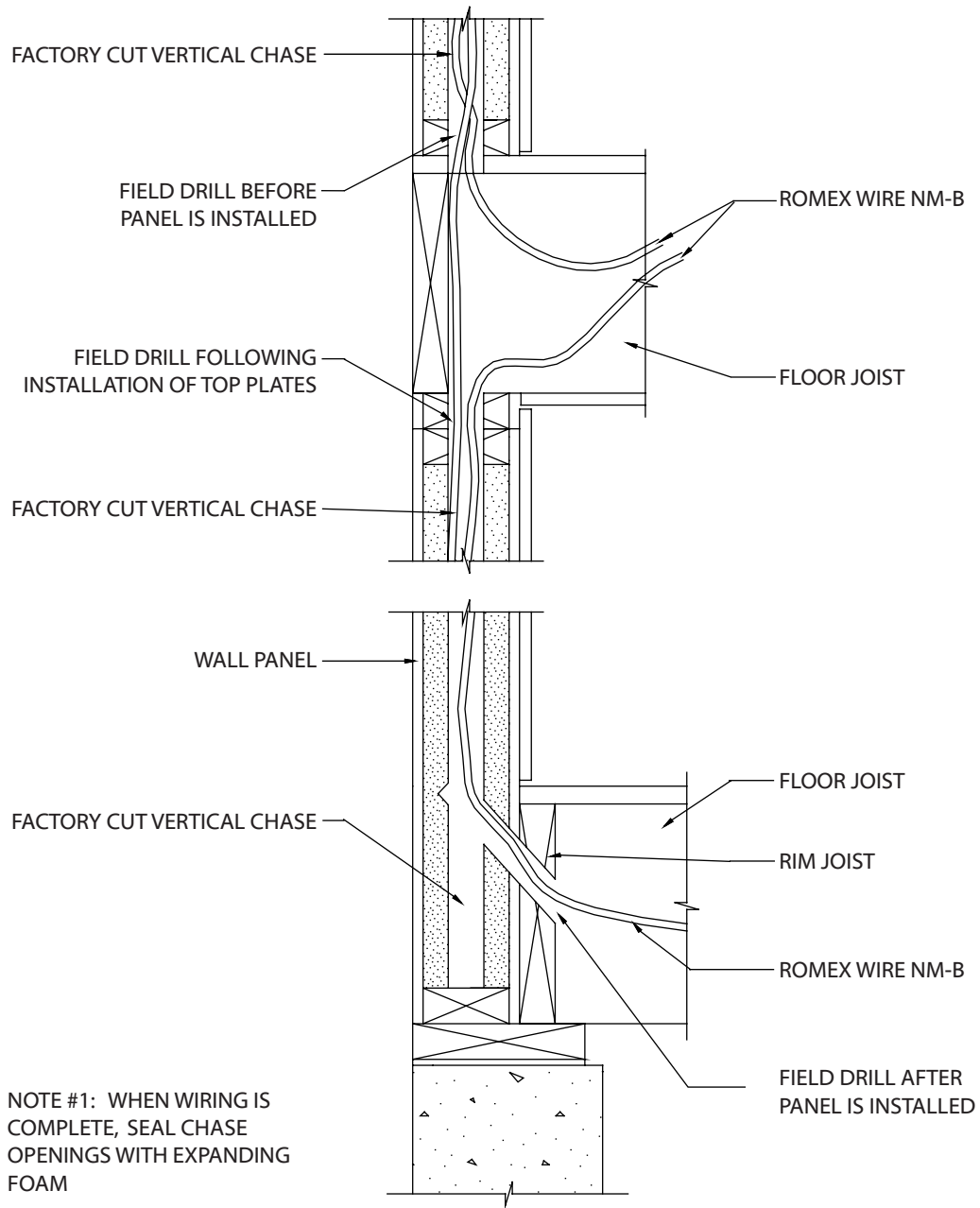
Electrical

ELEVATION OF TYPICAL ELECTRICAL INSTALLATION IN WALL PANELS



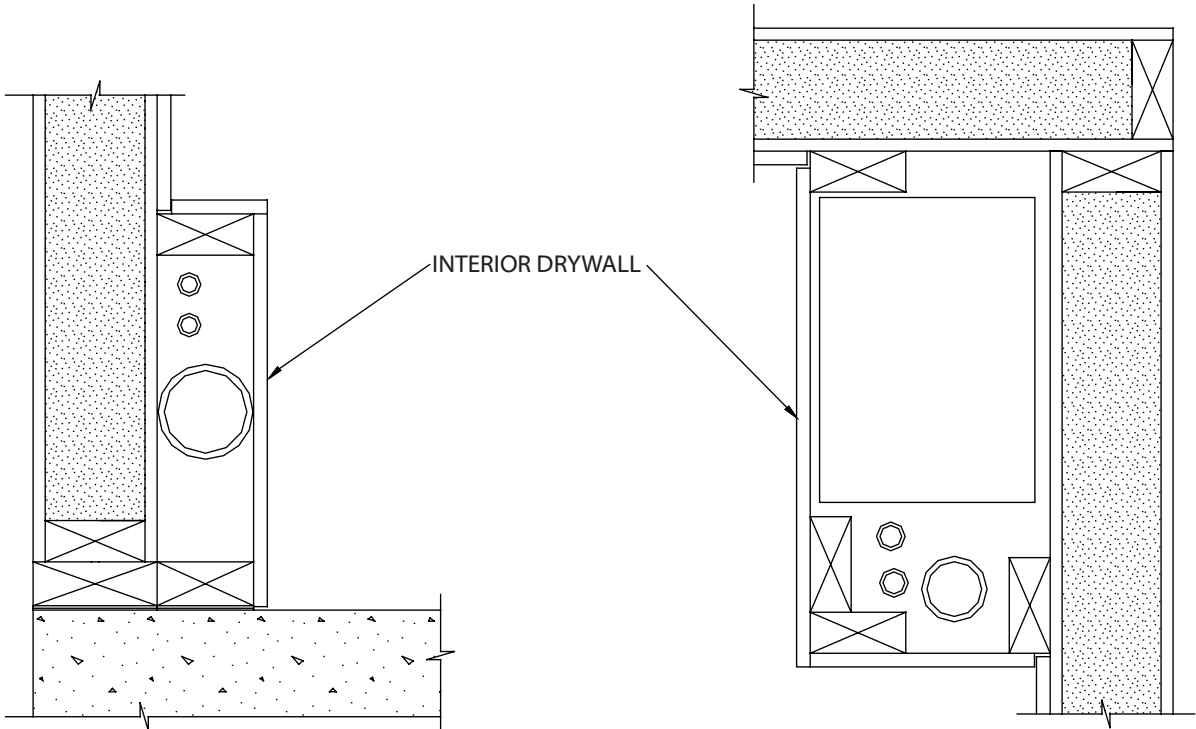
Electrical

SECTION OF WALL PANEL SHOWING VERTICAL WIRING RUNS



Electrical

SITE BUILT WALL CHASE EXAMPLES



HORIZONTAL CHASE

VERTICAL CHASE