EPS BUILDINGS

Residential Construction Details and Manual

Using Structural Insulated Panels (SIPs)

Table of Contents – Construction Manual

1. General Information

The information provided in this manual is to be used as a general guide. Refer to detailed drawings provided by EPS for job specific information. Be sure to follow local and state building codes.

a. Panel Make Up

Structural insulated panels (SIPs) are high performance building panels used in floors, walls, and roofs. The panels are made by sandwiching a core of expanded polystyrene (EPS), between two structural skins of oriented strand board (OSB), or plywood. EPS panels have standard overall thicknesses of 4-1/2", 6-1/2", 8-1/4" and 10-1/4". Foundation panels have a thickness of 8-7/8".

Wall Type	Core Thickness	Overall Thickness	Panel Make Up	Whole Wall R-Value at exterior temp of 75°	40°	Weight PSF
R-18	3 5/8"	4 1/2"	7/16" OSB, 3 5/8" EPS, 7/16" OSB	18.0	20.6	3.3
R-26	5 5/8"	6 1/2"	7/16" OSB, 5 5/8" EPS, 7/16" OSB	22.8	24.1	3.5
R-33	7 3/8"	8 1/4"	7/16" OSB, 7 3/8" EPS, 7/16" OSB	30.1	31.8	3.6
R-40	9 3/8"	10 1/4"	7/16" OSB, 9 3/8" EPS, 7/16" OSB	38.5	40.0	3.9

*R-Values stated based on standard Type I EPS

b. Foam Specification

EPS used Type I Expanded Polystyrene (EPS) for all SIP panels. Borate is added to the foam to make it insect-resistant. Higher R-Values can be achieved with Graphite Polystyrene also known as GPS with Neopor. Contact EPS for Neopor pricing.

c. Fabricated panels

Fabricated panels are cut to fit each project and ready to assemble. The panel edges are factory routed to accept plates and splines. Window and door rough openings are cut out and routed. Along with having panels cut to fit, vertical and horizontal wire chases are installed in the panels to make the electricians' job easier. Panels are typically cut from an 8'X24' master panel. After a panel comes off the CNC machine it could be as large as 7'-11" wide X the height of the ceiling (jumbos). The panel size will be determined by the engineer. Because each project is unique panel sizes will vary.

d. Thermal Barrier

Section 2603.4 of the 2015 International Building Code requires all foam plastic insulation to be covered with an approved minimum 15 minute thermal barrier. 7/16" OSB itself does not constitute a 15 minute thermal barrier. All interior panel surfaces must be covered with a minimum of ½" type X sheetrock to provide an adequate thermal barrier.

e. Fire Testing

One hour fire test have been performed on wall and roof panels. Please refer to testing reports at the back section of this book.

f. Bracing and Shoring

All the shoring and bracing is the responsibility of the general contractor. An EPS building package has little or no waste. Extra bracing material can be sent upon request.

g. Order Information

Before an engineer can get started, a good set of detailed drawings is needed. These drawings need to have a floor plan, foundation plan, elevations and a door and window rough opening schedule. The opening locations will also need to be dimensioned on the plan view. EPS engineers provide detailed structural drawings and panel shop drawings to ensure a structurally sound building.

After the engineer has all the information, a detailed set of preliminary of drawings will drafted. These drawings will then be sent to the dealer for approval. An approval letter will accompany the drawings. Once the approval letter is returned, the project will be completed and turned into production. Any changes to the preliminary drawings over and above what was ordered will result in change orders. If the drawings need engineering seals additional lead times may apply.

h. Delivery

Job packages will be delivered with a typical tractor trailer and flatbed. The job site will need to be tractor trailer accessible. If job site access is not permitted be prepared to shuttle panels from an alternate location using a smaller vehicle at the contractor's expense.

Proper unloading and handling equipment needs to be on site before the panels arrive. EPS can provide unloading services for an additional fee and some restrictions may apply. EPS packages the panels for optimal efficiency for shipping therefore the panels are rarely in order. Be sure to leave room to sort the panels. Refer to the Tools and Equipment section for recommended unloading and handling equipment.

Once the panels have been delivered proper storage is important. The panels must be kept dry and stacked on level blocking. Some panel bundles may be shrink wrapped. If a bundle is shrink wrapped, a slit is made at the bottom of the shrink wrap to allow any moisture within the bundle to escape. The shrink wrap is for transportation only and should be removed at the job site. The panels are to be tarped once they have been unloaded. It is also recommended to keep all the lumber and spline material covered to keep any excess moisture out of the panels.

i. Materials List

EPS offers a complete structural framing package. The following items are provided in a standard EPS panel package.

Wall Panels:

- Top & bottom plates (treated if required)
- Pre-cut wall panels with door and window cut outs
- Pre-built headers (if required)
- Spline and stud material
- 2x material for door and window bucks
- 1 ½" horizontal wire chase 16" & 44" off floor (optional)
- 1 ½" Vertical wire chases approximately 4' O.C.
- Sealants
- Hand drive or Paslode nails
- Seam tape (if required)

Roof Panels:

- Pre-cut roof panels
- 2x panel edging
- Spline material (2x, LVL, surface as required by span & loading)
- Sealants (2-part foam is optional)
- Wire chase at spline
- Ridge or Mid-span beams (if required)
- Out-looker & rake material (if required)
- Hand drive or paslode nails

Foundation Panel:

- Pre-cut foundation panel
- 2x8 treated top & bottom plates
- 2x8 treated studs
- SPF cap plate
- 1x treated screed board

Foundation Panel continued:

- 6 mil poly film
- Sealants & construction adhesive
- Treated plywood strips
- Hand drive or Paslode nails

Floor System:

- 2x treated sill plate
- Rim board material
- Trusses or joist
- Floor beams (if required)
- Hangers (if required)
- Hand drive or paslode nails
- Sealants
- ¾" T&G Subfloor (Advantech, plywood, OSB)
- Strong back bracing & ribbon material

Roof Truss System:

- Roof trusses with 12" energy heel
- Roof sheathing (OSB or CDX)
- Truss bracing
- Hangers & Ties
- Hand drive or paslode nails
- Plywood clips
- 2x Fascia Board
- Porch headers and columns

j. Tools and Equipment

Builders will utilize the same tools that are used to build stick framed structures and other conventionally framed buildings. In addition, some additional SIP specific tools will be necessary. Panels are large and heavy so special lifting equipment is recommended.

General tools:

- Hammer
- Tape Measure
- 4' Level
- Hand Saw
- Caulking Gun/QT
- Square
- Electric drill
- Sledge hammer
- 1" Wood Bit
- Circular saw
- Reciprocating saw
- Pry bars
- Ladders
- String line
- Chalk line
- Come-a-long

SIP specific:

- Foam Scoop
- Chain saw & guide
- Sausage tube applicator
- Hot wire assembly (optional)

Equipment:

- Fork lift or crane
- Fork extensions
- Lifting plates
- Ratchet straps

k. Structural Loading

The base building is designed for the necessary top chord live load, 10 psf dead load on the top chord, and 10 psf dead load on the bottom chord. In the case of SIP roof panels the panel is designed for the necessary live load in addition to 15 psf of total dead load.
The live load is calculated by the county or elevation in which the building ships to and the building use and conditions. EPS can engineer a building above and beyond the local loadings upon request. The structure is assumed to be located in an area defined as Exposure "C" and have an importance factor of 1.0. Exposure "C" is defined as an open, unobstructed area.

The wind load is designed for an IBC 2015 – 115 mph ultimate wind, Exposure "C". Contact EPS for design requirements which exceed what is stated here.
Floor systems will be designed with a minimum loading of 40 psf live load, 10 psf dead load on the top chord, and 5 psf dead load on the bottom chord. Be sure to verify loads stated on contract & construction documents are suitable for the particular location of the project.

I. Design Considerations

The following are features of residential structures that may affect the structure. These items need to be discussed with EPS personnel prior to placing the order.

- Roofing materials. The standard loading assumes standard roof sheathing and asphalt shingles. Roofing materials such as clay tile and slate are much heavier and must be addressed.
- Floor coverings. Areas with heavy flooring materials such as slate, granite, stone or gypcrete covering must be accounted for.
- Architectural features such as stone fireplaces, glass block walls, ect. can impose large loads on the floor system and need to be noted.
- Decks that are attached to the EPS structure need to be noted to ensure that a proper surface is provided for attachment.
- Window walls. Walls with a large number of openings may not be feasible to build with SIPs. This will be noted on the preliminary drawings. Materials will be provided to stick build these areas.
- Window and door rough openings and locations. Due to the nature of SIP panels all window and door rough openings and locations are necessary for the building design. The order ***WILL NOT*** be started in engineering until all rough openings and locations are determined.

Specifications beyond the standard loading are subject to an increase in price up until the time the preliminary drawings are sent.

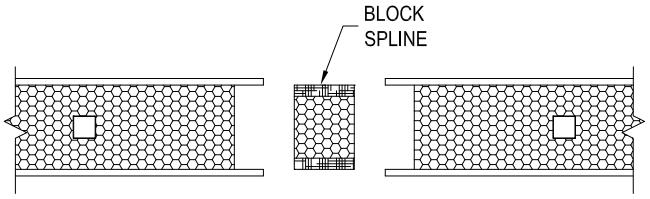
I. Panel Connections

All panels must be fastened at the joints using nails or other EPS approved fasteners. A sealant is used to prevent air and moisture from penetrating the panels. Below are the most commonly used panel connections.

a. Splines

Splines are used to connect two butting panels. There are three typical spines used: Block splines, surface splines, and column splines.

Block spline: These splines are non-structural and can be used in wall and roof applications.



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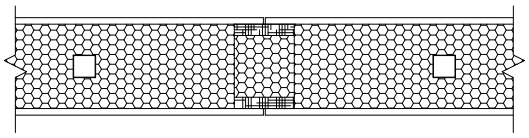
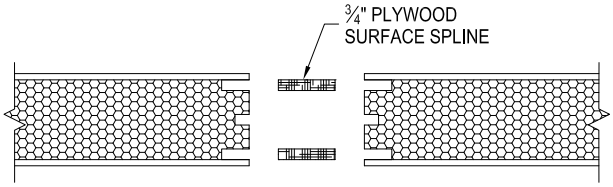


Surface spline: These splines are used in roof panels with short spans.



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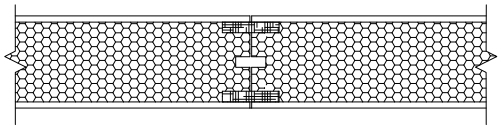
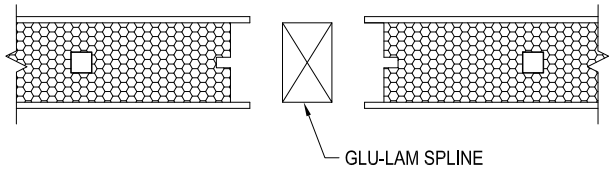


Column spline: These splines are used with large point loads and tall wall.



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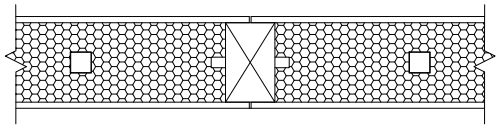
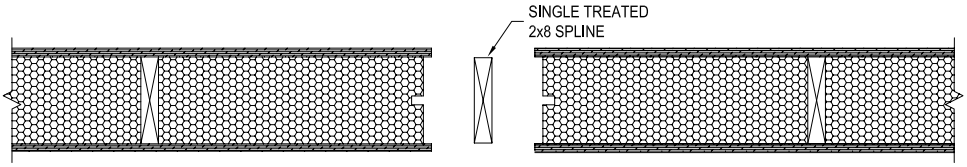


II. Foundation Panels

Foundation panels are slightly different than the standard wall panels. Because the panels are below grade, the exterior skin needs to be pressure treated foundation grade plywood. The panel also needs to take horizontal load that the soil pressure is putting on the panel. Therefore, treated 2x8 studs are laminated into the center of a panel. Horizontal wire chases are not allowed in foundation panels. Verticals can still be installed at the spline locations. Foundation panels are limited to 8' or 9' tall.

a. General Assembly (Foundation Panel)

All splines in a foundation panel are treated 2x8 lumber splines. All fasteners are stainless steel exterior and galvanized interior. Refer to fastening schedule and construction details for exact locations and spacing.



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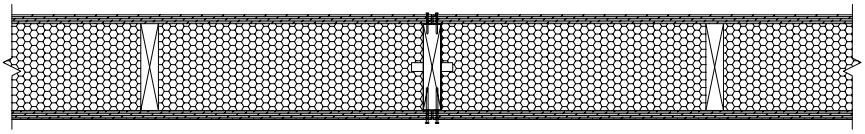
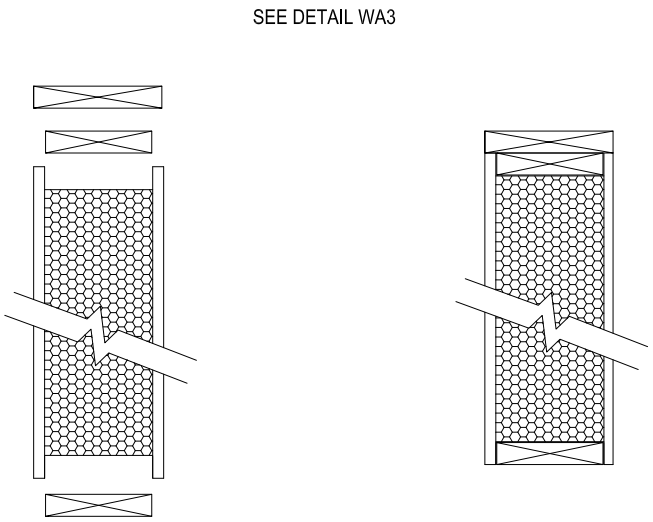
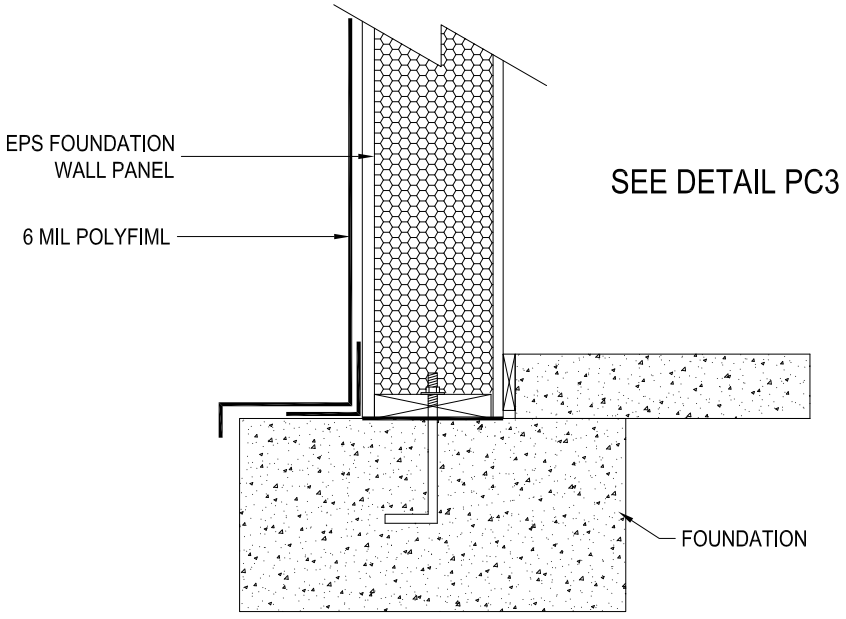


b. Foundation Plate Assembly

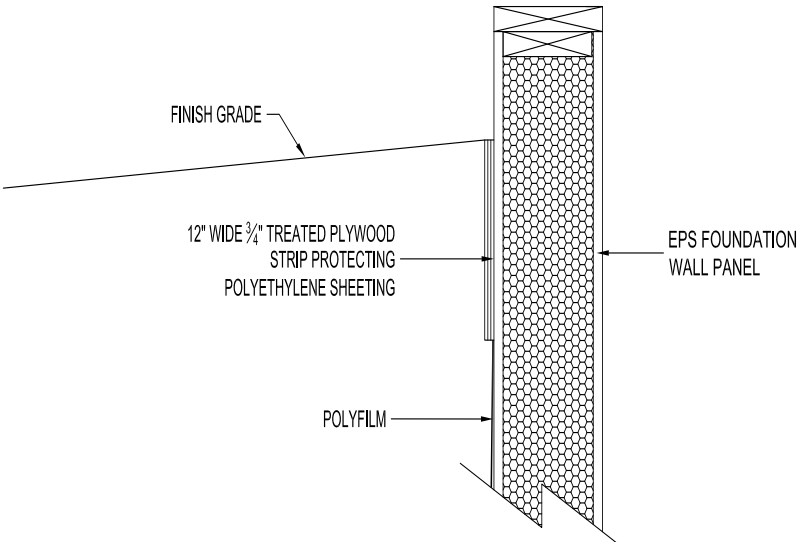


c. Foundation Base Assembly



d. Waterproofing Foundation Panel

Waterproofing is extremely important when using a wood foundation. EPS provides 6mil poly film to cover the foundation walls. The top of the poly is fastened with ¾"x12" strips of foundation grade treated plywood. Seal the top and behind the plywood strip with urethane sealant.



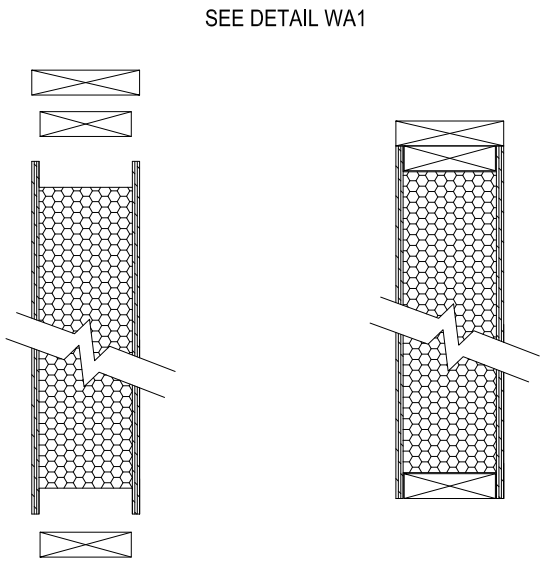
e. Backfilling

Backfill with crushed stone or gravel 12" deep for group I soils and half the backfill for groups II & III soils. Cover top of gravel w/ asphalt or polyethylene strips prior to remaining backfill. Soil conditions play an important role in determining the design of a wood foundation. Refer to the soil surveys published by the U.S. Department of Agriculture's Soil Conservation Service to determine soil conditions at site location. A soil survey maybe needed to determine if the soil is adequate for an EPS wood foundation.

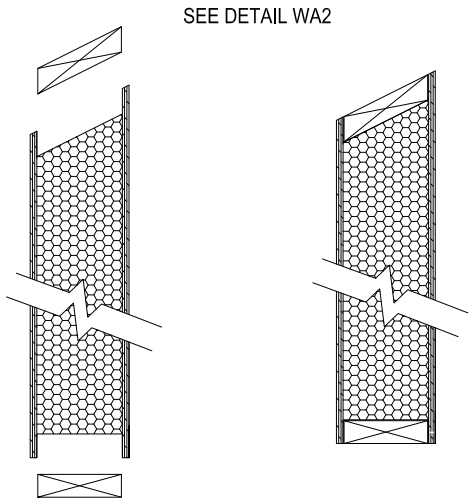
III. Wall Panel Installation

Before starting, make sure the foundation is square and level. If there are any issues, corrections need to be done ahead of time. Framing on a foundation that is not square or level will cause more corrections and panel modifications. Make sure the panels have full bearing so loads can be transferred through both skins. An EPS wall will have either a double top plate or a single double beveled top plate. The double top plate can be used with roof trusses or roof panels. The single double beveled top plate is used with roof panels only.

a. Double top plate:

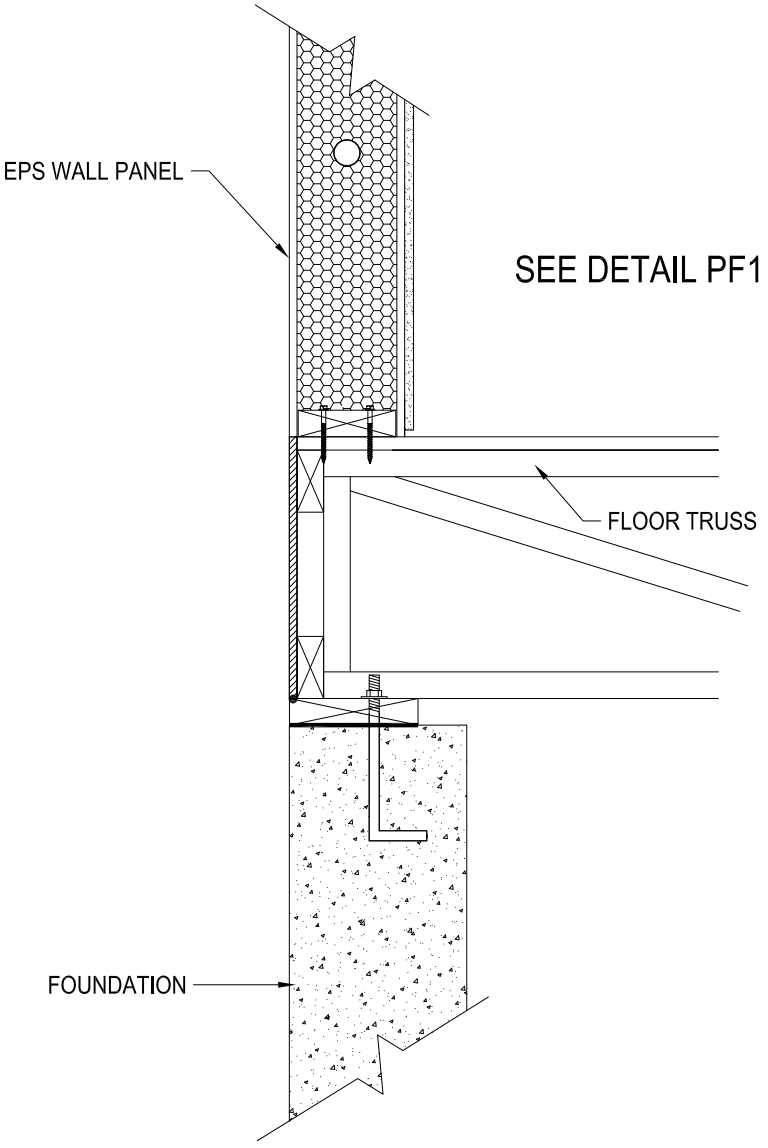


b. Double beveled plate:

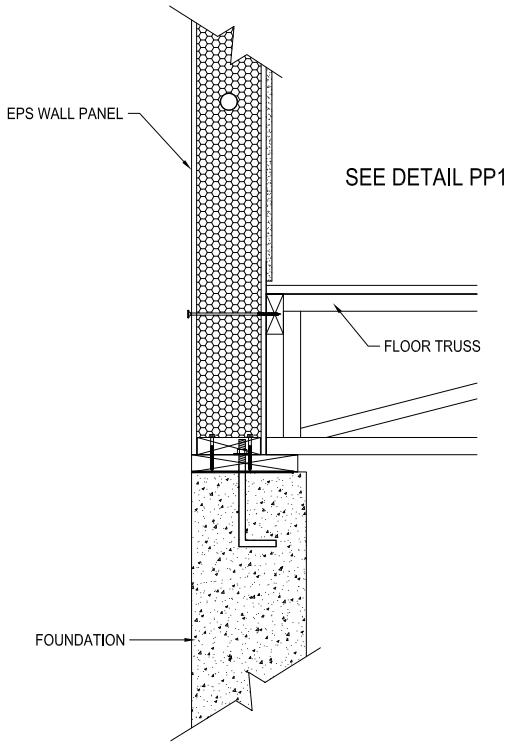


Wall panels are going to be installed to the base in one of three basic ways: On top of the subfloor, running the panels past the floor and setting on top of foundation, or directly on concrete slab. When using panels past, the foundation walls need to be a minimum of 10" thick.

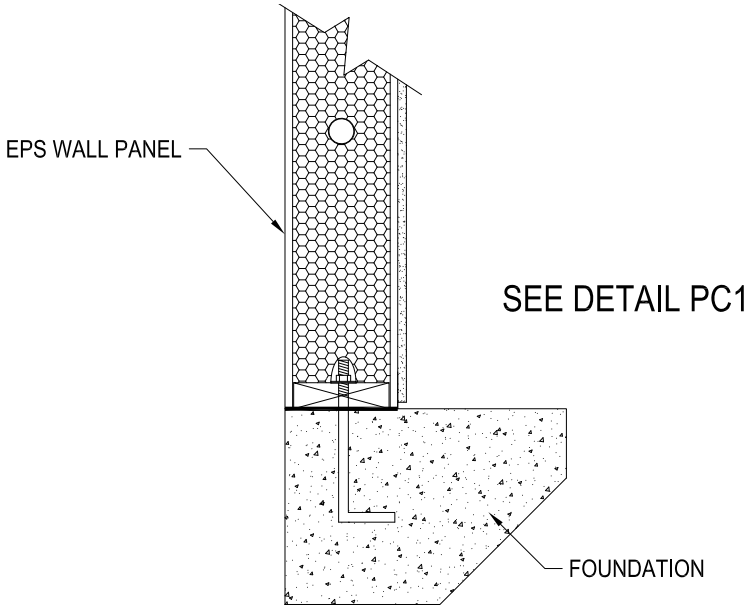
c. Panels on subfloor: (Pricing Option "A")



d. Panels past: (Pricing Option "B")

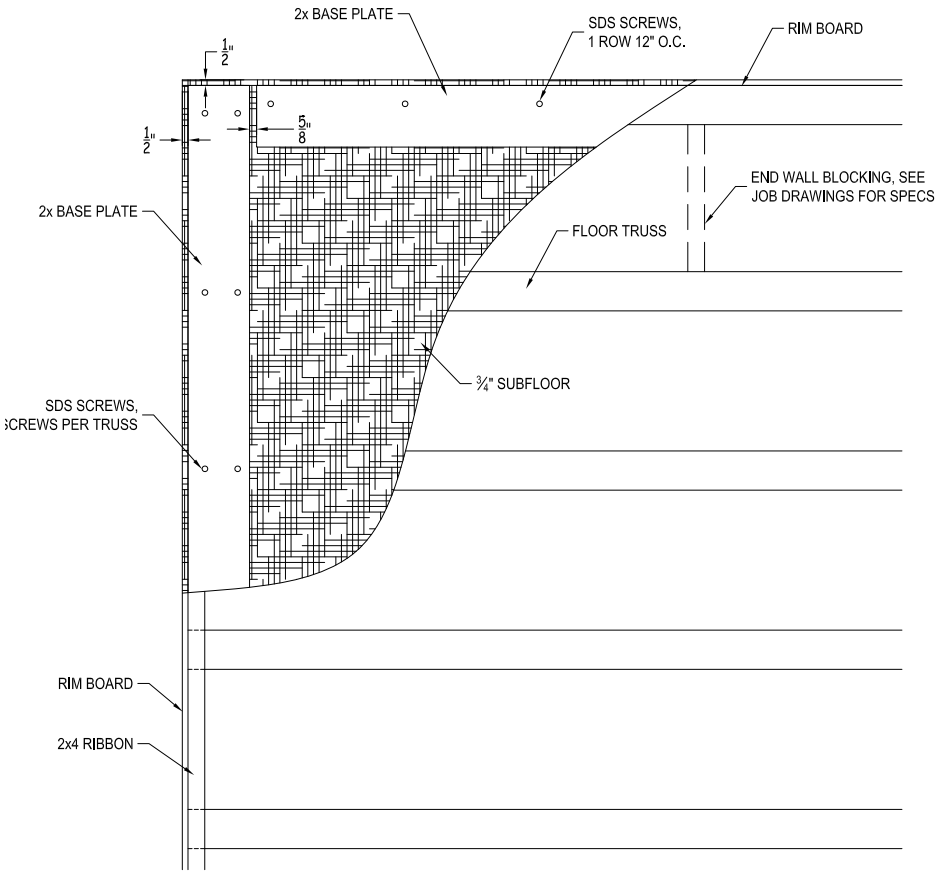


e. Panels on slab:



IV. Base Plate

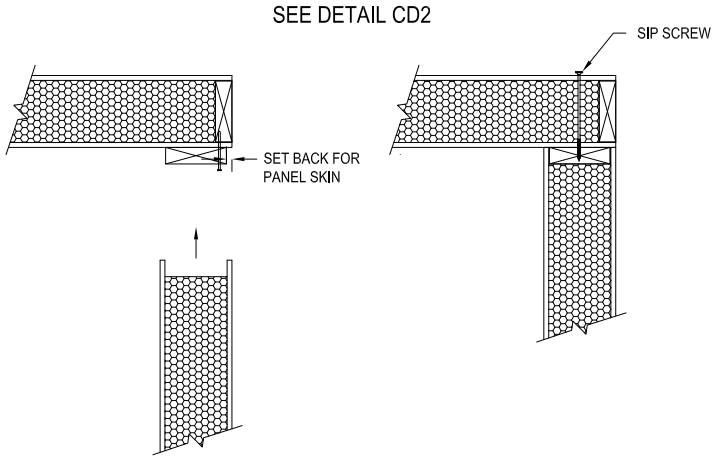
When installing the base plate to the subfloor first check to see if the floor is square. If the floor is square, measure ½" in from the edge and chalk a line. Base plates need to be fastened to the subfloor using SDS screws and two continuous beads of sealant. First apply two rows of sealant to the area on which the plate will be setting. Then attach the SDS screws 12" O.C. into parallel floor truss/joist and two SDS screws per truss/joist that run perpendicular (see below). Verify screw spacing per plan.

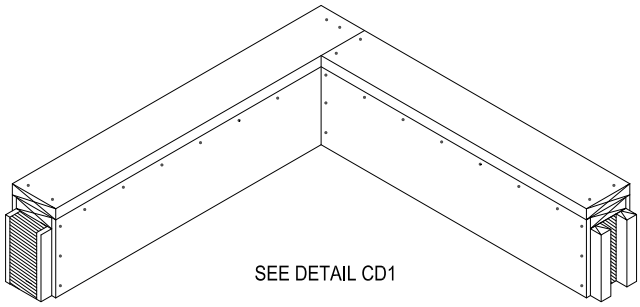


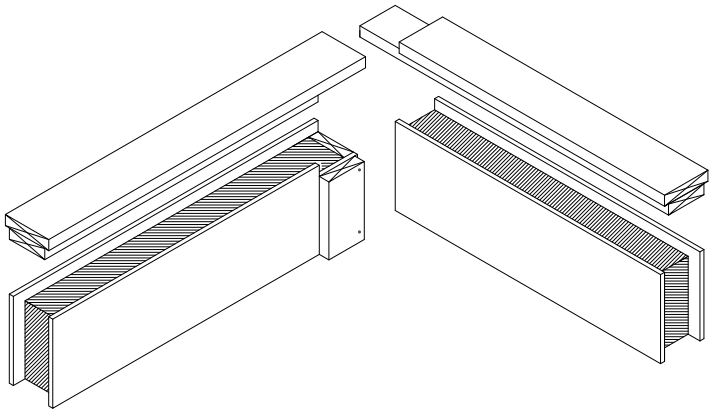
V. Corners

The two basic corner details used are butt corners & fly-by corners. The butt corners are most commonly used with standard residential wall panels while the fly-by corners are used with foundation panels and our Solid Core line of buildings.

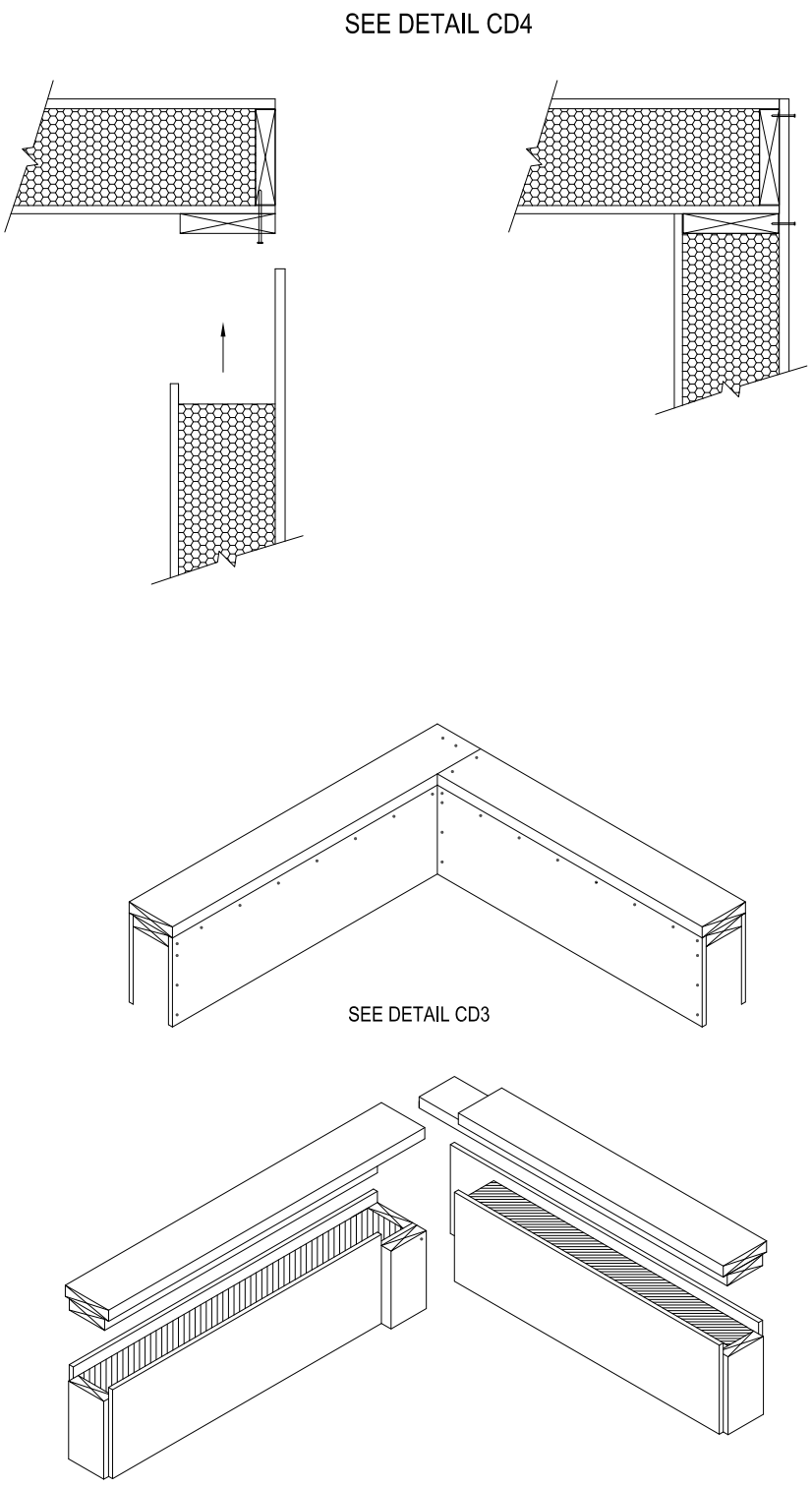
Butt corner:







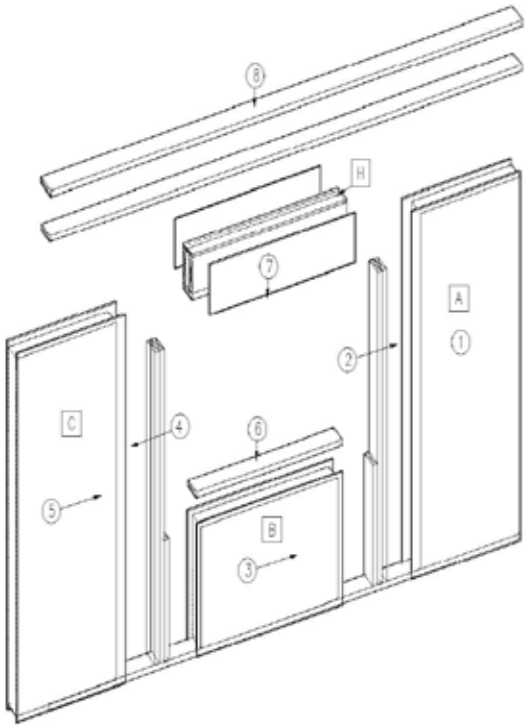
Fly-by corner (foundation panel corner shown):



VI. Headers

Window size, header panel height, snow load, building size and truss point loads are all factors that determine if a header is needed. A general rule of thumb is no headers are needed on gable end walls. If a header is required, the size will be determined by an EPS engineer. Most box headers are pre-built and ready to install. Longer headers will be sent in pieces. The typical EPS header is a 2-ply 1-3/4"11-1/4" LVL with an eps foam core between, size may vary per job. Windows and doors will have 1 or 2 bearing studs. Openings over 6' may need full length studs to prevent deflection. The header will typically fill the entire distance between the opening and the top plates. On taller walls, a filler panel is installed beneath the header. Below are the two examples.

Header only:



1) Start by erecting panel "A"

2) Pre-assemble all bearing and filler studs into the panel.

3) Slide panel "B" into panel "A".

4) Pre-assemble all bearing and filler studs into panel "C".

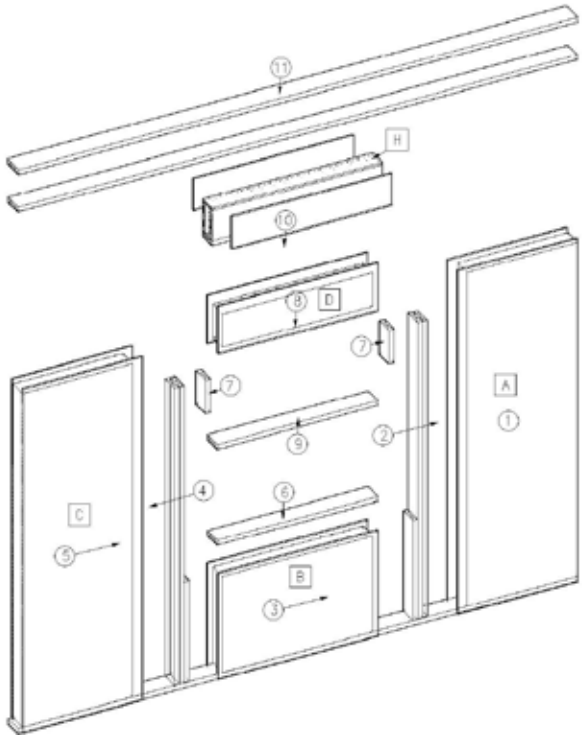
5) Slide panel "C" into panel "B". Check horizontal rough opening dimension.

6) Install lower opening framing.

7) Drop header "H" into opening and sheath both sides of header with loose OSB.

8) Continue with wall and install top plates.

Header and panel:



1) Start by erecting panel “A”

2) Pre-assemble all bearing and filler studs into the panel.

3) Slide panel “B” into panel “A”.

4) Pre-assemble all bearing and filler studs into panel “C”.

5) Slide panel “C” into panel “B”. Check horizontal rough opening dimension.

6) Install lower opening framing.

7) Install filler panel blocking.

8) Slide upper panel into place and verify rough opening dimension.

9) Install upper opening framing.

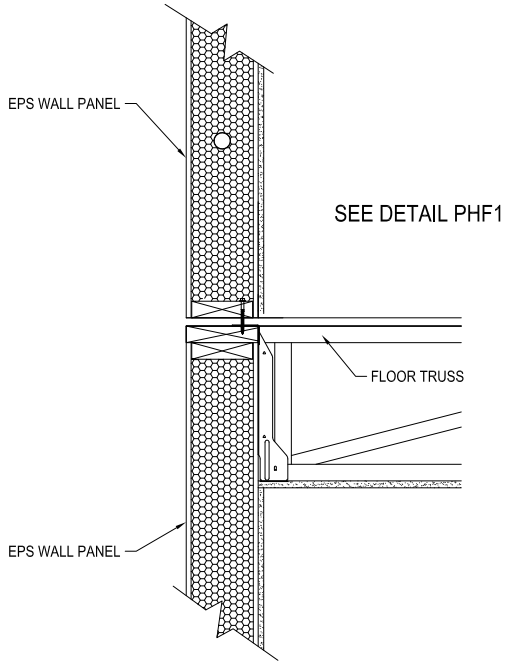
10) Drop header “H” into opening and sheath both sides of header with loose OSB.

11) Continue with wall and install top plates.

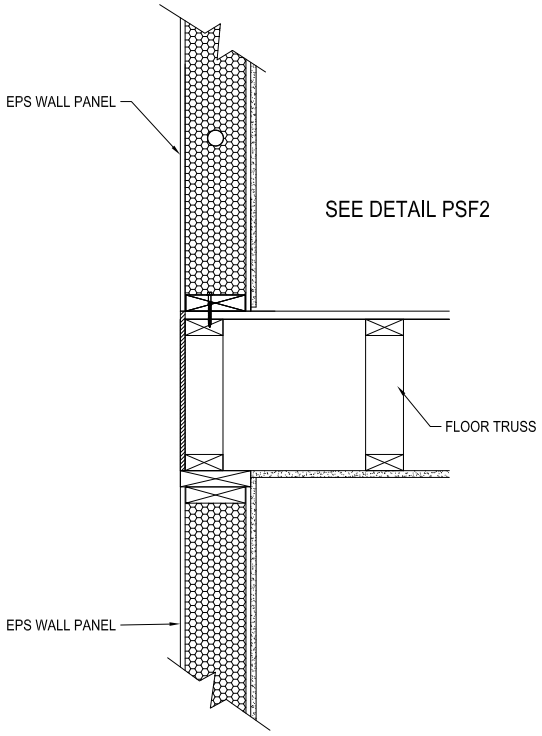
VII. Upper Floors

Many times a house will have more than one floor. Two options exist; conventionally framing the floor or hanging the floor system.

Option #2 (Hanging floor): (Pricing option "C")



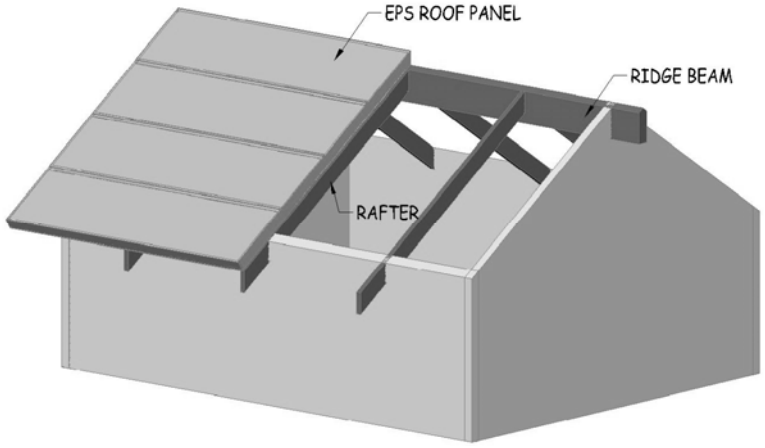
Option #1 (Conventional floor):



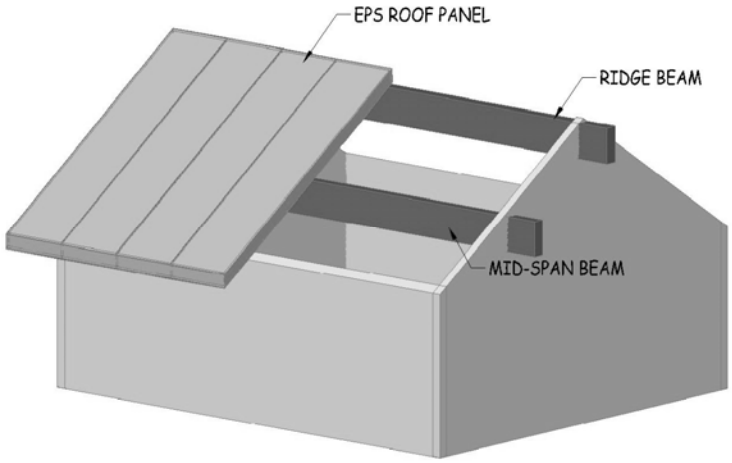
VIII. Roof Panel Installation

Roof panels range in overall thickness from 6-1/2" to 10-1/4". There are two basic ways to set roof panels; parallel to the ridge or perpendicular to the ridge. When panels run parallel to the ridge they typically have support rafters or trusses beneath that run perpendicular to the ridge. When panels run perpendicular to the ridge a mid-span beam may be needed. The span and snow loading will determine which spline is used.

Parallel to ridge:



Perpendicular to ridge:

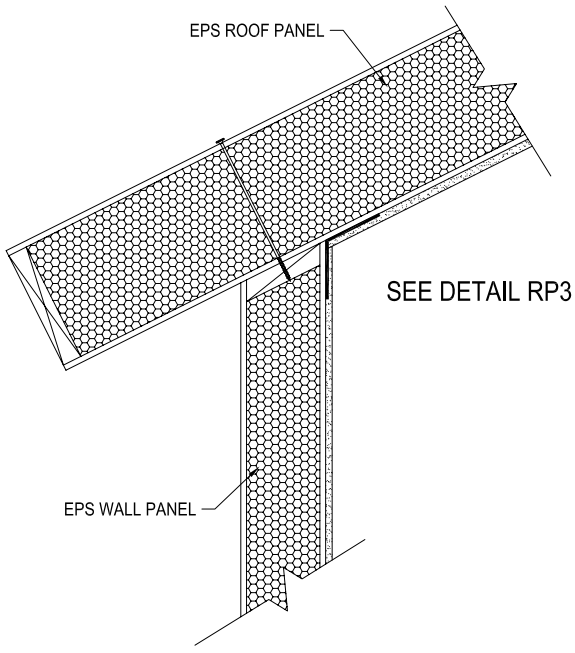


For efficiency, assemble as much of the roof as possible on the ground. This will reduce the time in the air. Some panels might fit together snugger than others. By using ratchet straps the panels can be pulled together. Depending on the size and type of roof, several panels can be put together on the ground and set in large sections. Grouping panels on the ground will also decrease the number of lifts. Roof panel sections are large and heavy so be sure to have a crane operator that has done this type of lifting before.

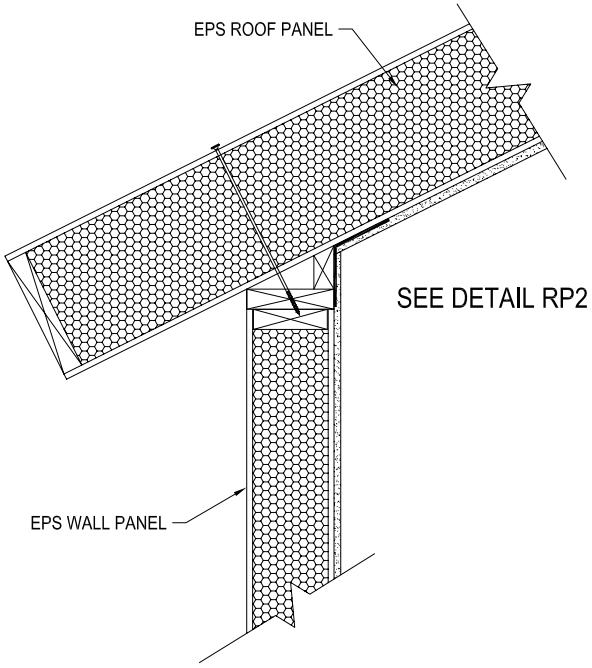
a. Wall to Roof Connections

When using roof panels the wall will be beveled or square. The beveled top plate matches the pitch of the roof panels and is the most energy efficient. A standard double top plate can also be used, with a bearing block installed after the panels are set.

Beveled top plate:



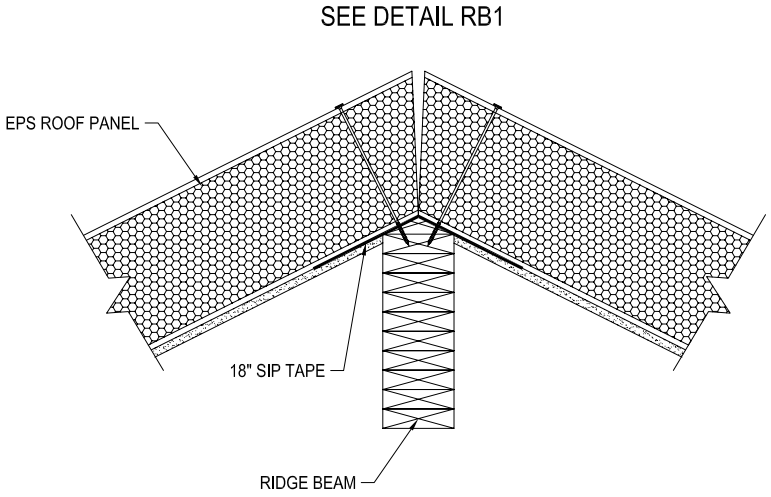
Double top plate:



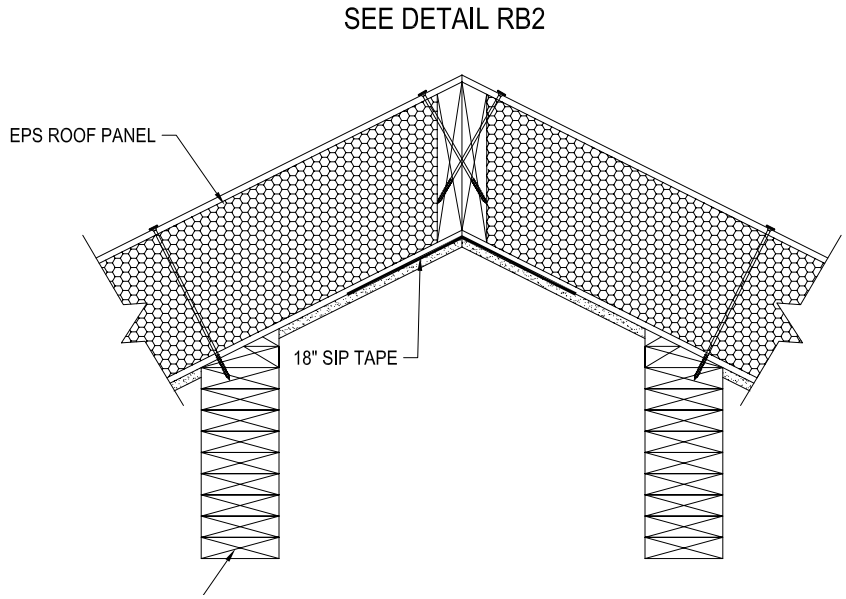
b. Ridge Connections

The type of ridge connection is determined by the direction of the panels and the type of support under the panels. Ridge beams can be either LVL or Glu-Lam's.

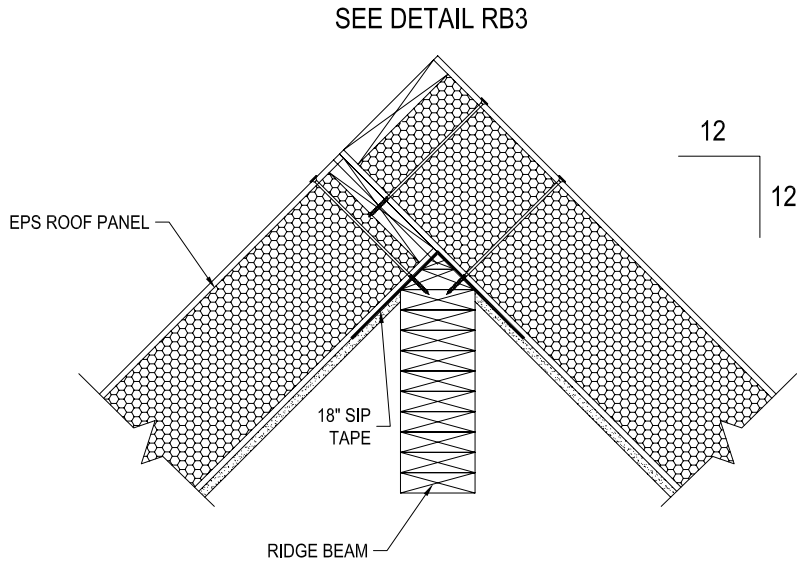
Ridge with void:



Cantilevered ridge with double lumber:

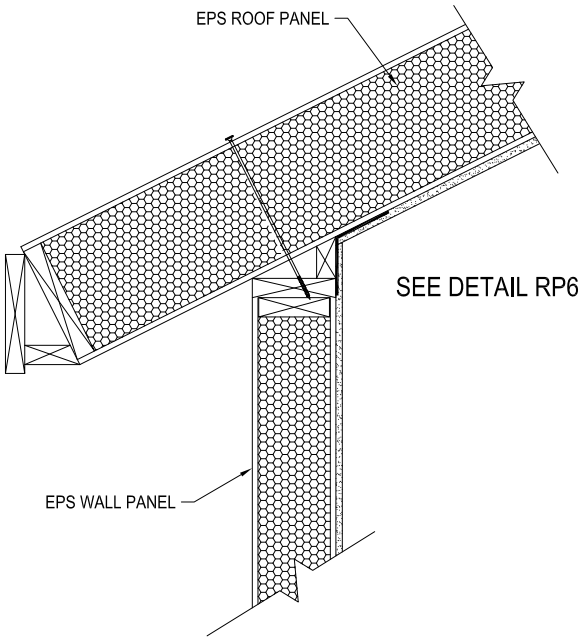


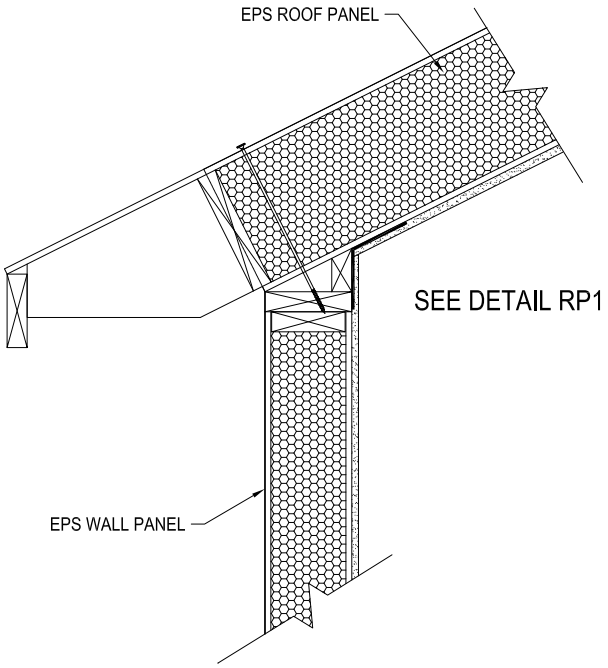
Ridge overlay (12/12 pitch only):



c. Eave Details

The eave detail will depend on the style of the house and the customer's personal preference. Refer to the detail manual for all eave styles.

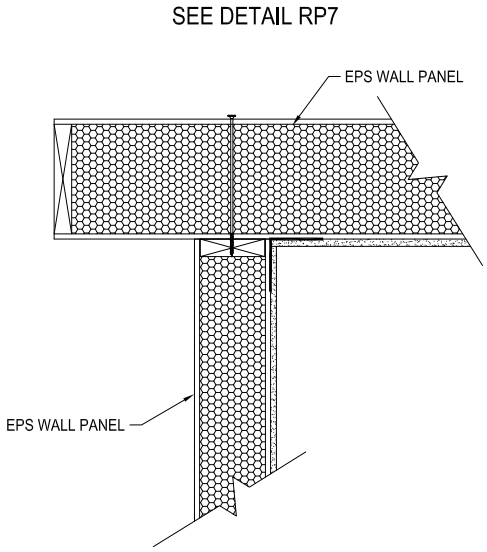




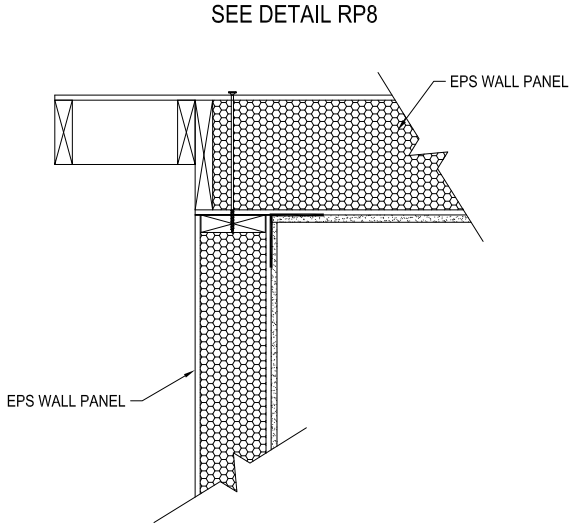
d. Rake Extension Detail

Typically gable end walls will extend up to the underside of a roof panel. When the wall is extended the double top plate is no longer needed. Refer to the construction details for all rake options.

Panel overhang:



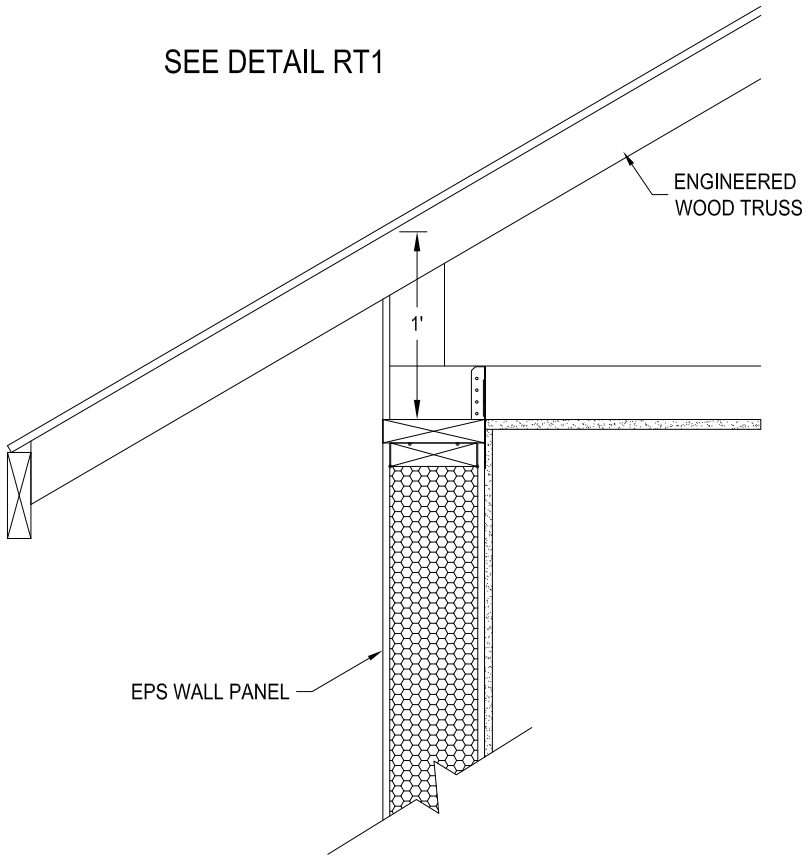
Ladder overhang:



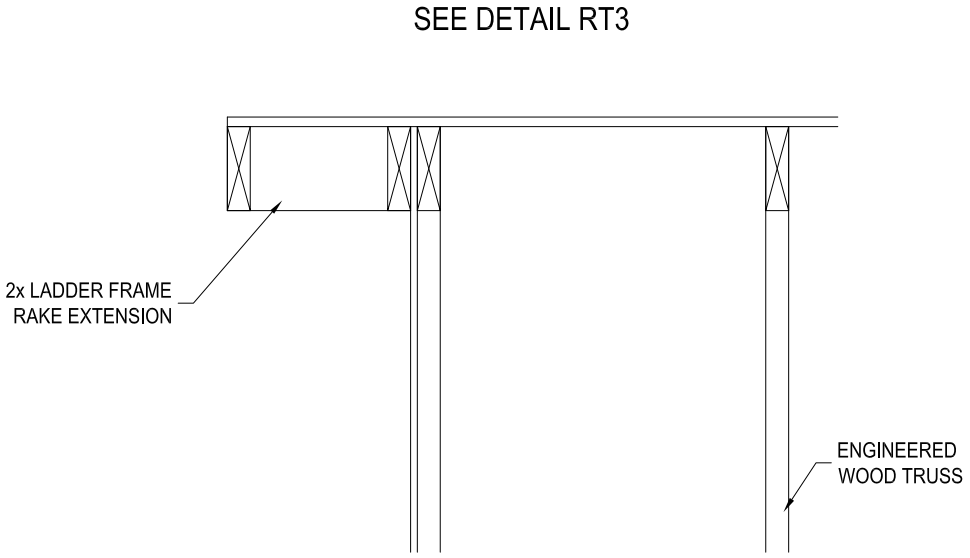
IX. Roof Trusses

Along with roof panels, EPS also manufactures roof trusses. In many cases roof trusses may be a better option than roof panels. EPS standard roof truss features a 12" energy heel for optimal energy efficiency. Trusses are held back 1/2" to allow for the truss tails to be sheathed. Roof sheathing options are OSB and CDX with thicknesses of 1/2"and 5/8". Two options exist for the gable end rake extension, either a ladder framed overhang or an out-looker overhang with a dropped gable truss.

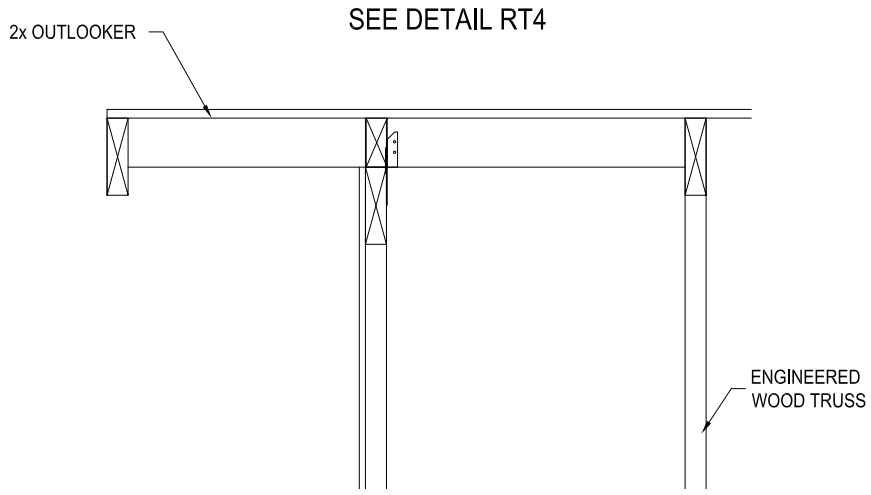
Eave overhang detail:



Ladder framed rake detail:



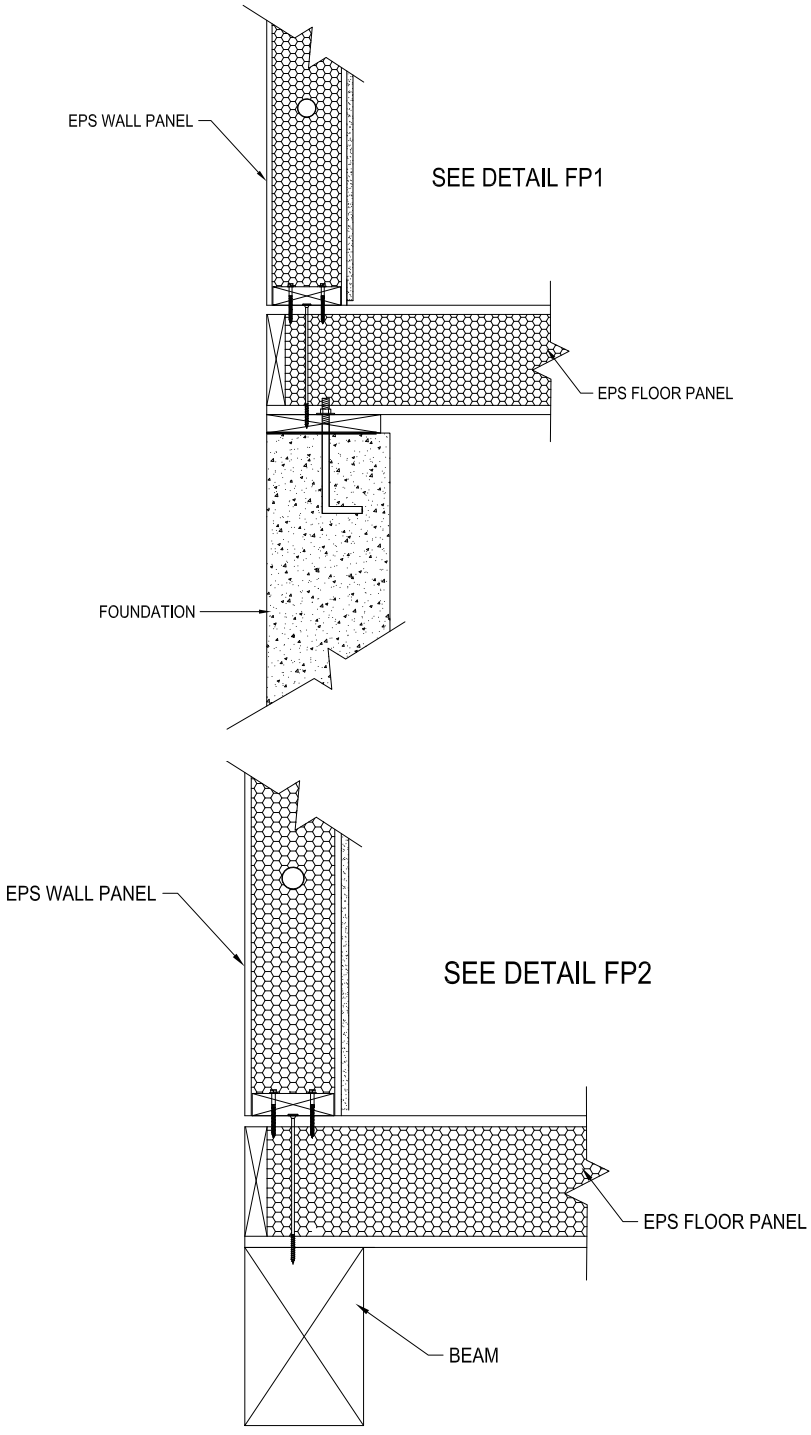
Out-looker framed rake detail:



The contractor shall be familiar with the Building Component Safety Information (BCSI) manual. A BCSI manual is available from EPS upon request. Sections B1,B2 and B3 will be provided with all construction prints. It is the contractor's responsibility to read and understand this manual. EPS will provide all permanent bracing material. The contractor is responsible for all temporary shoring and bracing.

X. Floor Panels

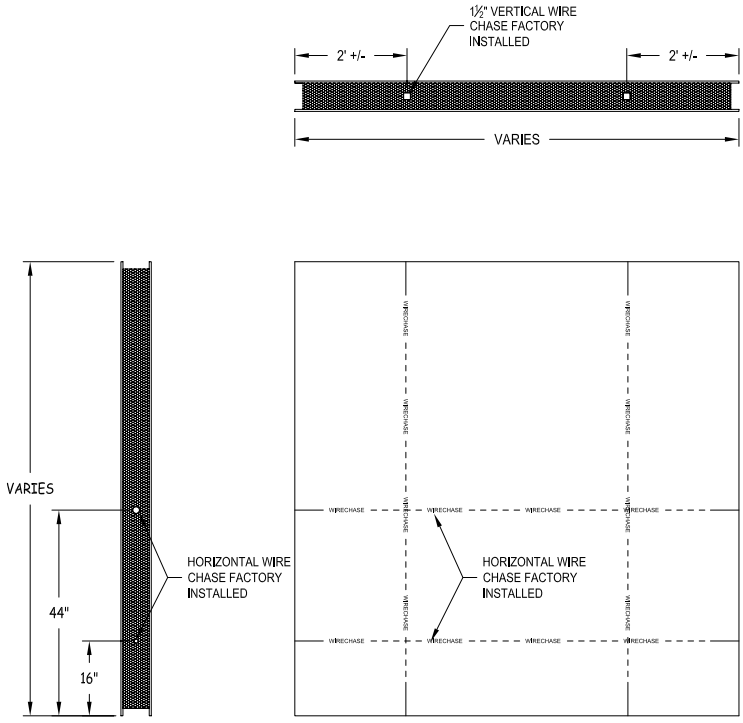
EPS offers floor panels to be used over crawl spaces or with a pier and beam foundation. These panels can be made out of a variety of panel thicknesses and skin make ups.



XI. Wiring & Plumbing

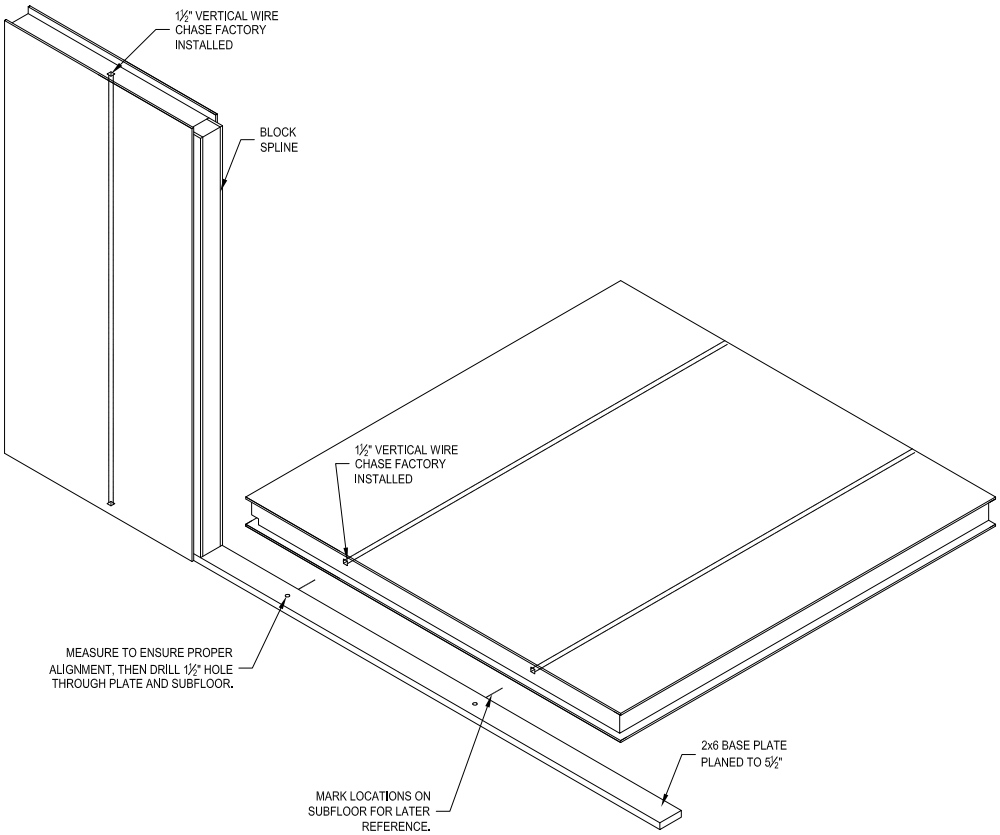
a. Wire Chases

Wire chases are factory installed into every EPS panel unless otherwise noted. Vertical wire chases are installed approximately 4' O.C. with an optional horizontal wire chase at 16" and/or 44"off the floor. Vertical wire chases are provided within 8" of door openings.



The wire chases will be marked on both panel skins with a black marker at both vertical and horizontal locations. If the chase is not marked be sure to mark it before the panel is installed.

Before the panels are installed, take a few minutes to mark the subfloor and drill 1 ½" access holes through the base plates and subfloor. These few minutes may save hours later on. Once the panels are installed a 1 ½" hole will also need to be drilled through the top plates.

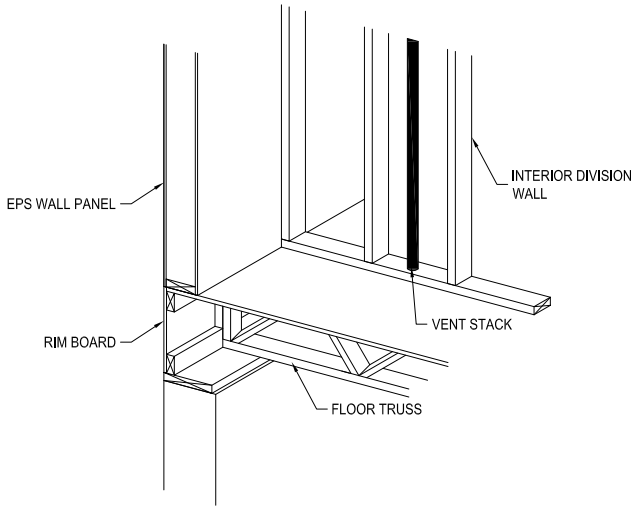


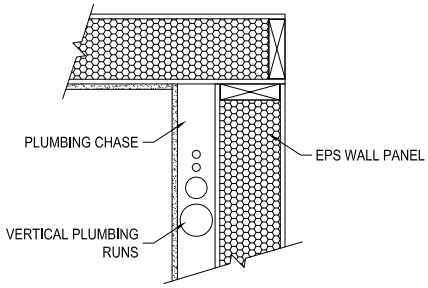
b. Boxes

Electrical boxes may be cut into the interior skin by using a router, or a hole saw. A retro fit electric box may be used to fasten the box in the center of a panel. If the box is next to a stud or column spline then the box can be fastened to the lumber.

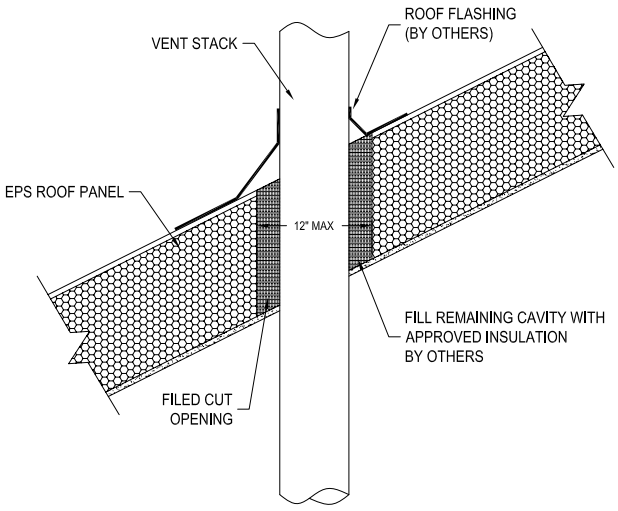
c. Plumbing

Running plumbing lines through SIP walls is not recommended. Plumbing lines and vertical vents should be run through interior walls or through plumbing chases.



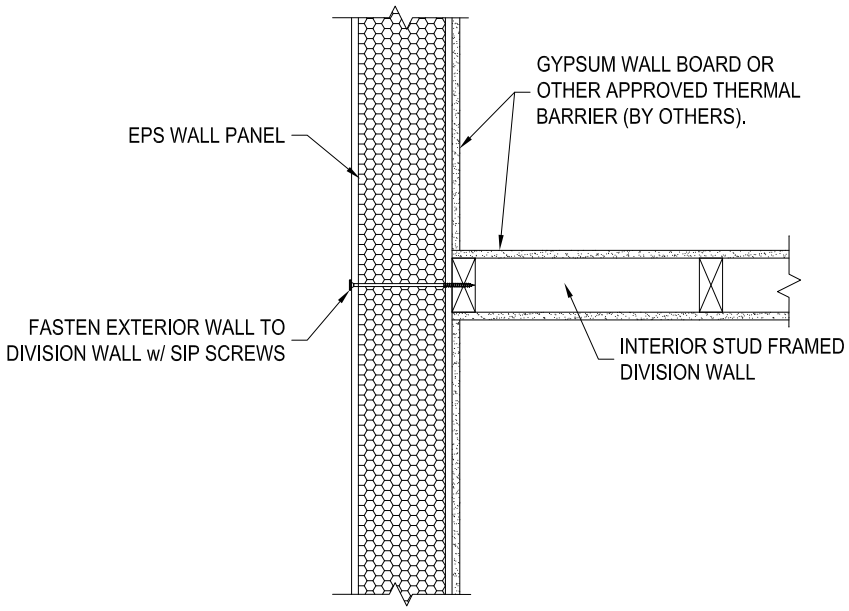


When using EPS roof panels, vertical vent stacks will need to be cut through the roof panel. Unsupported roof penetrations are allowed up to 12". Anything larger will require engineered supports within the panel.

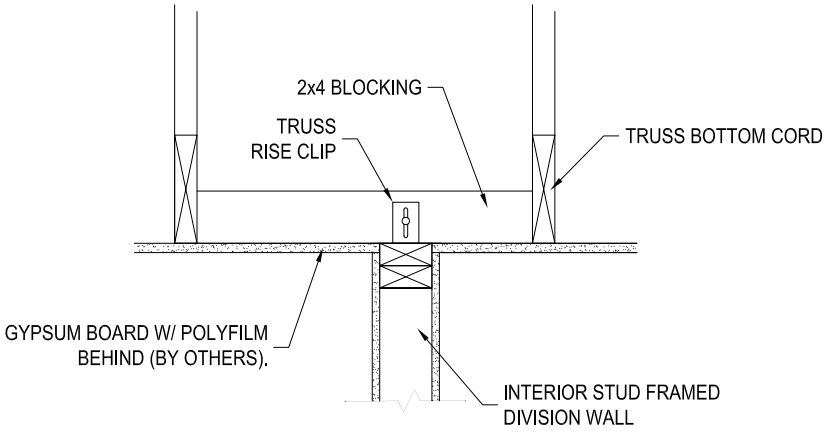


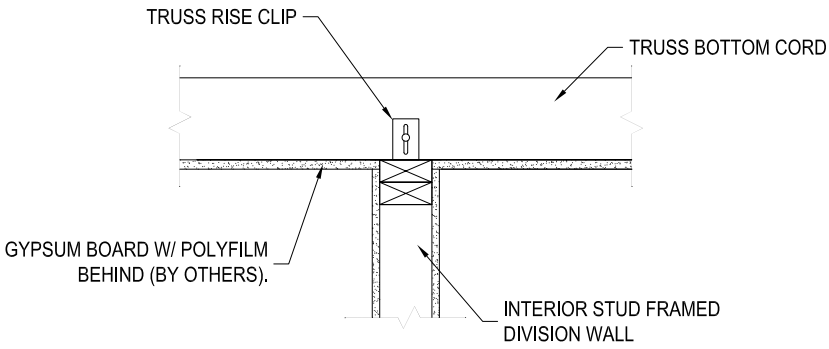
XII. Division Walls

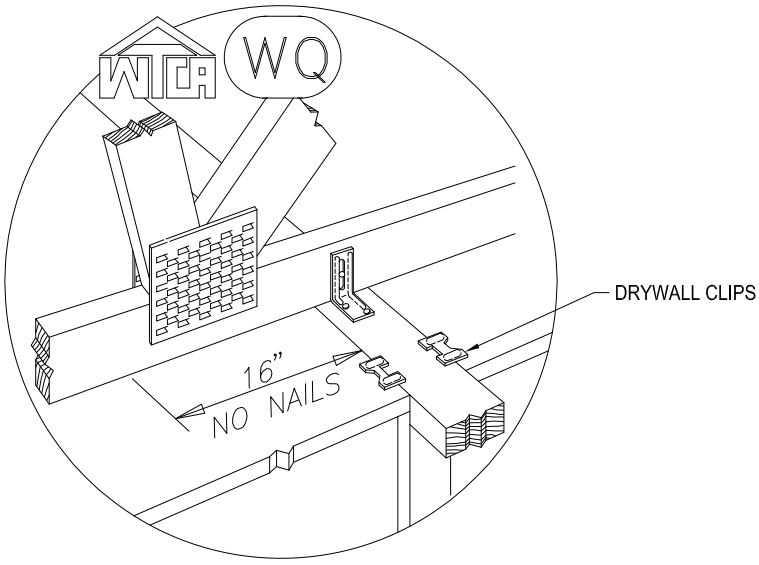
Division walls are a part of almost every project. EPS recommends fastening interior division walls to the panels with SIP screws. This will help prevent drywall separation and cracking in the corners. A floating drywall corner may also be used.



Division walls that are connected to roof trusses should use a truss rise clip to help prevent drywall cracking during truss rise. In addition, drywall clips should be used and the ceiling drywall should not be fastened within 16" of the division walls.







XIII. Sealant, Tape, Adhesive & Fasteners

EPS provides all necessary sealants, tapes, adhesives and fasteners with each building package. Refer to cross sections and construction details for exact placement of each. Refer to fastening and adhesive schedule for proper quantities. Fastening schedule may change depending on location and conditions.

a. SIP-Seal

EPS uses Sustant SIP-seal sealant. This sealant is used for all foam to foam, foam to wood and wood to wood connections. SIP-seal will not harden or become brittle and remains flexible after it cures. It can be applied in temperatures between 0 F to 120 F and will not freeze. SIP-seal comes in 20 oz. sausage tubes that cover approx. 50'at 3/8" bead. EPS can provide a manual and battery operated sausage tube applicators.

b. One-Component (Gun foam-optional)

EPS uses "All Seasons" polyurethane foam gun sealant made by Touch-n Seal. This foam is called one-component expanding low pressure foam sealant. It is ideal for filling small gaps and cracks, providing airtight insulation that stops air infiltration. One 24 oz. can of the "All Seasons" will yield a bead ¼"x 2,150'. The shelf life of a can will last as long as 12 months. Once the can is started, do not remove the gun until the can is empty; then purge gun and remove can. Clean gun thoroughly with acetone or polyurethane foam cleaner. Do not allow foam to harden in the gun. For more information on foam sealants go to www.touch-n-seal.com.

c. Two-Component (optional)

For large voids and cavities that need filled, a two-component foam may be required. Two-component foam kits are not a part of a standard package, but can be sent upon request. For more information on foam sealants go to www.touch-n-seal.com.

d. Tape

SIP tape is used at all roof seams to prevent air infiltration. Ensure all surfaces are clear of any debris before applying. Tape may not stick as well if surfaces are too cold. SIP tape comes in widths of 4", 9", & 18". SIP tape is also used under panels that rest directly on concrete to prevent moisture from being wicked up into the panel skin. Refer to construction details for exact placement.

XIV. Ventilation

SIP buildings are extremely airtight and require mechanical ventilation. Ventilation systems bring fresh air into the building in controlled amounts and exhaust moisture laden and stale air to the outside. By limiting air exchange to controlled ventilation systems, SIP homes allow for all incoming air to be filtered for allergens and dehumidified, resulting in better indoor air quality. Ventilation systems can be designed to incorporate heat recovery ventilators (HRV's). These advanced systems harness heat being exhausted from the home and utilize it to heat the fresh air coming into the home for an even more efficient use of energy. Proper ventilation is important in all homes to preserve indoor air quality.

XV. MSDS

Some areas of the country may require MSDS sheets on the products going into the project. This information is lengthy and not needed by everyone. EPS can provide a complete MSDS packet upon request.

General Recommendations

EPS Structural Insulated Panels (SIPs) must be designed and installed in accordance with:

- All Applicable Codes
- Load Charts & Construction Details
- Information within Quotations & Drawings
- Following Items

Thermal Barriers

All interior surfaces of SIP panels must be finished with a minimum 15-minute thermal barrier, typically ½" gypsum board or 1X wood paneling. One hour fire rated systems can be achieved when constructed per listed design. Consult applicable codes regarding compliance requirements.

Mechanical Ventilation

Properly installed EPS SIP panels will greatly reduce air movement through walls and roofs. While fewer air exchanges saves energy, air quality is affected and humidity is increased possibly causing mold and mildew problems. A professional, familiar with tight construction such as SIPs, should design and install a HVAC system that includes an adequate fresh air ventilation system.

Vapor Retarders

EPS recommends the use of SIP tape at joints when mandated by code or required by climate conditions. Sealants applied to all connections (foam to foam, foam to wood, wood to wood) are required. In addition, a SIP tape must be installed at all roof panel connections including ridge.

Weather Resistive Barriers

Proper usage of sealants at panel connections is necessary. Flashing and sealants around all rough openings and penetrations is required. Properly installed house wrap will help protect the exterior OSB skin from damage due to moisture intrusion.

Storage, Handling and Protection

Store all panels in a level, well supported manner, fully covered with tarps or other protective wraps. When installing panels with a crane, straps or lifting plates should be used. Roof panels must have temporary water resistant paper applied after installation. EPS uses exposure I rated OSB skins which withstand limited weathering. The weatherproof exterior cladding system must be installed promptly. While SIPs are treated to resist termite and carpenter ant intrusion, standard deterrents such as insect clips, flashing or tarps should be installed.

Other Resources

- APA The Engineered Wood Association series “Build a Better Home” www.apawood.org
- NAHB National Association of Homebuilders www.nahb.com

Table of Contents – Construction Details

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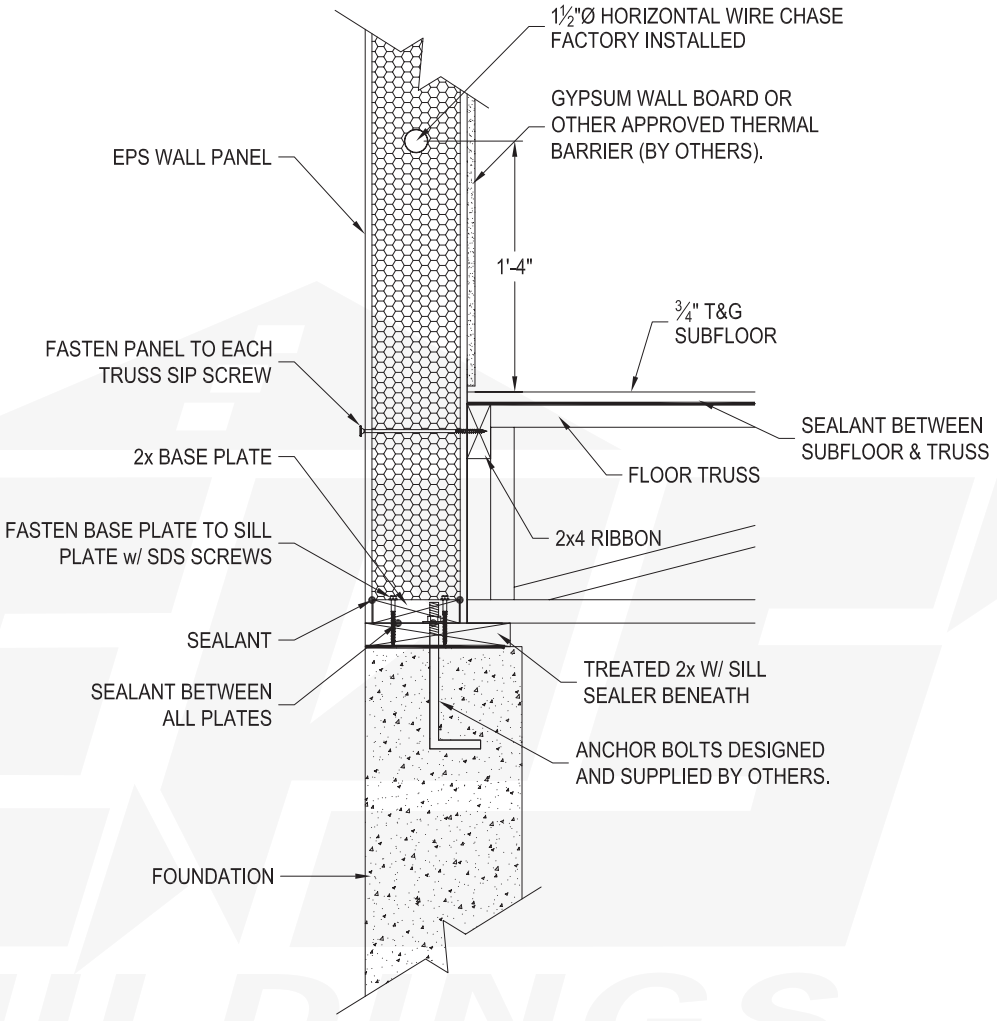
NOTE: SEE FASTEN SCHEDULE FOR ALL CONNECTIONS

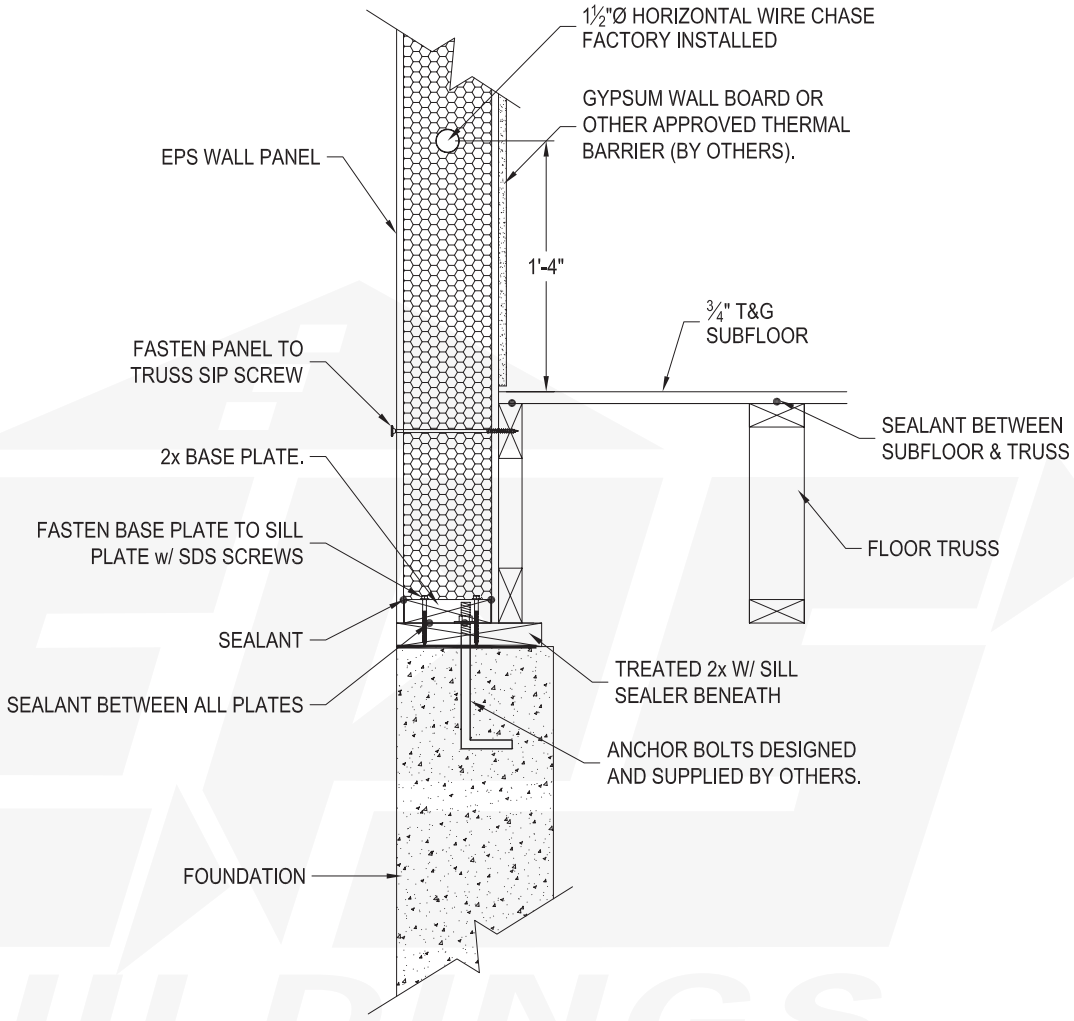


NOTE: MINIMUM FOUNDATION THICKNESS OF 10" FOR R-26 PANEL

DETAIL:	PANEL PAST/FLOOR TRUSS/CONRETE	
SCALE:	N.T.S.	DETAIL#
UPDATED:	1/26/16	PP1

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

NOTE: SEE FASTEN SCHEDULE FOR ALL CONNECTIONS



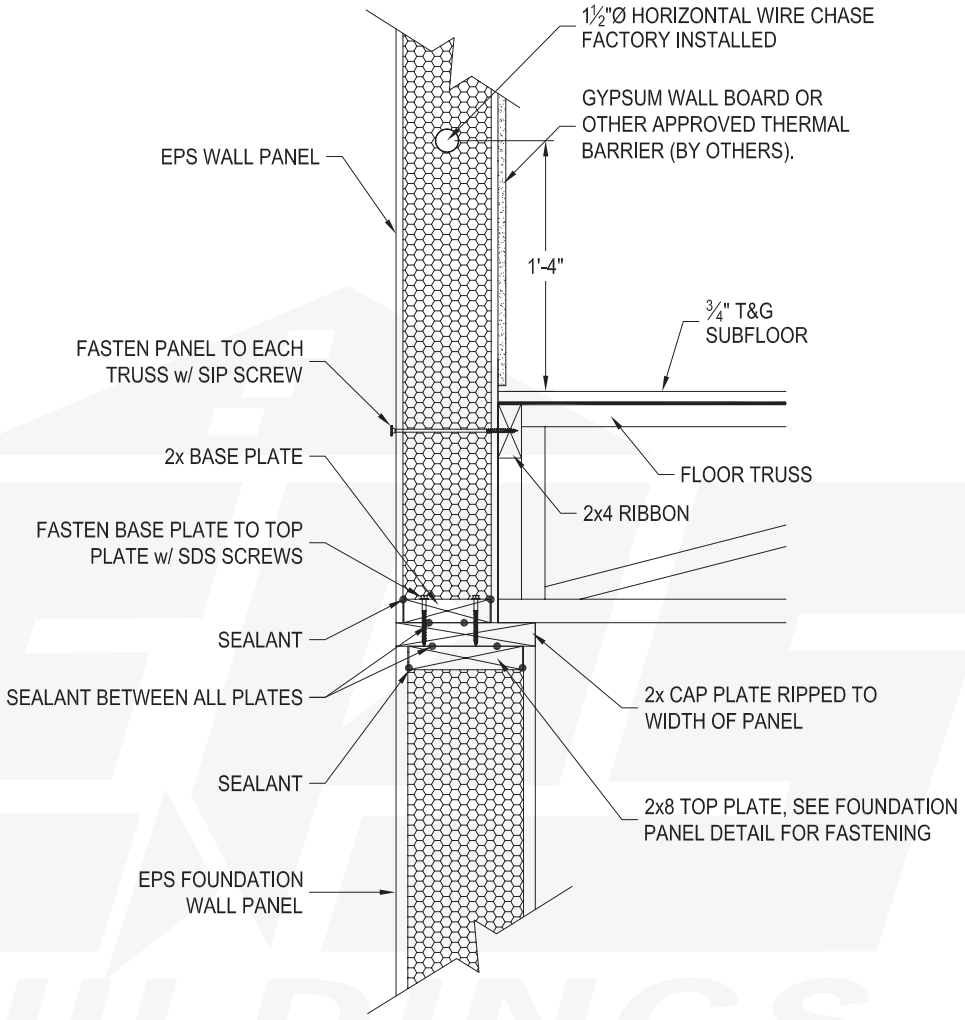
NOTE: FLOOR END WALL BLOCKING WILL BE REQUIRED WITH THIS DETAIL.
SPECIFICATIONS WILL BE PER JOB.

NOTE: MINIMUM FOUNDATION THICKNESS OF 10" FOR R-26 PANEL

EPS BUILDINGS	DETAIL: PANEL PAST/FLOOR TRUSS PARALLEL/CONCRETE	
	SCALE: N.T.S.	DETAIL#
	UPDATED: 1/26/16	PP2

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

NOTE: SEE FASTEN SCHEDULE FOR ALL CONNECTIONS



DETAIL: PANEL PAST/FLOOR TRUSS/FOUNDATION PANEL

SCALE: N.T.S.

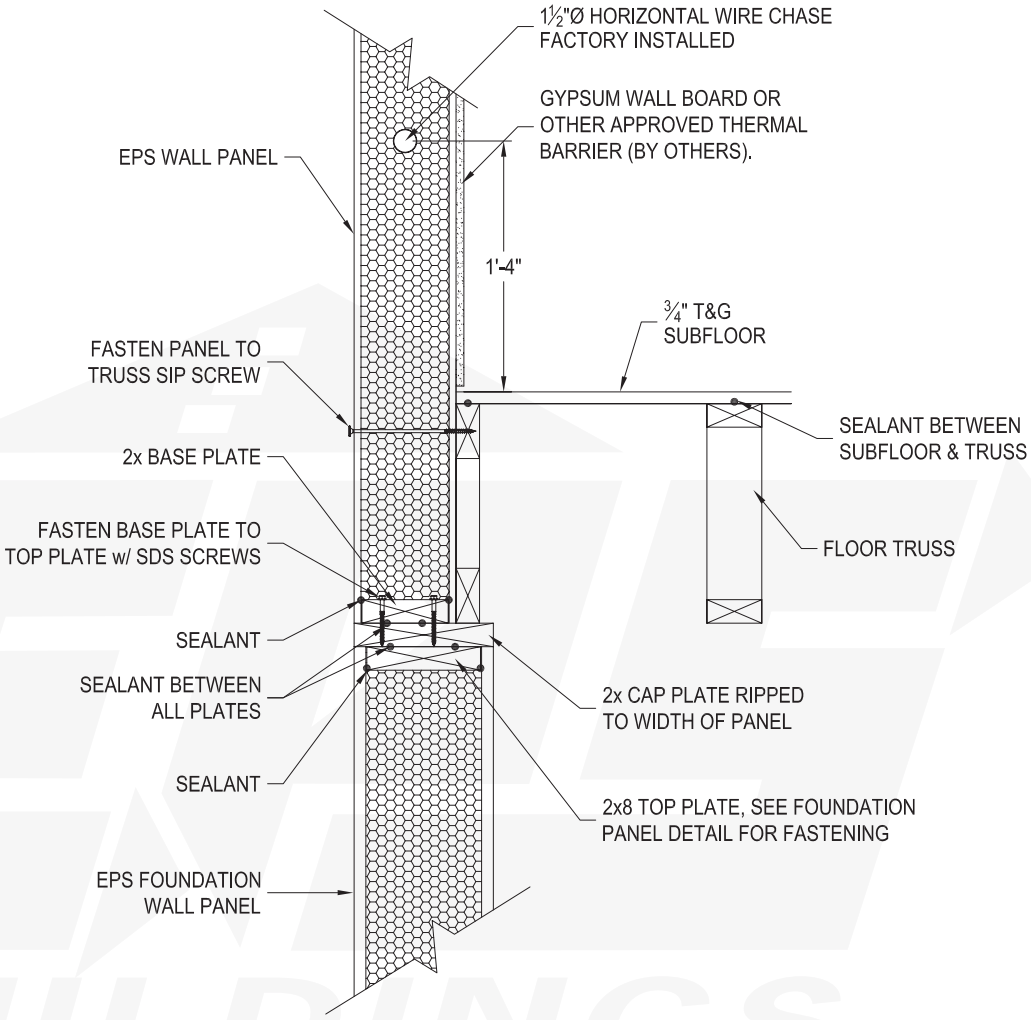
DETAIL#

UPDATED: 1/26/16

PP3

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

NOTE: SEE FASTEN SCHEDULE FOR ALL CONNECTIONS



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EPS BUILDINGS

DETAIL: PANEL PAST/FL. TRUSS PAR./FOUNDATION PANEL

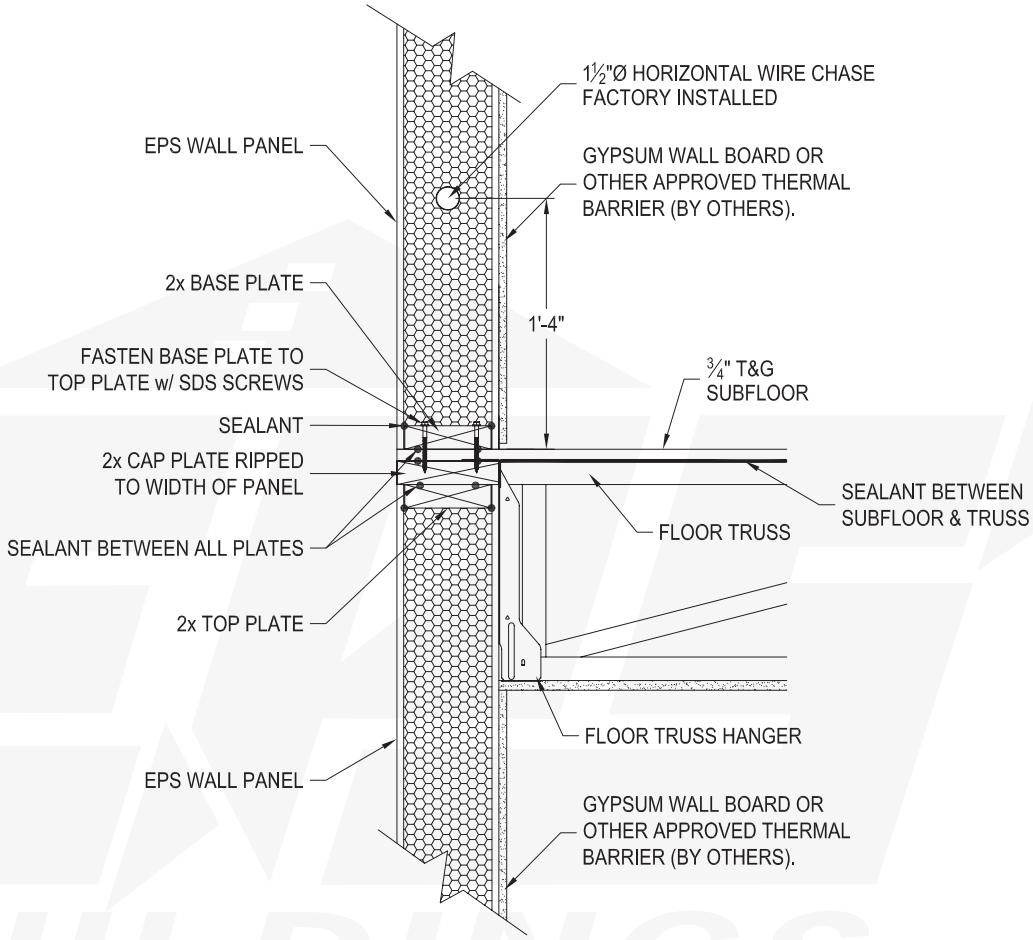
SCALE: N.T.S.

DETAIL# PP4

UPDATED: 1/26/16

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

NOTE: SEE FASTEN SCHEDULE FOR ALL CONNECTIONS



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SCALE: N.T.S.

DETAIL# PHF1

UPDATED: 1/26/16

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

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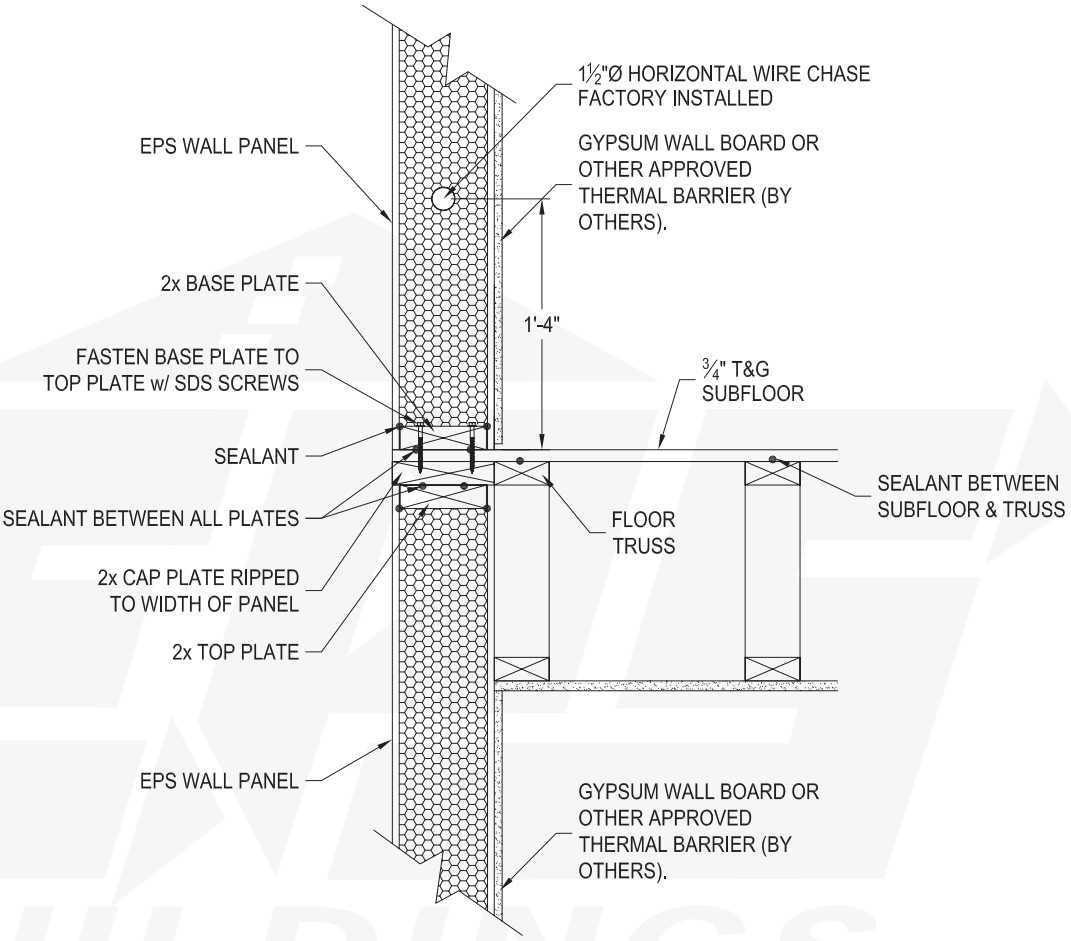

NOTE: FLOOR BLOCKING WILL BE REQUIRED WITH THIS DETAIL.
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EPS BUILDINGS

DETAIL: PANEL/FLOOR TRUSS PARALLEL/PANEL

SCALE: N.T.S.

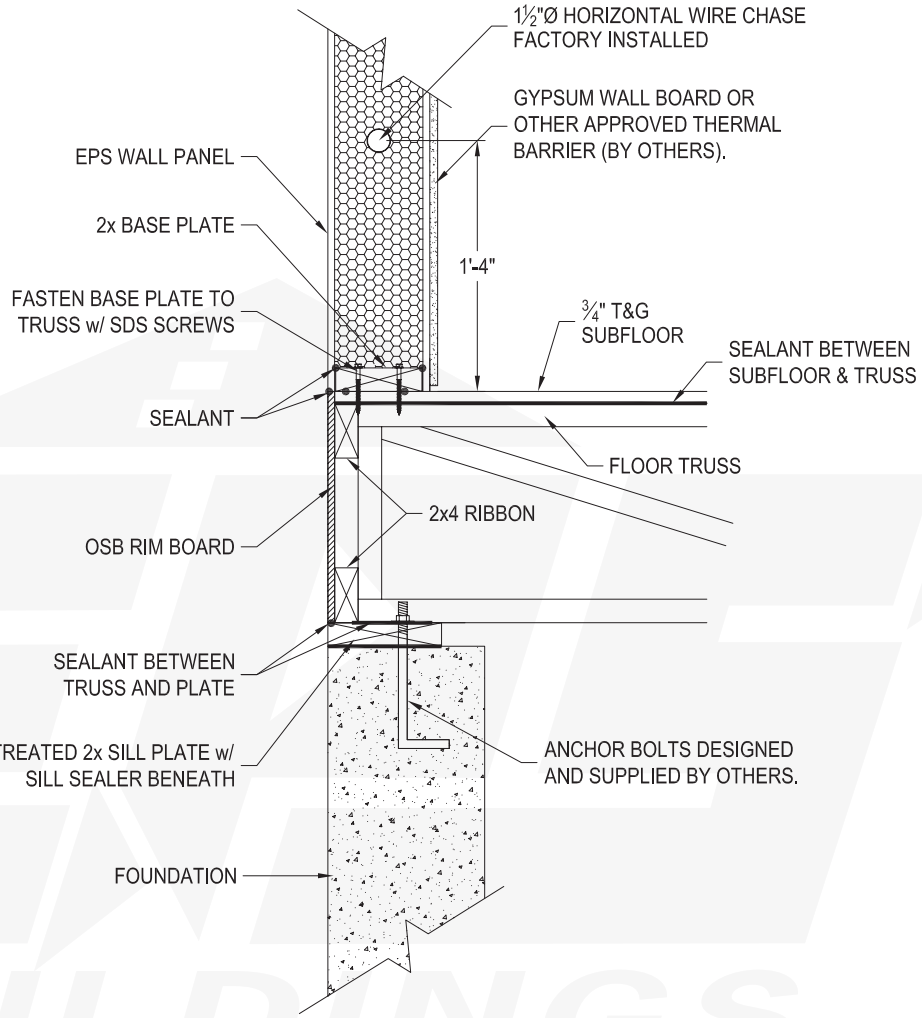
DETAIL#

UPDATED: 1/26/16

PHF2

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

NOTE: SEE FASTEN SCHEDULE FOR ALL CONNECTIONS



DETAIL: PANEL/TYPICAL FLOOR TRUSS/CONCRETE

SCALE: N.T.S.

DETAIL#

UPDATED: 1/26/16

PF1

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

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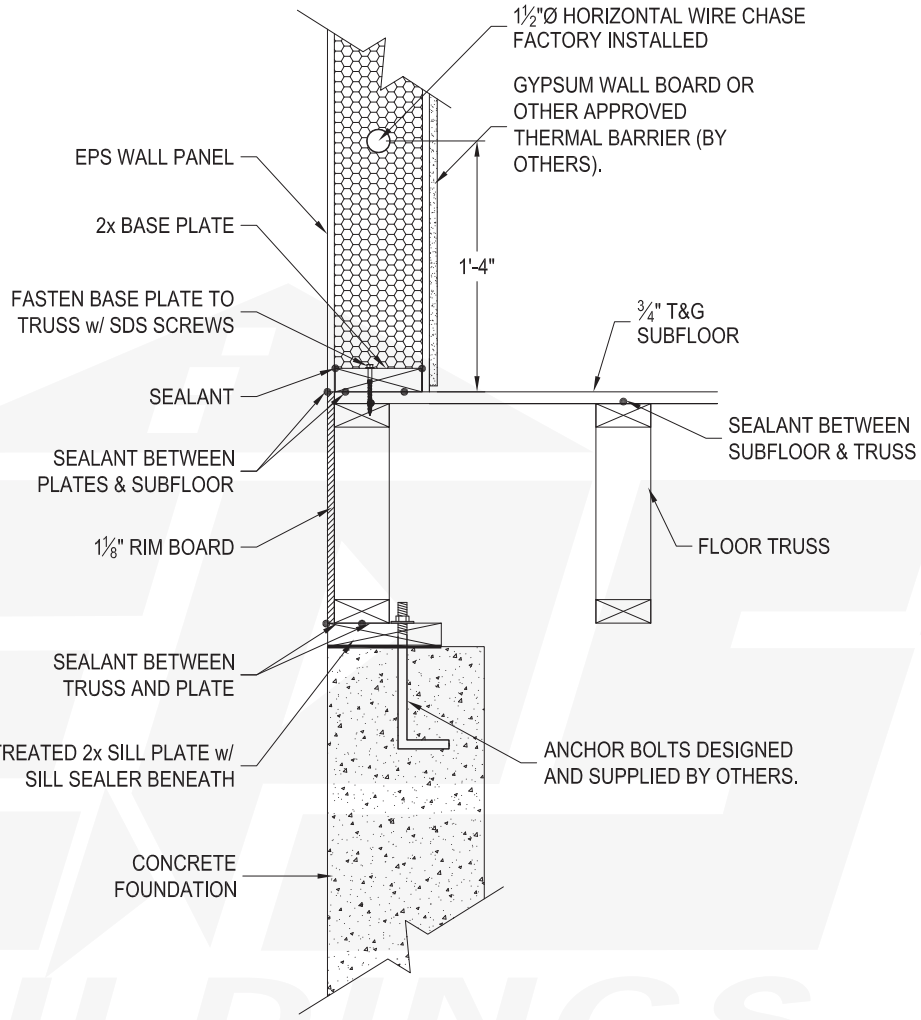

NOTE: FLOOR END WALL BLOCKING WILL BE REQUIRED WITH THIS DETAIL. SPECIFICATIONS WILL BE PER JOB.

EPS BUILDINGS

DETAIL: PANEL/TYPICAL FLOOR TRUSS PAR./CONCRETE

SCALE: N.T.S.

DETAIL# PF2

UPDATED: 1/26/16

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

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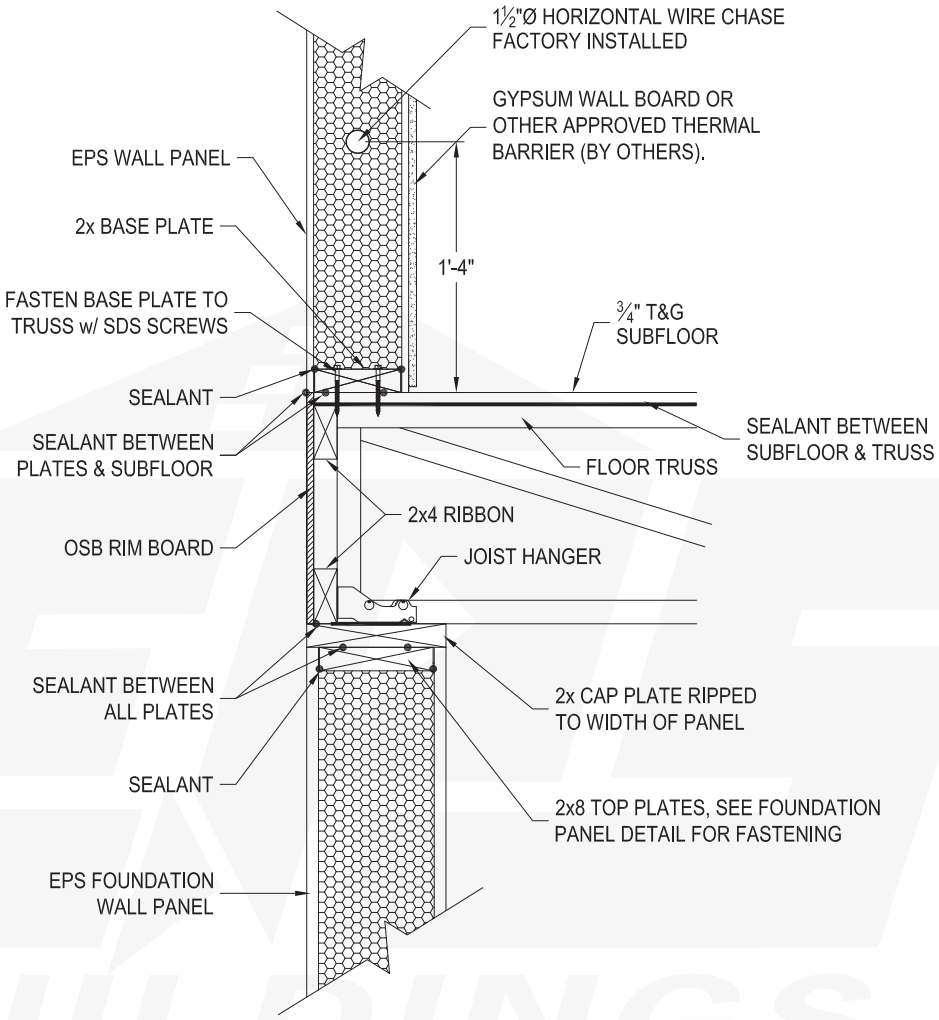

DETAIL:	PANEL/TYPICAL FLOOR TRUSS/FOUNDATION PANEL	
SCALE: N.T.S.		DETAIL#
UPDATED: 1/26/16		PF3

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

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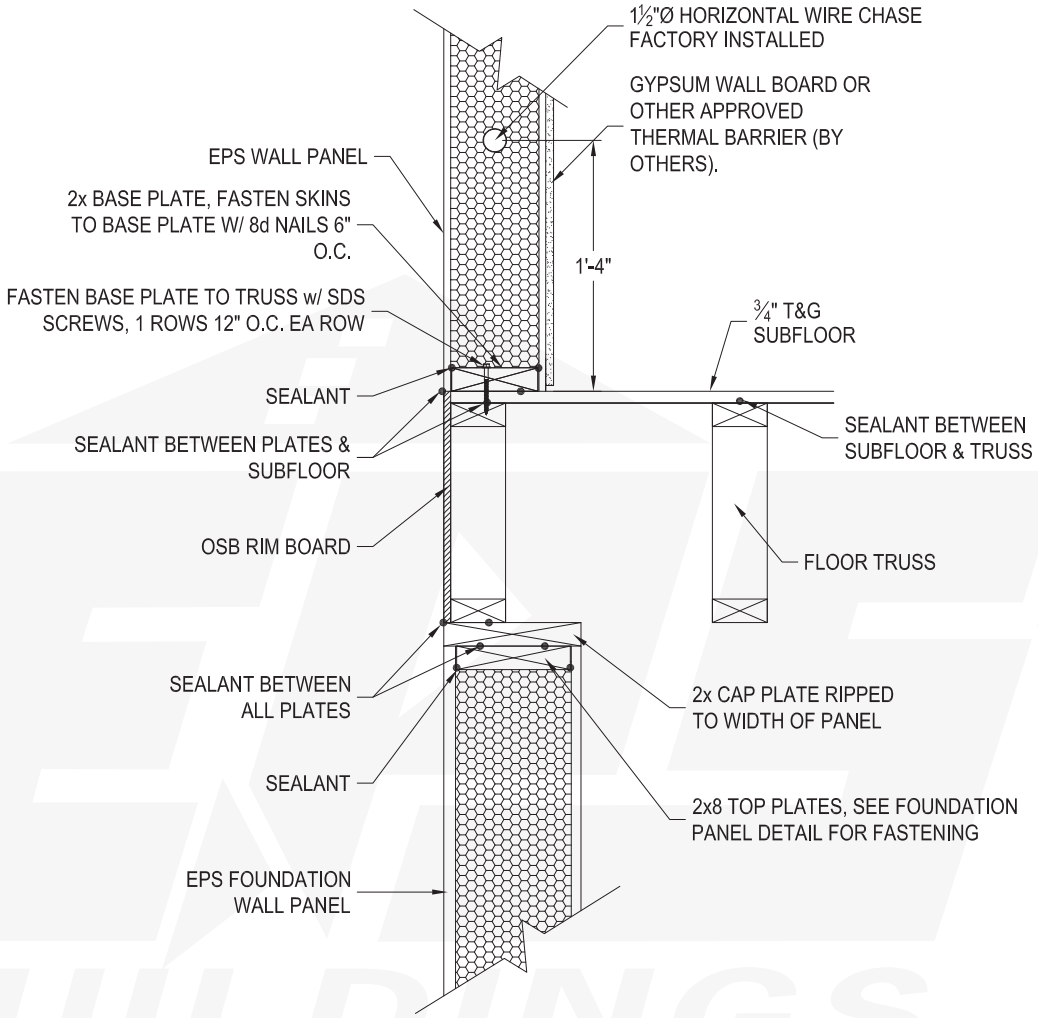

NOTE: FLOOR END WALL BLOCKING WILL BE REQUIRED WITH THIS DETAIL. SPECIFICATIONS WILL BE PER JOB.

EPS BUILDINGS

DETAIL: PANEL/TYPICAL FL. TRUSS PAR./FOUNDATION PAN.

SCALE: N.T.S.

DETAIL#

UPDATED: 1/26/16

PF4

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

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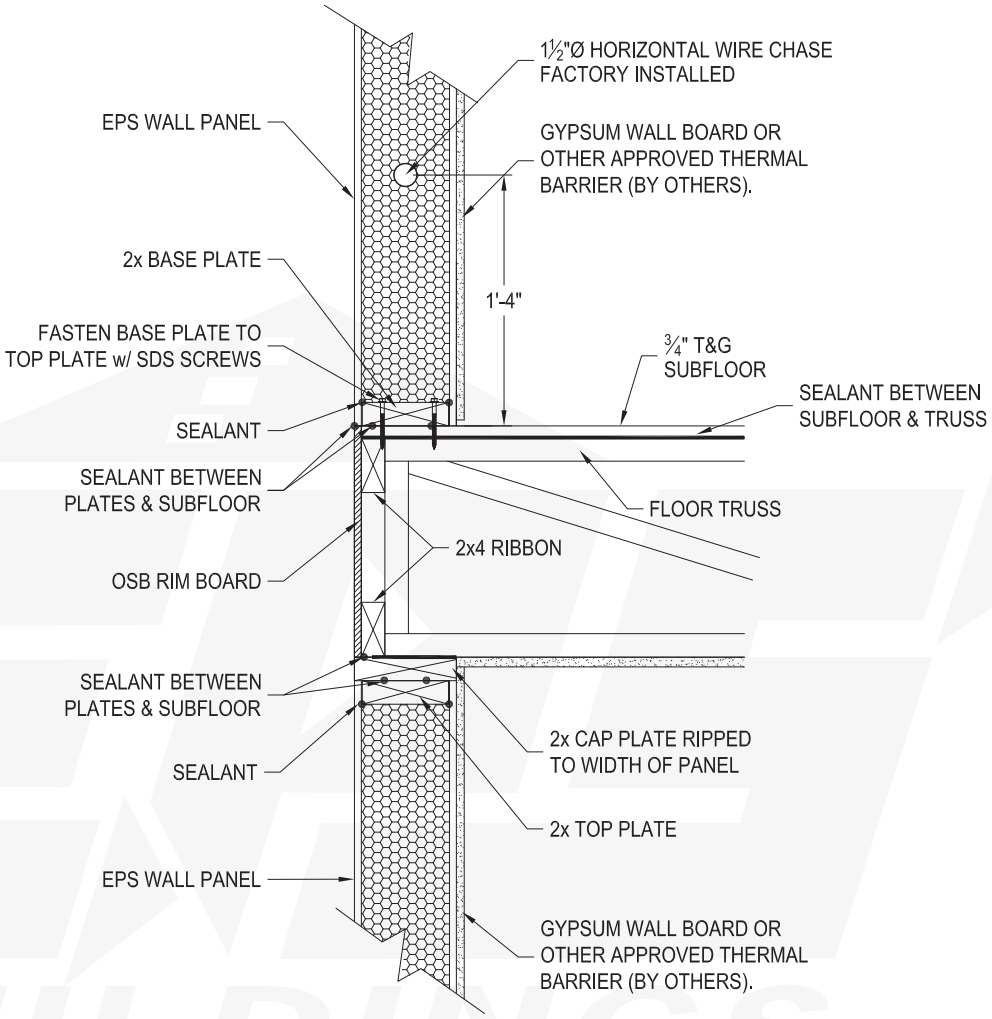

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SCALE:	N.T.S.
UPDATED:	1/26/16

DETAIL# PSF1

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
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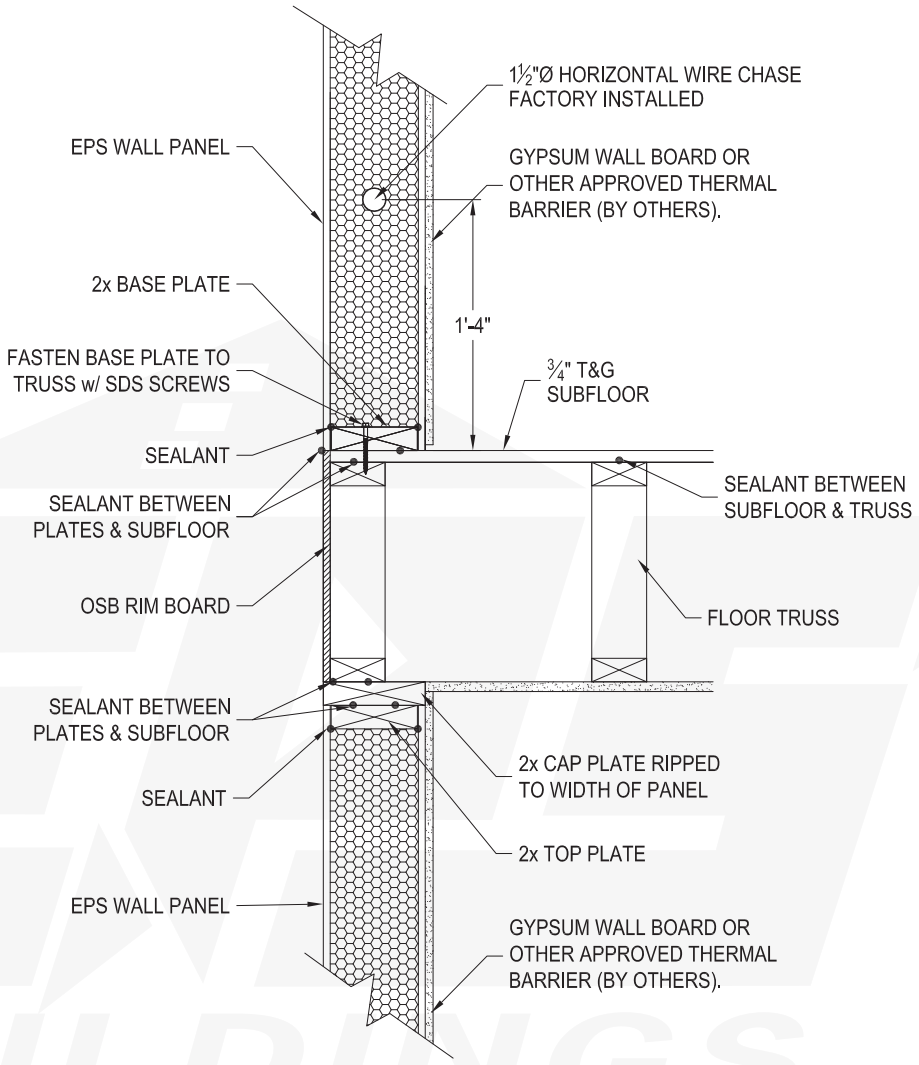

NOTE: FLOOR END WALL BLOCKING WILL BE REQUIRED WITH THIS DETAIL.
SPECIFICATIONS WILL BE PER JOB.

EPS BUILDINGS

DETAIL: PANEL/TYPICAL FLOOR TRUSS PARALLEL/PANEL

SCALE: N.T.S.

DETAIL# PSF2

UPDATED: 1/26/16

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

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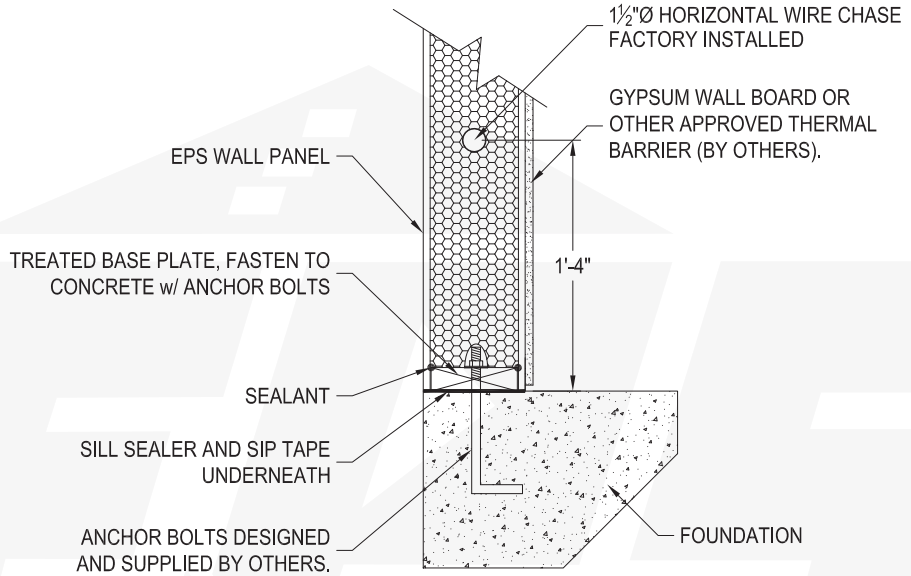
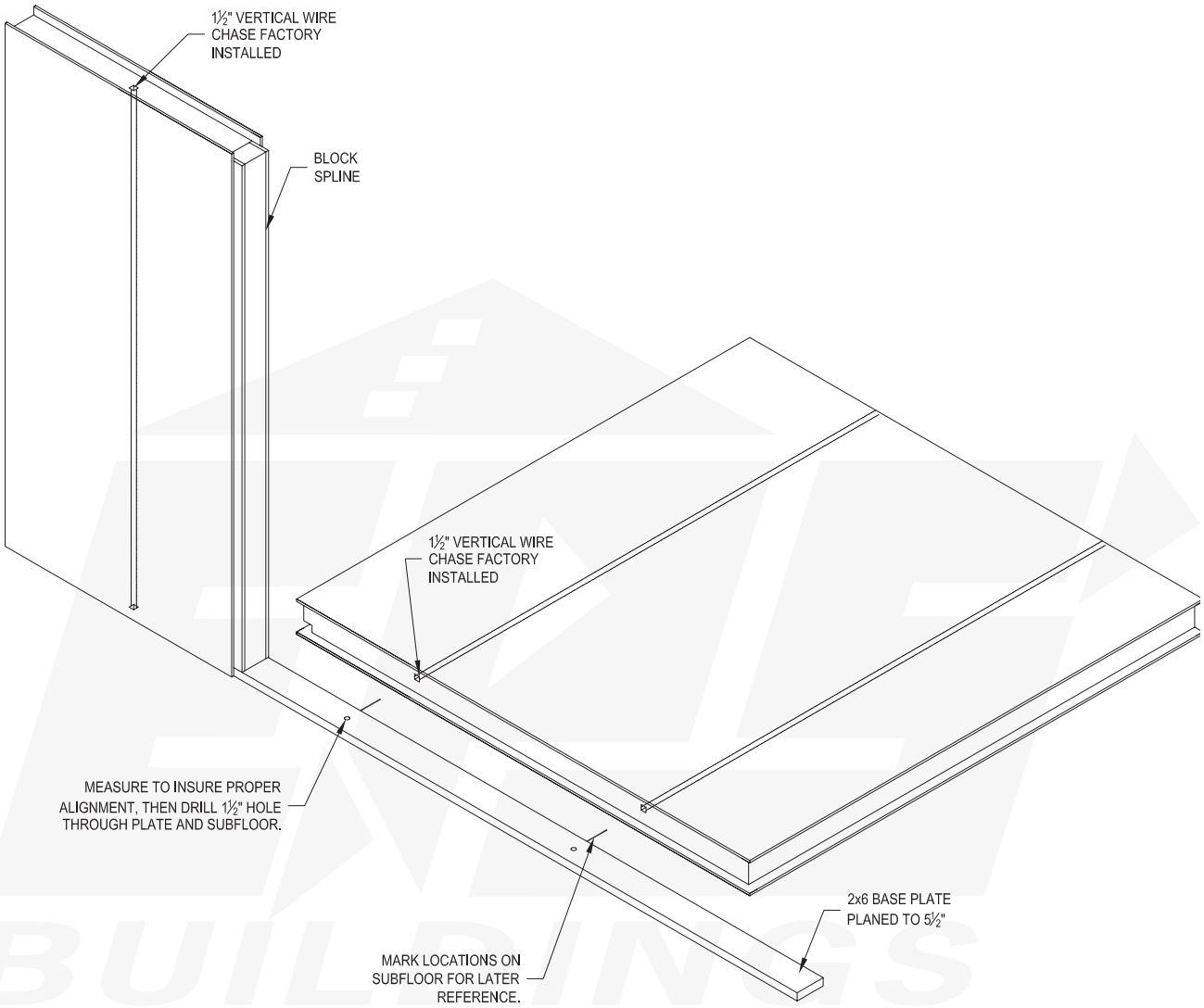


NOTE: SIP TAPE IS USED UNDER PANEL TO PREVENT PANELS FROM WICKING MOISTURE.

DETAIL:	PANEL/CONCRETE	
SCALE:	N.T.S.	DETAIL#
UPDATED:	1/26/16	PC1

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

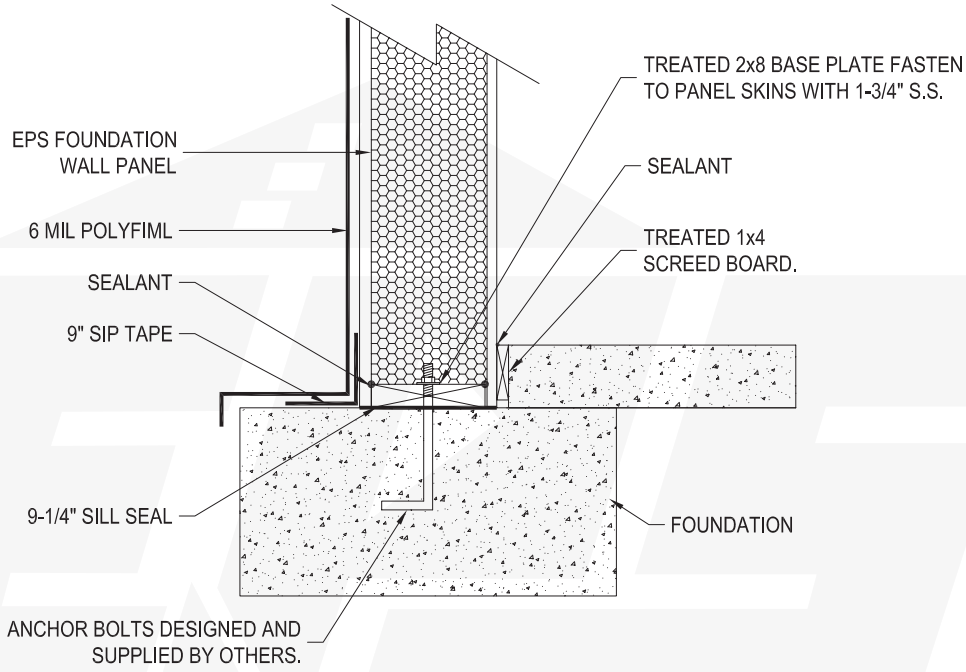
NOTE: HOLES MUST BE DRILLED INTO TOP AND BOTTOM PLATES TO GIVE ACCESS TO CHASES AFTER PANELS ARE SET.



NOTE: IF PANELS RUN PAST FLOOR YOU MAY NEED TO MARK THE SILL PLATE FOR LATER REFERENCE

DETAIL:	VERTICAL WIRE CHASE ALIGNMENT	
SCALE:	N.T.S.	DETAIL#
UPDATED:	1/26/16	WC2

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM



EPS BUILDINGS

DETAIL: PANEL/CONCRETE

SCALE: N.T.S.

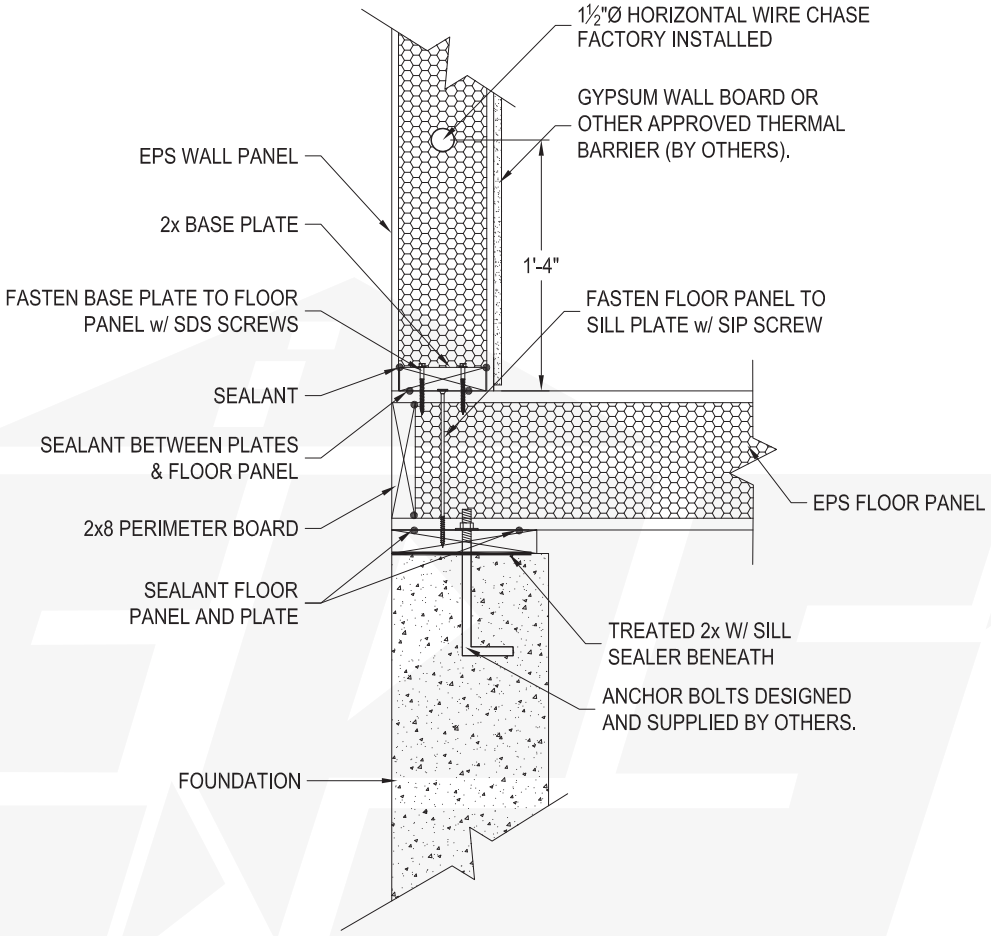
DETAIL#

UPDATED: 1/26/16

PC3

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

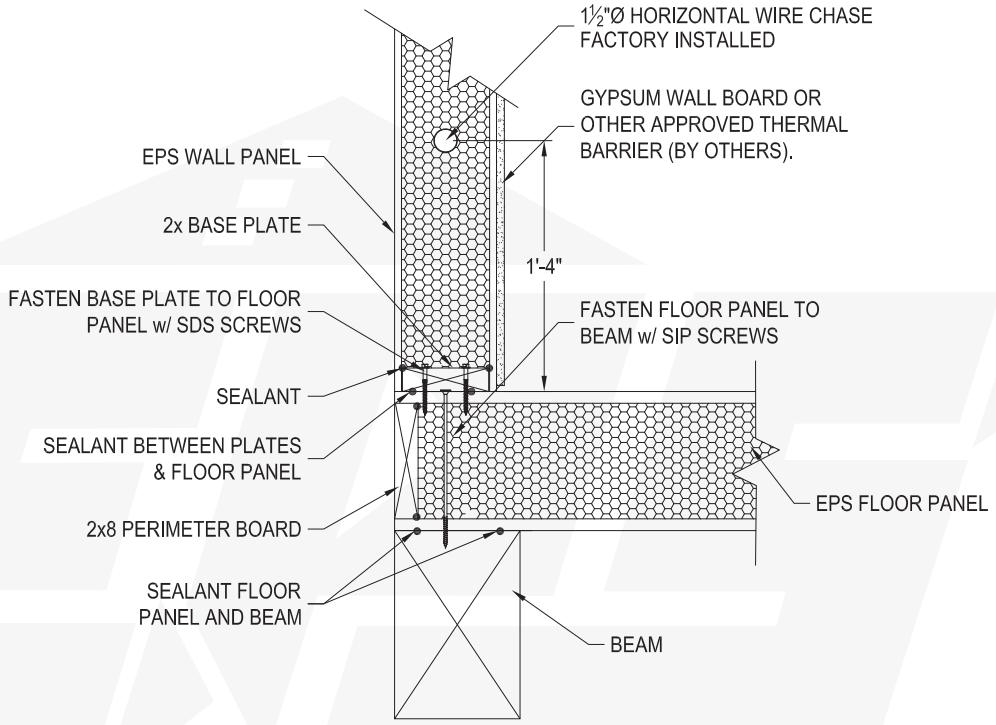
NOTE: SEE FASTEN SCHEDULE FOR ALL CONNECTIONS



DETAIL:	FLOOR PANEL / CONCRETE	
SCALE:	N.T.S.	DETAIL#
UPDATED:	1/26/16	FP1

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

NOTE: SEE FASTEN SCHEDULE FOR ALL CONNECTIONS



DETAIL: FLOOR PANEL / BEAM

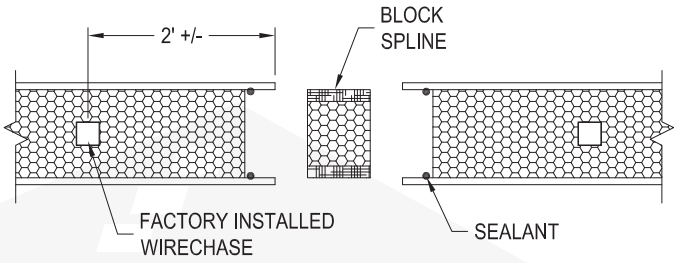
SCALE: N.T.S.

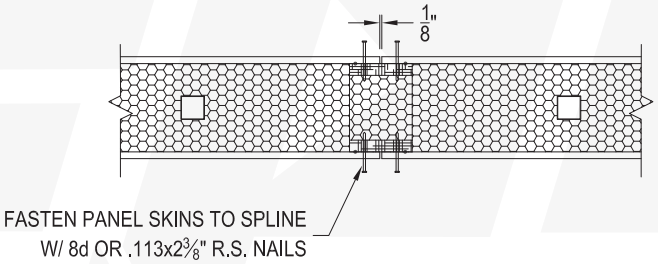
DETAIL# FP2

UPDATED: 1/26/16

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

NOTE: SEE FASTEN SCHEDULE FOR ALL CONNECTIONS

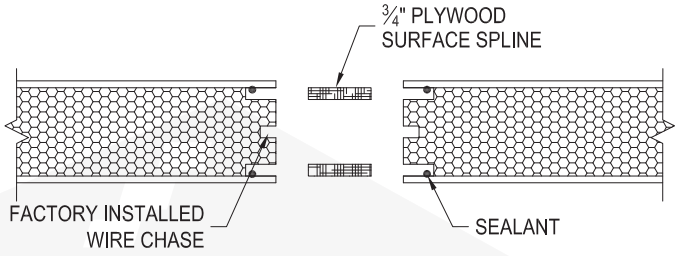


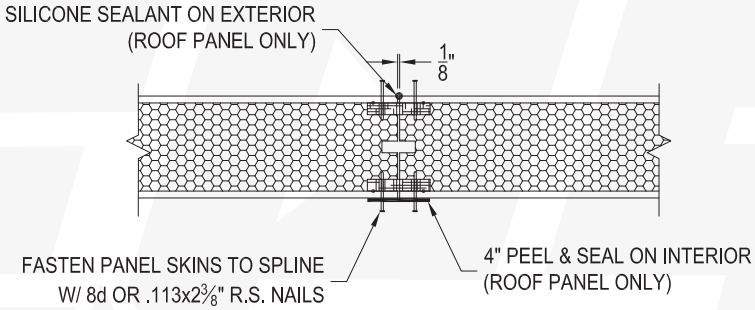


DETAIL:	BLOCK SPLINE ASSEMBLY	
SCALE:	N.T.S.	DETAIL#
UPDATED:	1/26/16	SP1

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

NOTE: SEE FASTEN SCHEDULE FOR ALL CONNECTIONS





NOTE: ROOF PANELS ONLY

DETAIL: SURFACE SPLINE ASSEMBLY

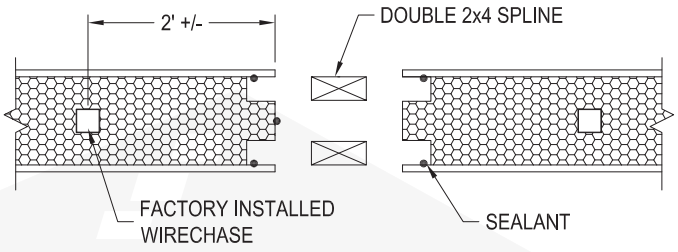
SCALE: N.T.S.

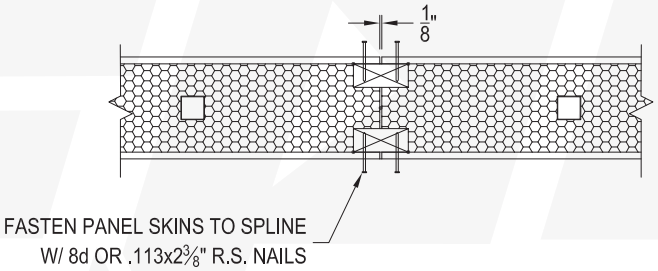
DETAIL# SP2

UPDATED: 1/26/16

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

NOTE: SEE FASTEN SCHEDULE FOR ALL CONNECTIONS



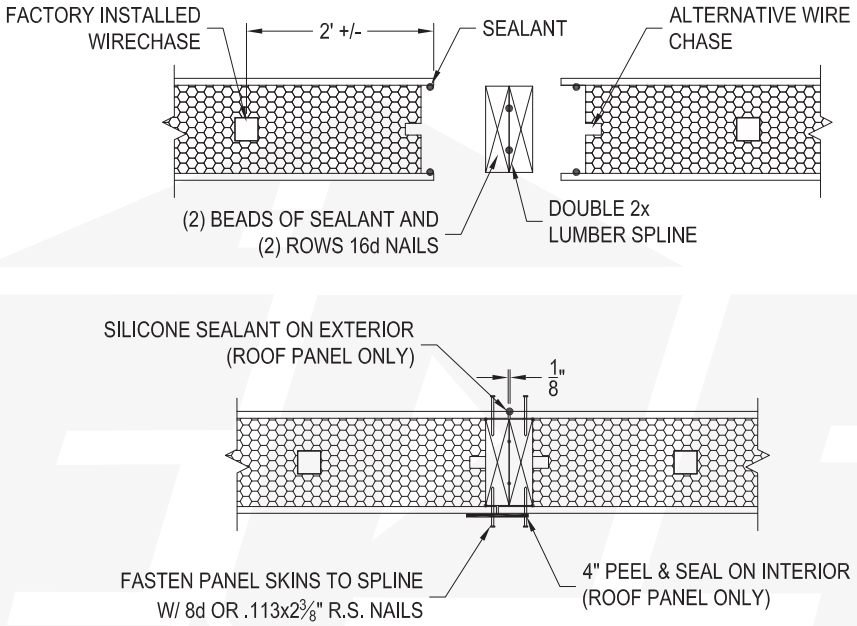


NOTE: WALL PANELS ONLY

DETAIL:	DOUBLE 2x4 SPLINE ASSEMBLY	
SCALE:	N.T.S.	DETAIL#
UPDATED:	1/26/16	SP3

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

NOTE: SEE FASTEN SCHEDULE FOR ALL CONNECTIONS



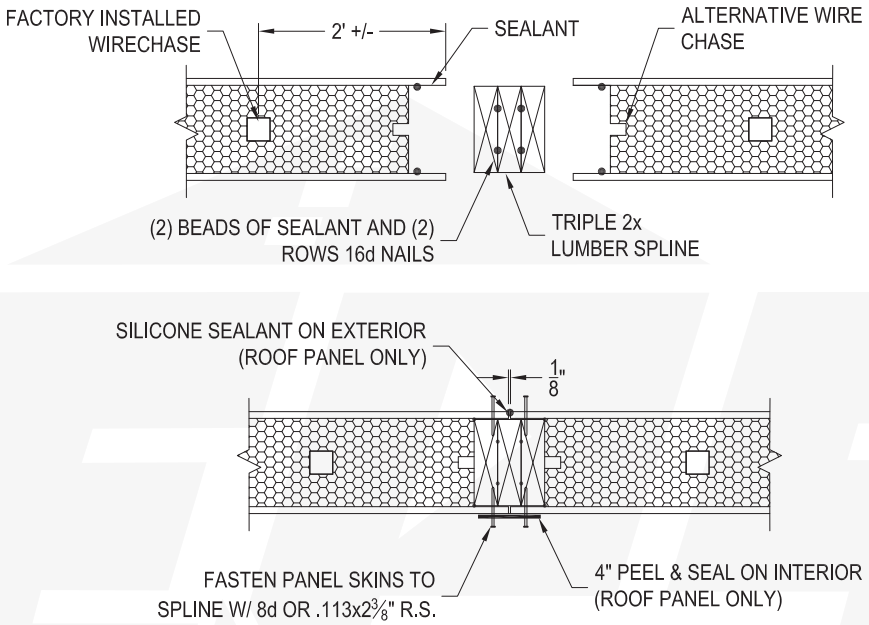
NOTE: OPTIONAL WIRE CHASE IS USED IN ROOF & FOUNDATION PANELS

NOTE: WALL PANELS, ROOF PANELS & FOUNDATION PANELS

EPS BUILDINGS	DETAIL: DOUBLE LUMBER SPLINE ASSEMBLY	
	SCALE: N.T.S.	DETAIL#
	UPDATED: 1/26/16	SP4

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

NOTE: SEE FASTEN SCHEDULE FOR ALL CONNECTIONS



NOTE: WALL PANELS, ROOF PANELS & FOUNDATION PANELS

EPS BUILDINGS

DETAIL: TRIPLE LUMBER SPLINE ASSEMBLY

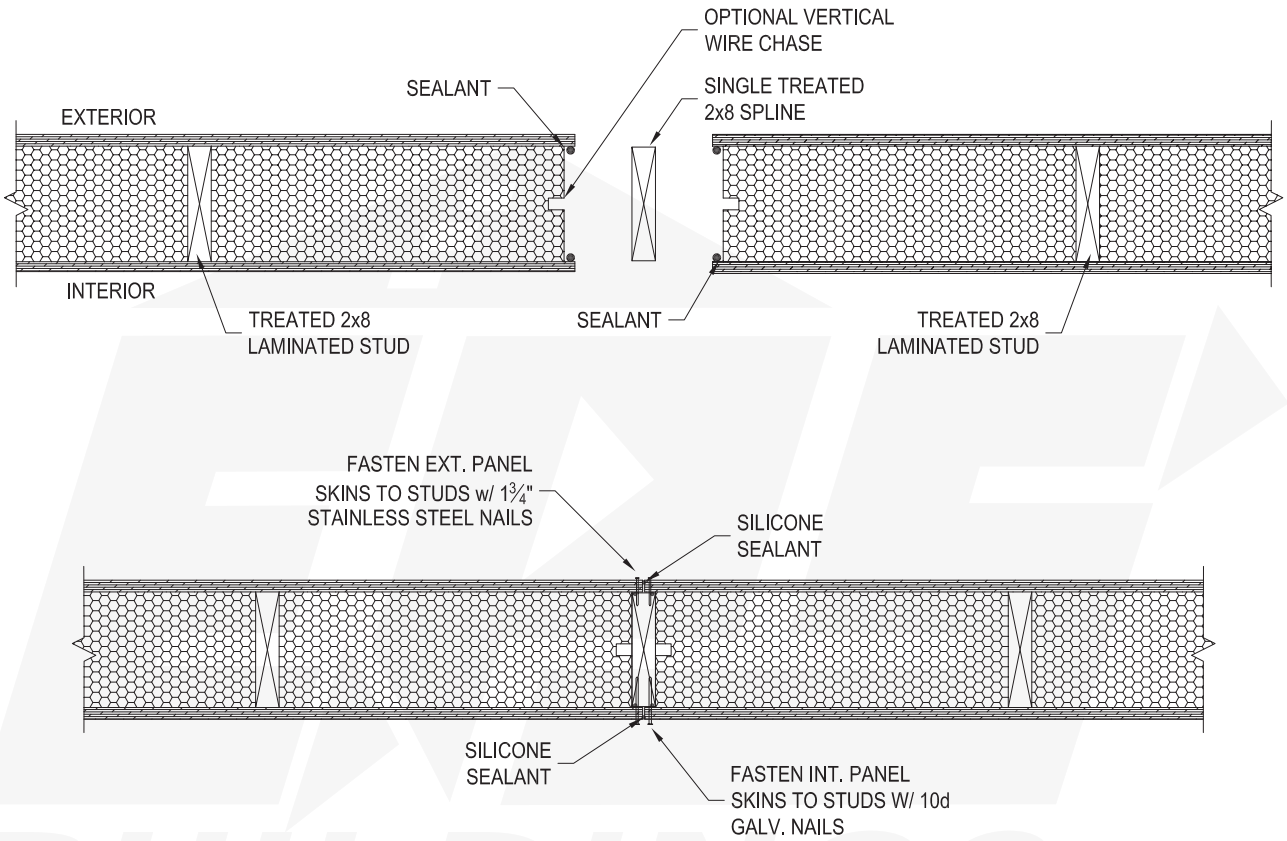
SCALE: N.T.S.

DETAIL# SP5

UPDATED: 1/26/16

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

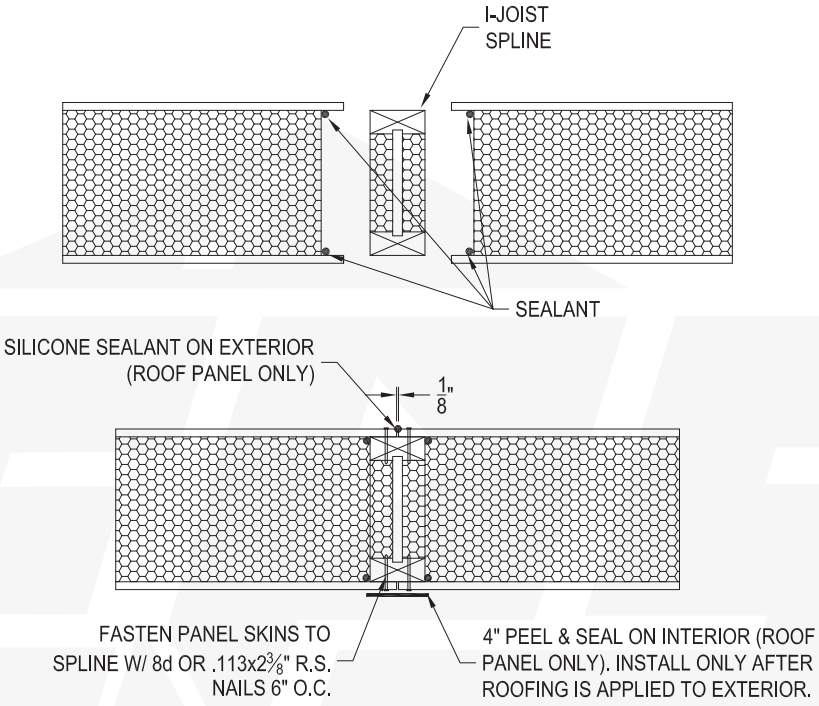
NOTE: SEE FASTEN SCHEDULE FOR ALL CONNECTIONS



DETAIL:	FOUNDATION SPLINE ASSEMBLY	
SCALE:	N.T.S.	DETAIL#
UPDATED:	1/26/16	SP6

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

NOTE: SEE FASTEN SCHEDULE FOR ALL CONNECTIONS

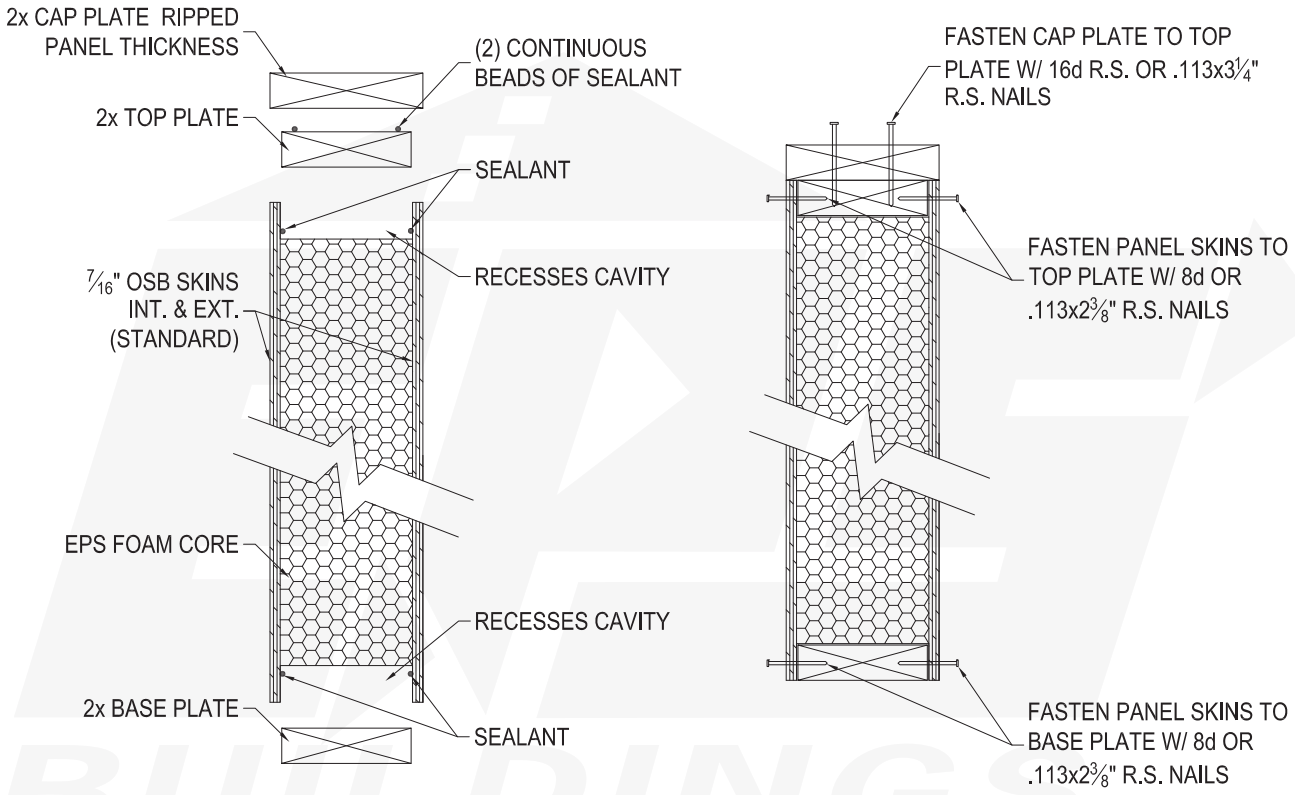


NOTE: ROOF PANELS. CHECK WITH EPS FOR AVAILABILITY

DETAIL:	I-JOIST ROOF SPLINE	
SCALE:	N.T.S.	DETAIL#
UPDATED:	9/27/10	SP7

ENERGY PANEL STRUCTURES, 102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

NOTE: SEE FASTEN SCHEDULE FOR ALL CONNECTIONS



DETAIL: TYPICAL WALL/DOUBLE TOP PLATE

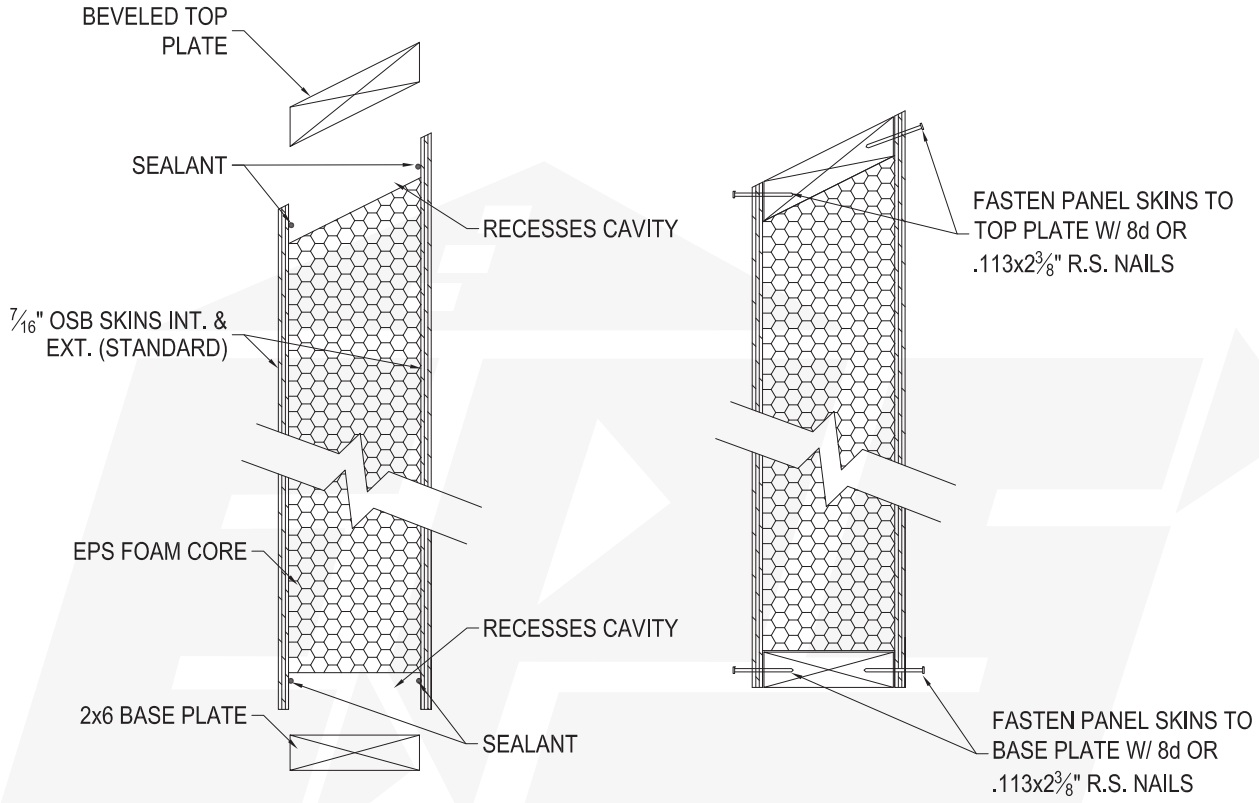
SCALE: N.T.S.

DETAIL# WA1

UPDATED: 1/26/16

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

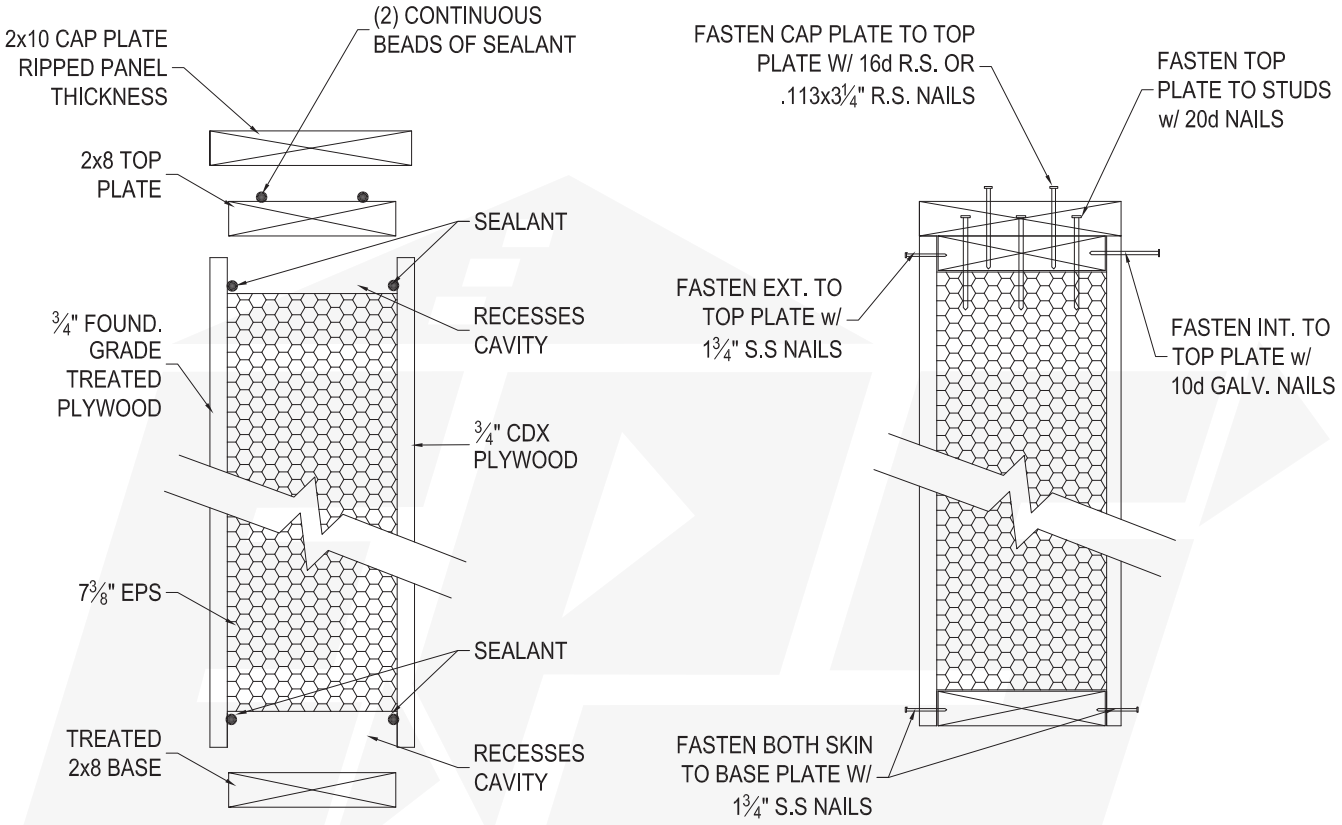
NOTE: SEE FASTEN SCHEDULE FOR ALL CONNECTIONS



DETAIL:	TYPICAL WALL/DOUBLE BEVELED TOP PLATE	
SCALE:	N.T.S.	DETAIL#
UPDATED:	1/26/16	WA2

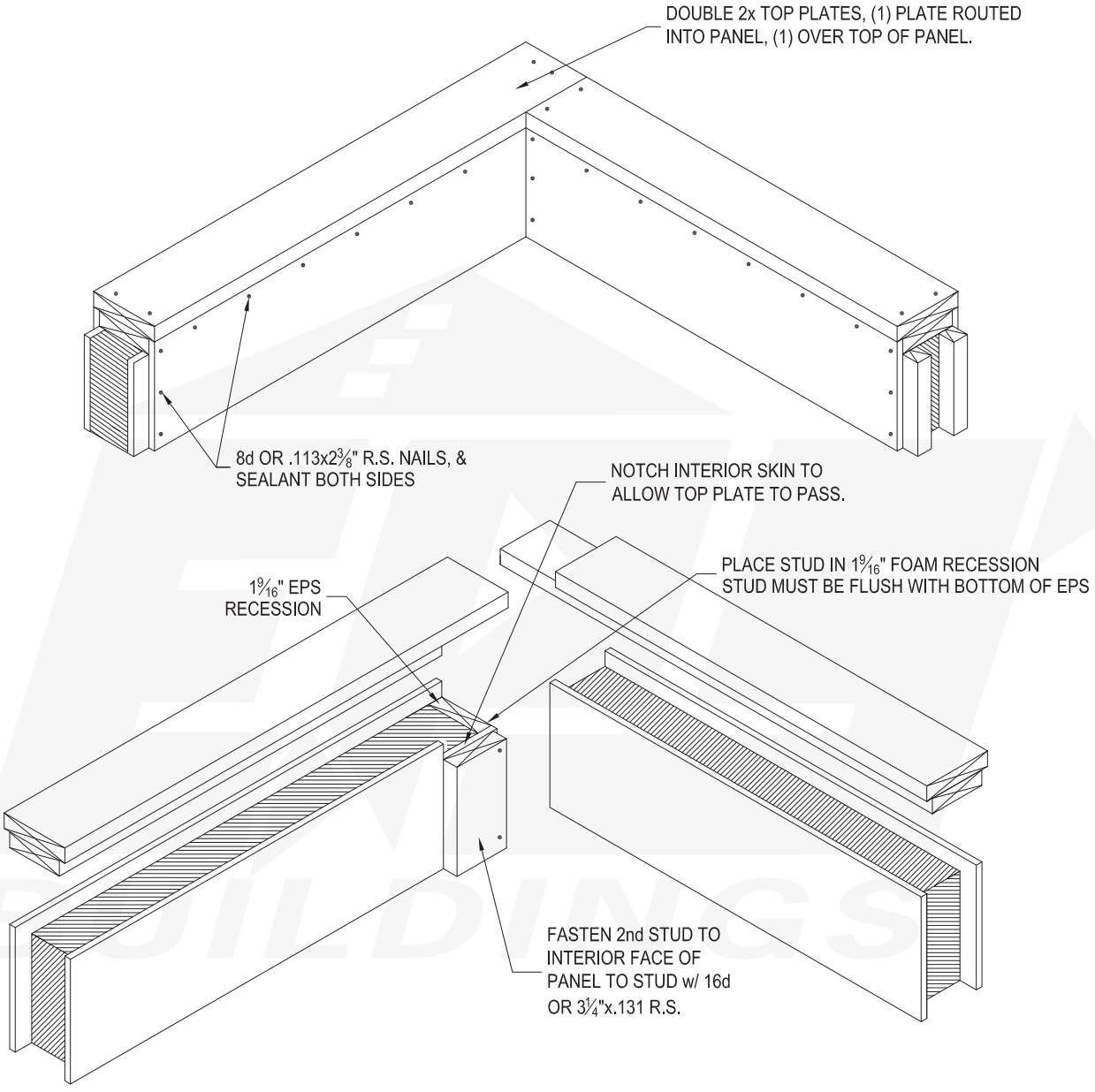
ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

NOTE: SEE FASTEN SCHEDULE FOR ALL CONNECTIONS



DETAIL: TYPICAL FOUNDATION PANEL		
SCALE: N.T.S.		DETAIL#
UPDATED: 1/26/16		WA3

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM



EPS BUILDINGS

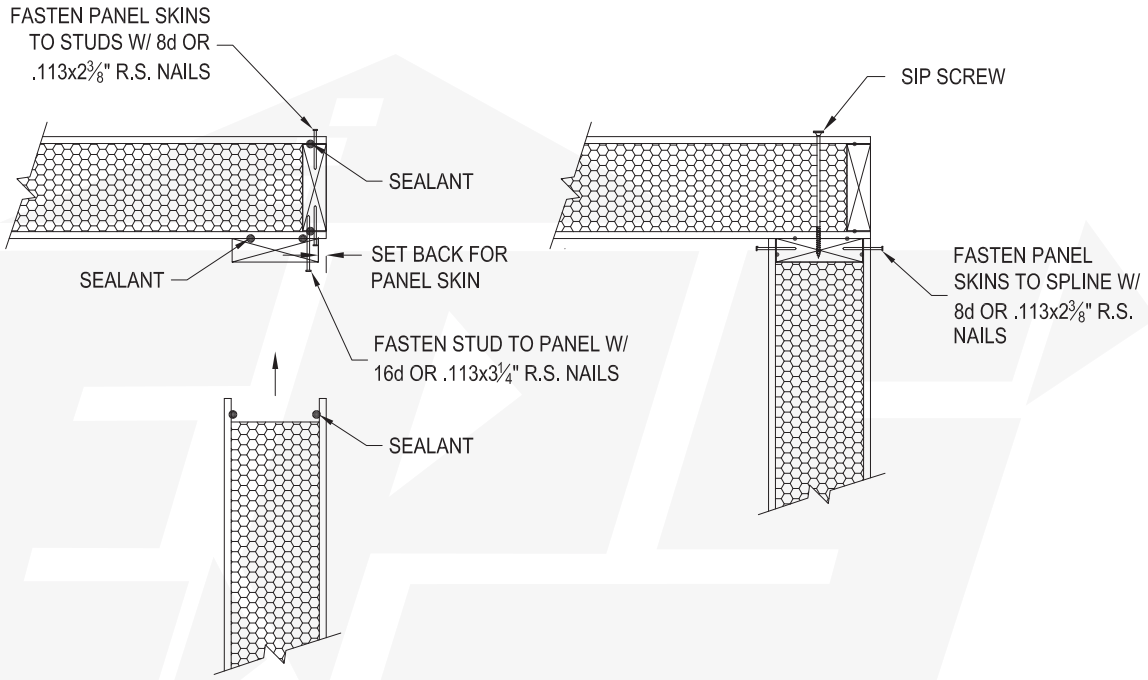
DETAIL: CORNER DETAIL

SCALE: N.T.S.

DETAIL# CD1

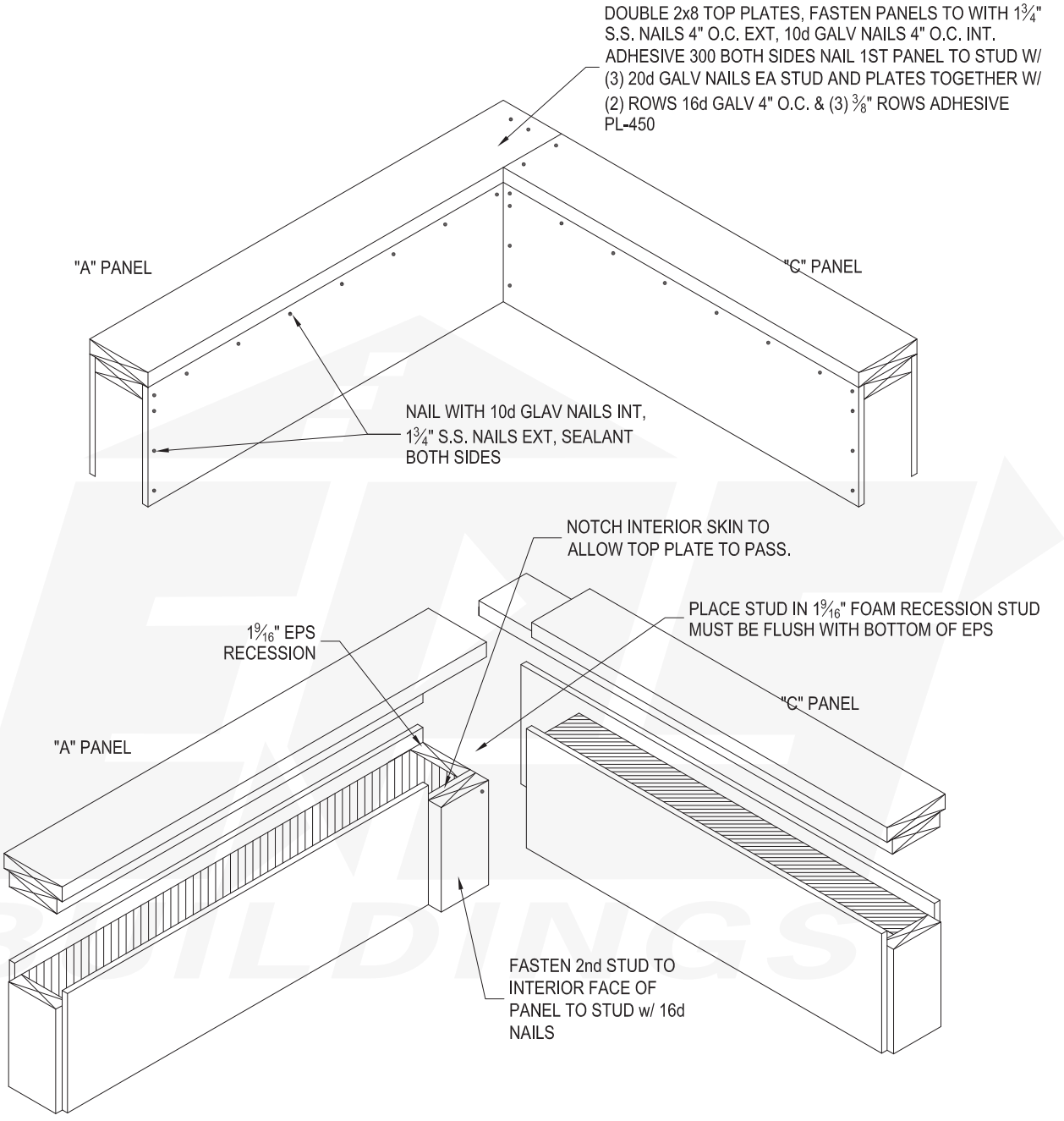
UPDATED: 1/26/16

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM



DETAIL:	CORNER DETAIL (STANDARD)	
SCALE:	N.T.S.	DETAIL#
UPDATED:	1/26/16	CD2

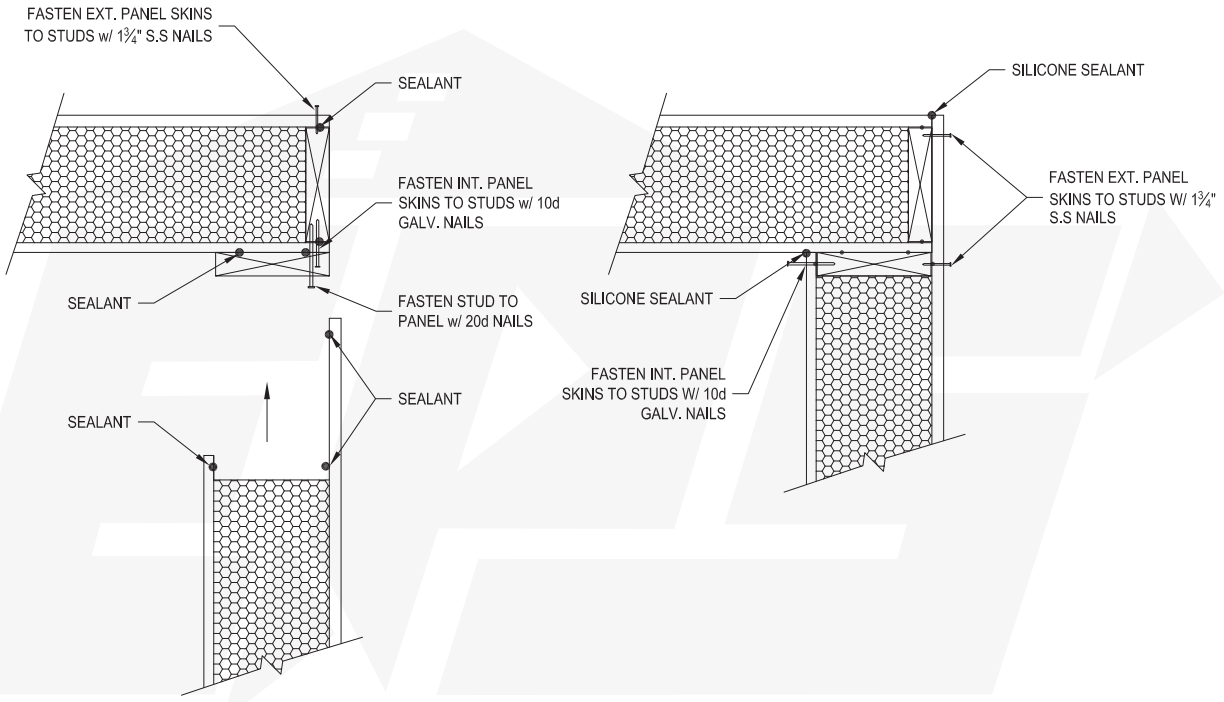
ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM



EPS BUILDINGS

DETAIL: FOUNDATION CORNER DETAIL	
SCALE: N.T.S.	DETAIL#
UPDATED: 1/26/16	CD3

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM



DETAIL: FOUNDATION CORNER DETAIL (STANDARD)

SCALE: N.T.S.

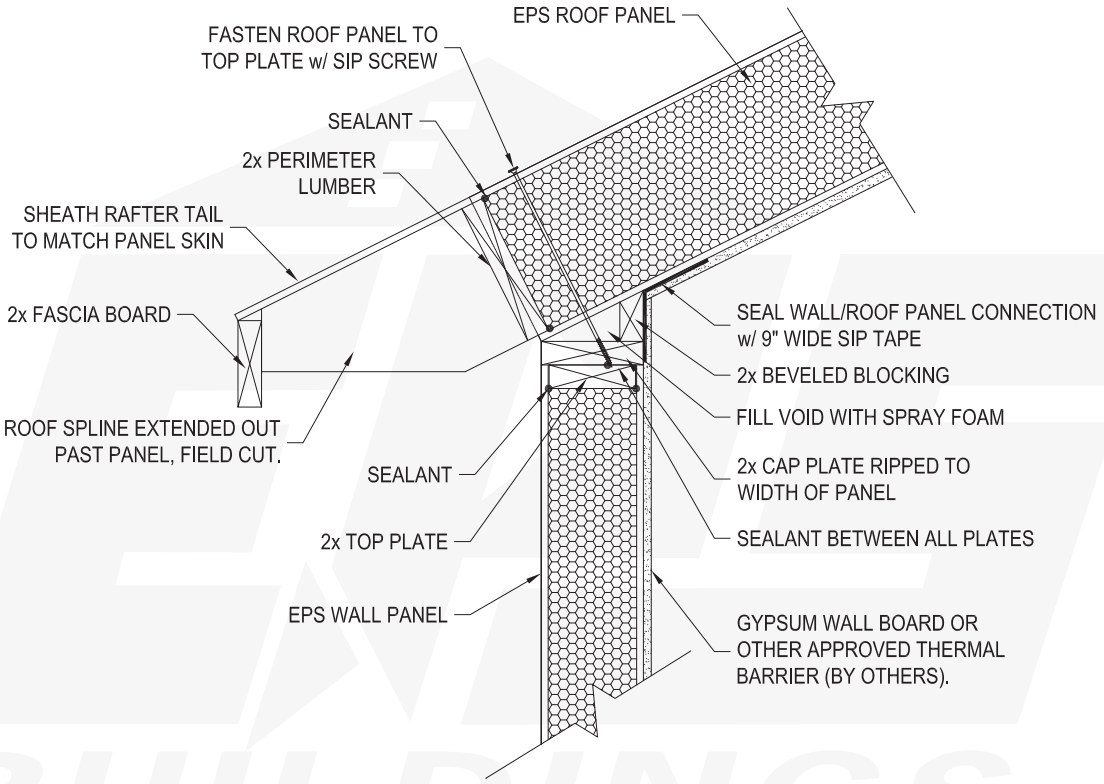
DETAIL# CD4

UPDATED: 1/26/16

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

NOTE: SEE FASTEN SCHEDULE FOR ALL CONNECTIONS

EPS STANDARD

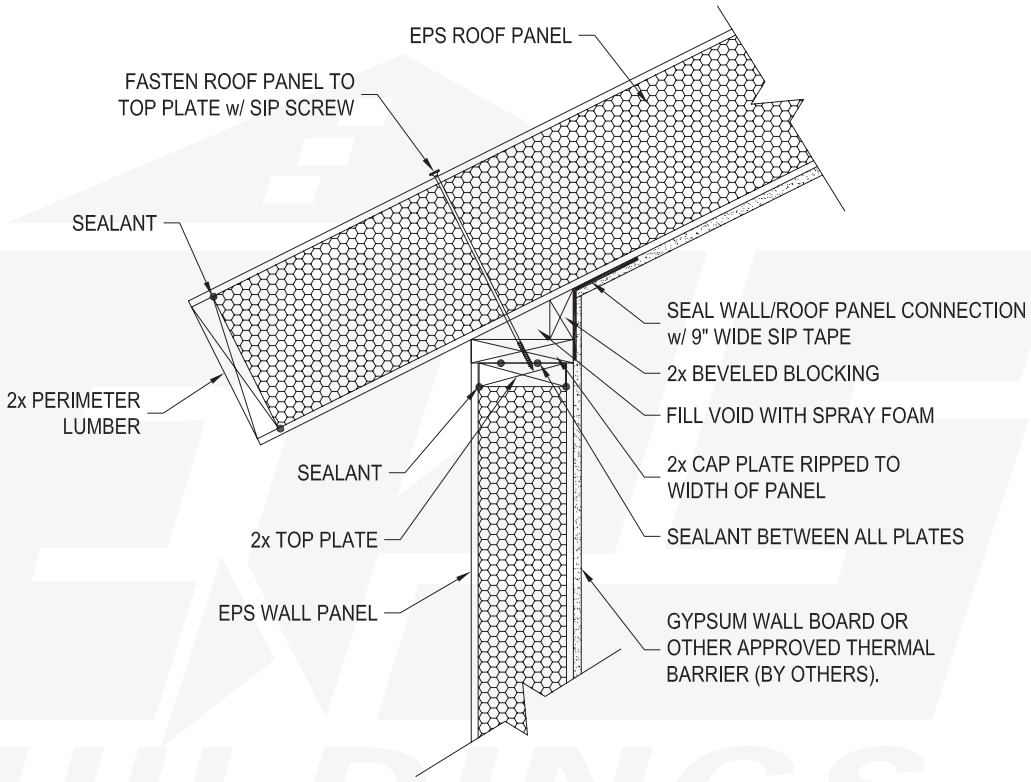


NOTE: THIS DETAIL CAN ONLY BE USED WITH STRUCTURAL LUMBER SPLINES

DETAIL:	DOUBLE TOP PLATE/SQ CUT EAVE/RAFTER PAST	
SCALE:	N.T.S.	DETAIL#
UPDATED:	1/26/16	RP1

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

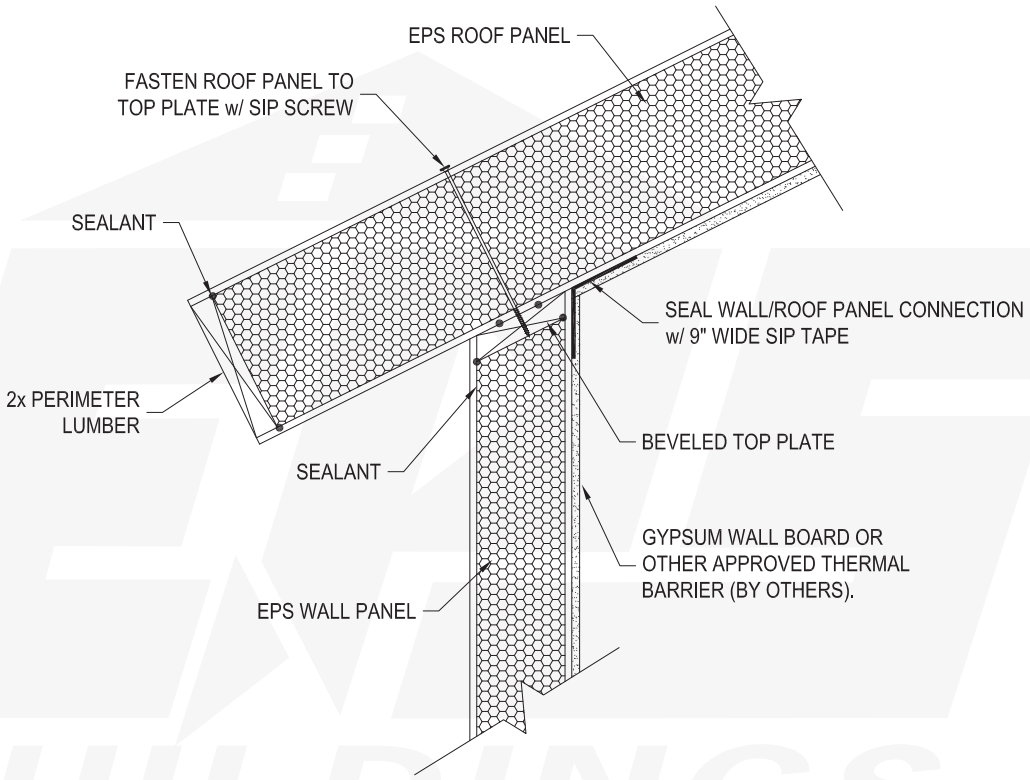
NOTE: SEE FASTEN SCHEDULE FOR ALL CONNECTIONS



DETAIL:	DBL. TOP PLATE W/BEVELD BLOCK/SQ CUT EAVE	
SCALE: N.T.S.		DETAIL#
UPDATED: 1/26/16		RP2

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

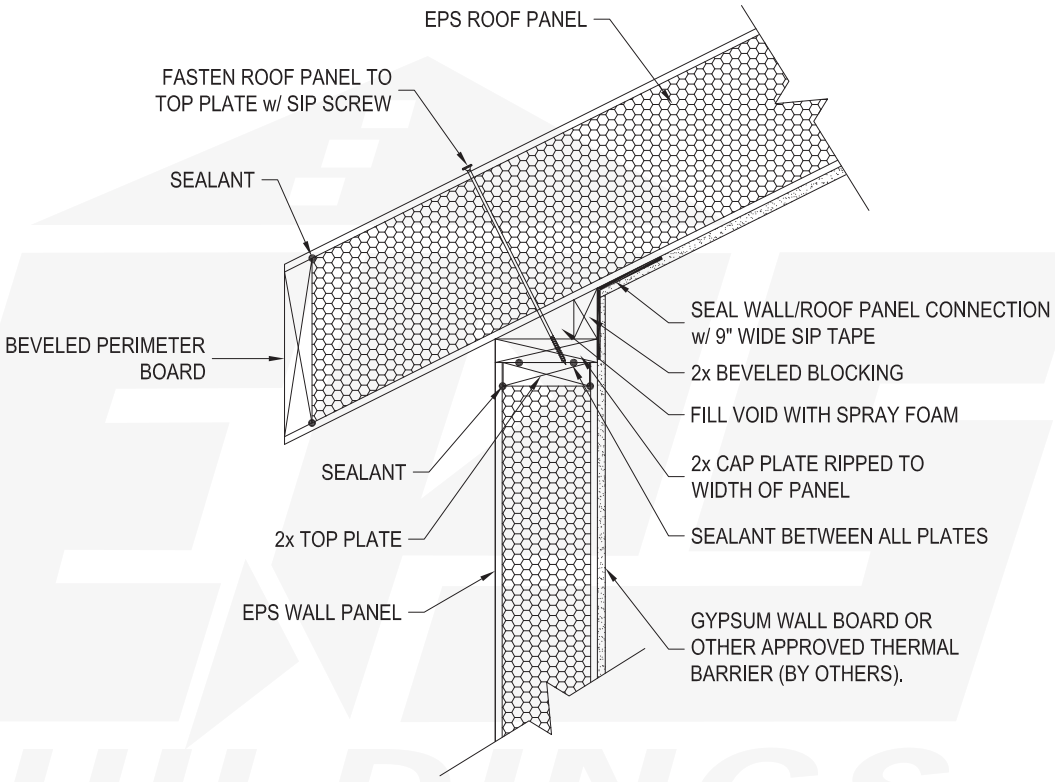
NOTE: SEE FASTEN SCHEDULE FOR ALL CONNECTIONS



DETAIL:	BEVELED TOP PLATE/SQ CUT EAVE	
SCALE:	N.T.S.	DETAIL#
UPDATED:	1/26/16	RP3

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

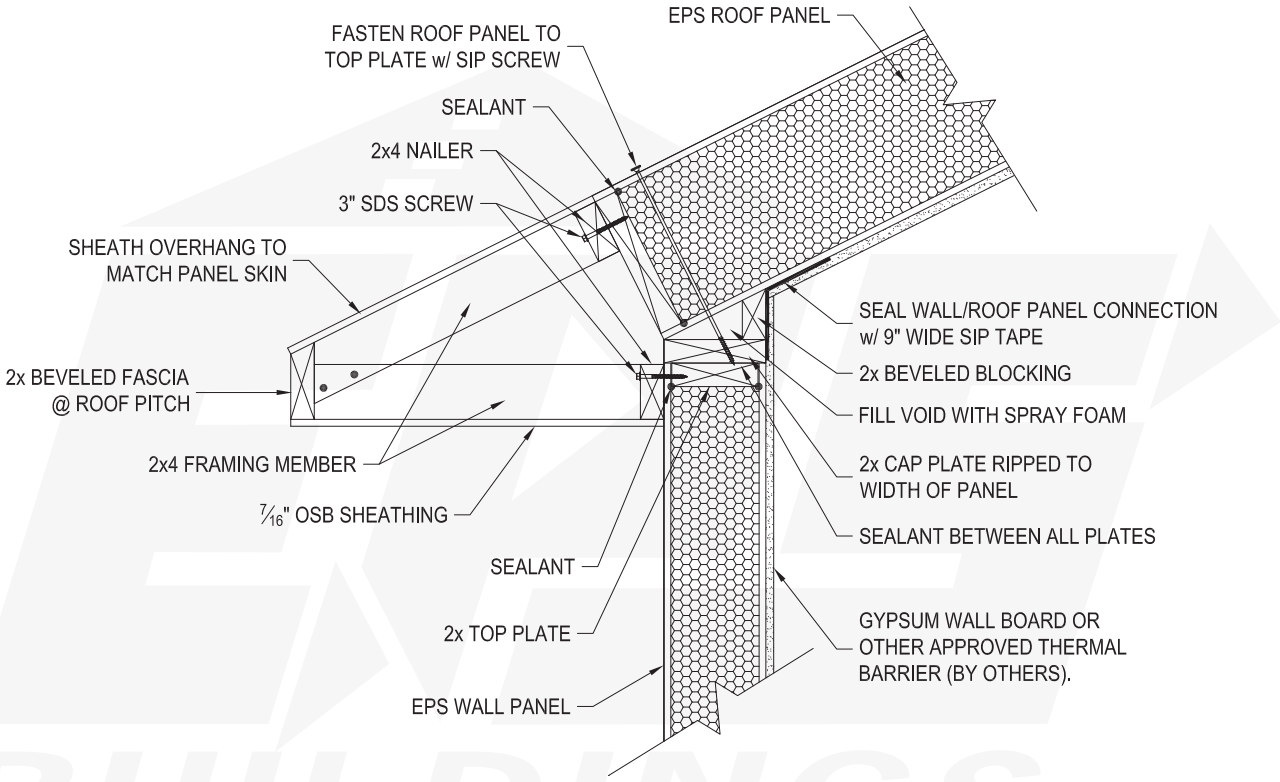
NOTE: SEE FASTEN SCHEDULE FOR ALL CONNECTIONS



DETAIL:	DOUBLE TOP PLATE/PLUMB CUT EAVE	
SCALE:	N.T.S.	DETAIL#
UPDATED:	1/26/16	RP4

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

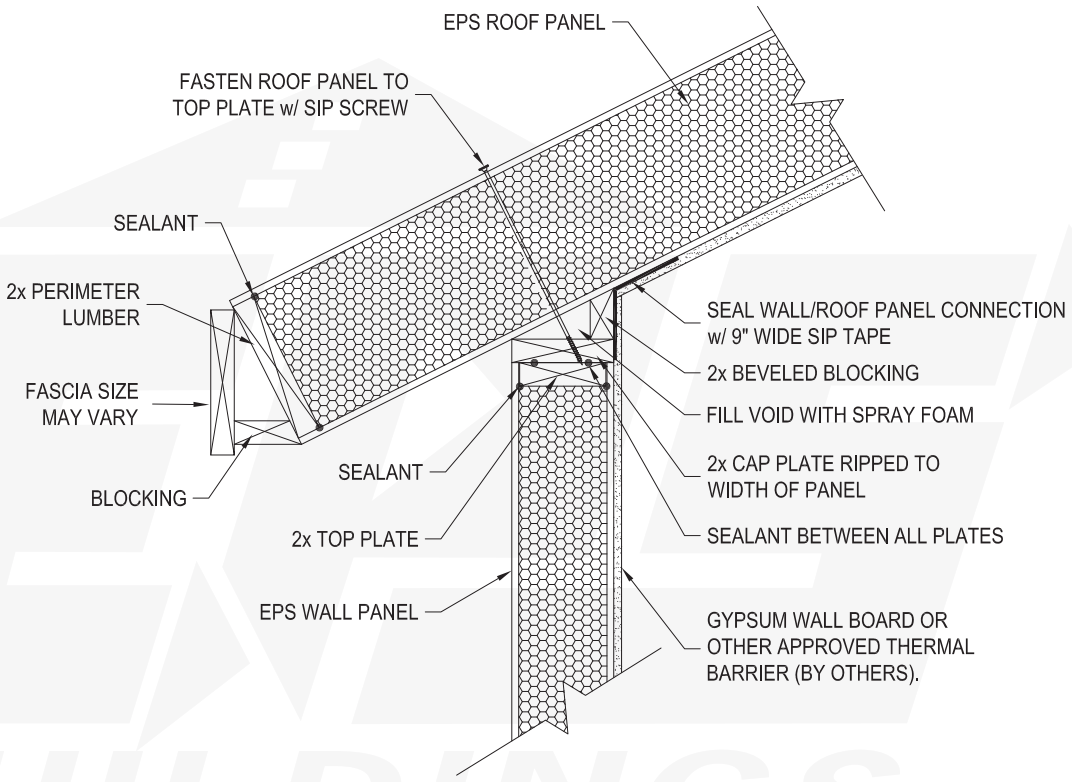
NOTE: SEE FASTEN SCHEDULE FOR ALL CONNECTIONS



DETAIL:	DOUBLE TOP PLATE/SQ CUT EAVE/RAFTER PAST	
SCALE:	N.T.S.	DETAIL#
UPDATED:	1/26/16	RP5

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

NOTE: SEE FASTEN SCHEDULE FOR ALL CONNECTIONS



DETAIL: DOUBLE TOP PLATE/SQ CUT EAVE

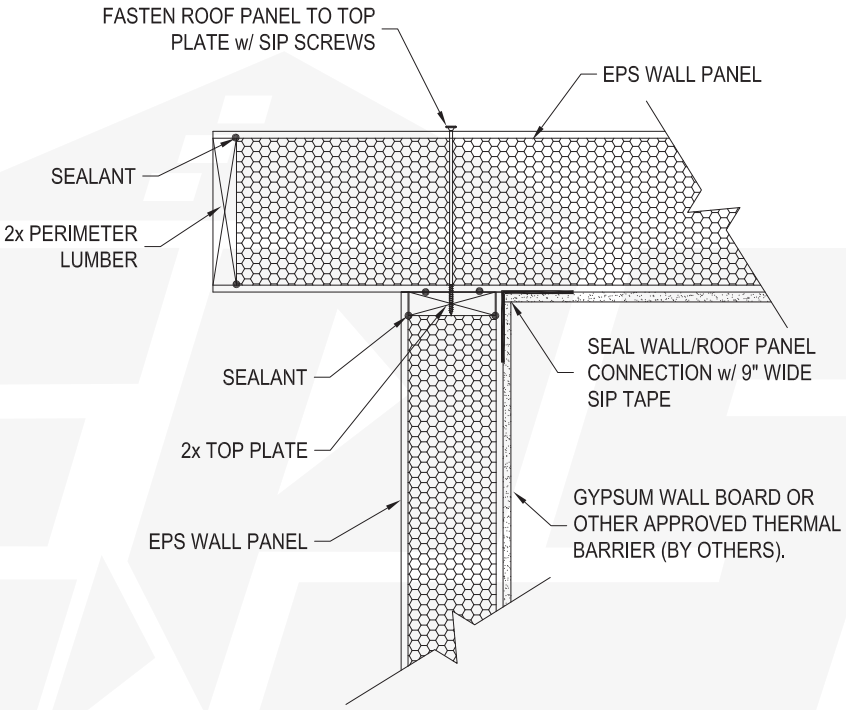
SCALE: N.T.S.

DETAIL# RP6

UPDATED: 1/26/16

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

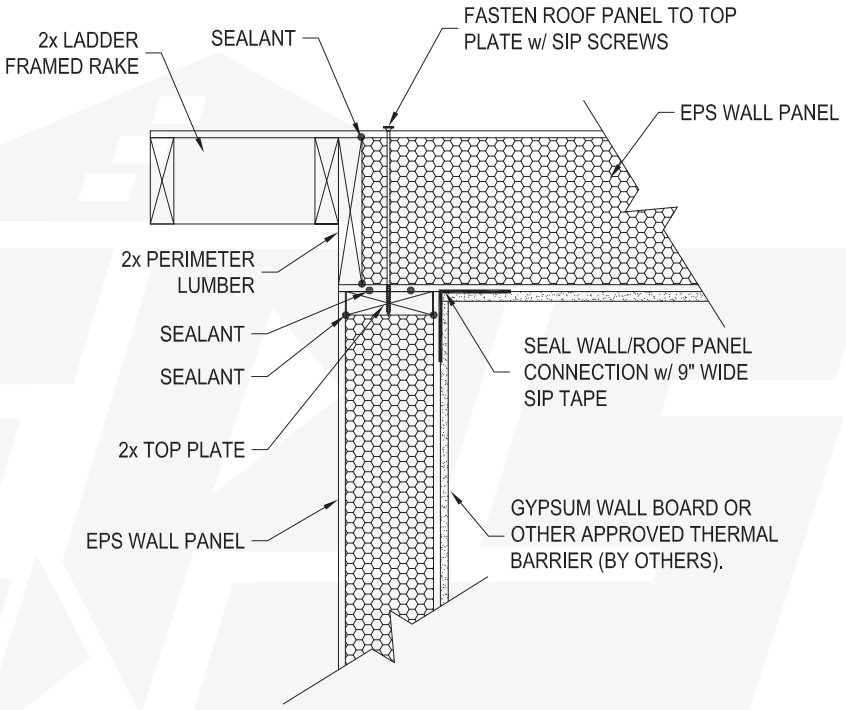
NOTE: SEE FASTEN SCHEDULE FOR ALL CONNECTIONS



DETAIL:	WALL PANEL/ROOF PANEL RAKE EXT.	
SCALE:	N.T.S.	DETAIL#
UPDATED:	1/26/16	RP7

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

NOTE: SEE FASTEN SCHEDULE FOR ALL CONNECTIONS

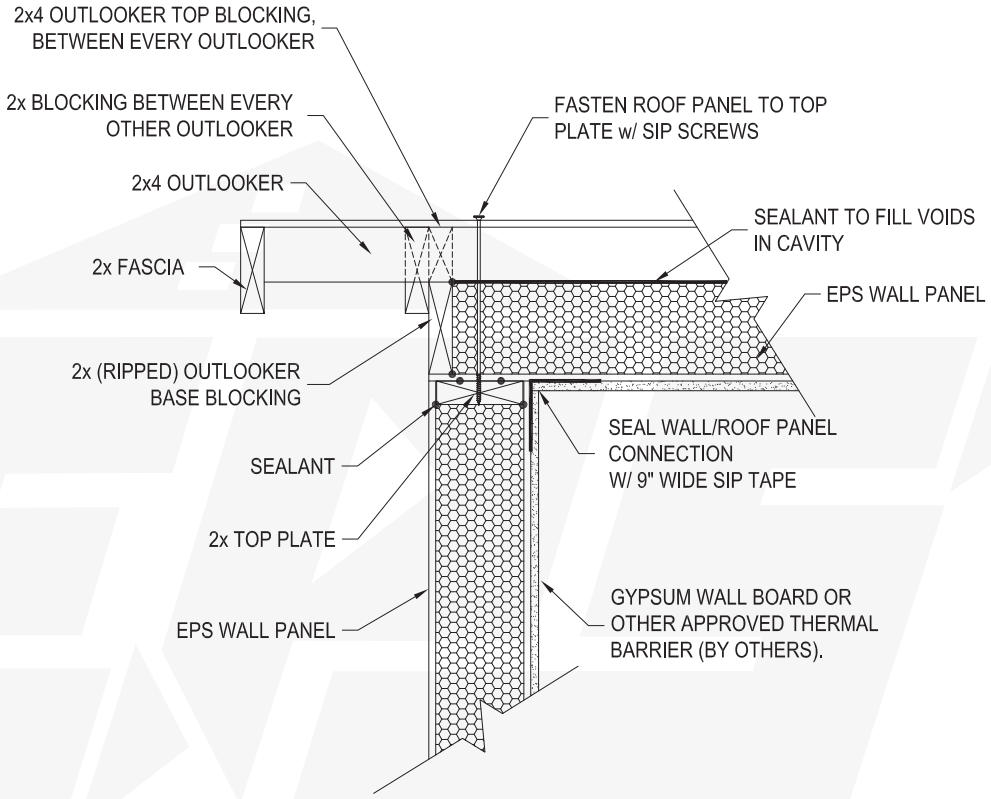


NOTE: 1'-0" MAXIMUM RAKE EXTENSION

DETAIL:	WALL PANEL/ROOF "C" PANEL W/ LADDER RAKE	
SCALE: N.T.S.		DETAIL#
UPDATED: 1/26/16		RP8

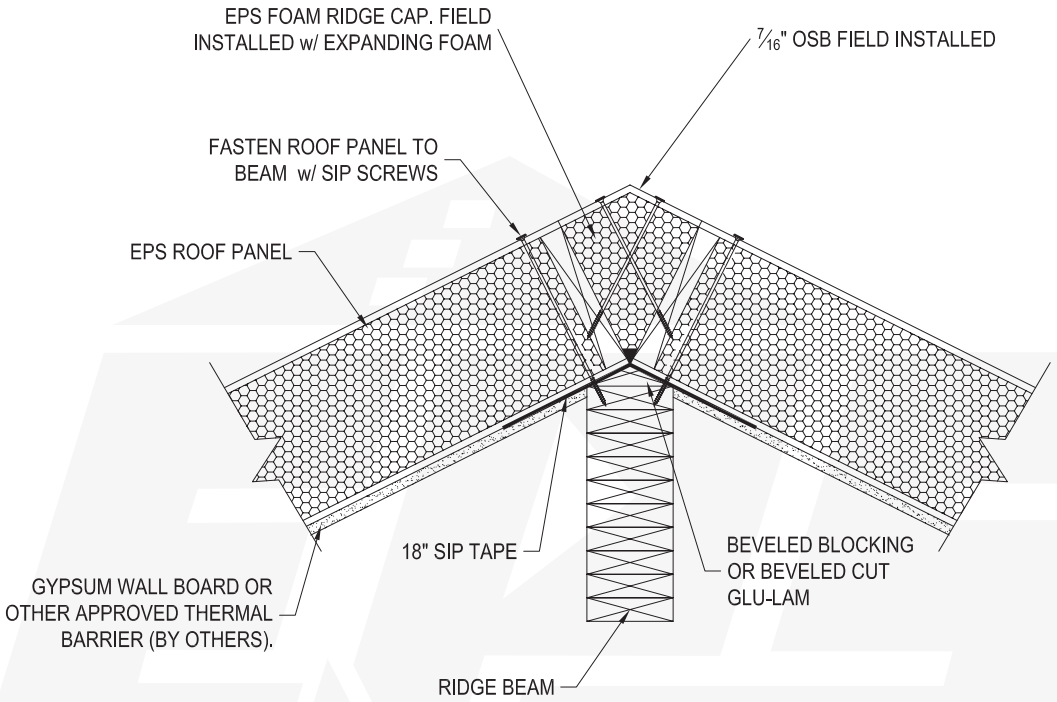
ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

NOTE: SEE FASTEN SCHEDULE FOR ALL CONNECTIONS



DETAIL:	WALL PANEL/ROOF PANEL W/ OUTLOOKER	
SCALE:	N.T.S.	DETAIL#
UPDATED:	1/26/16	RP9

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

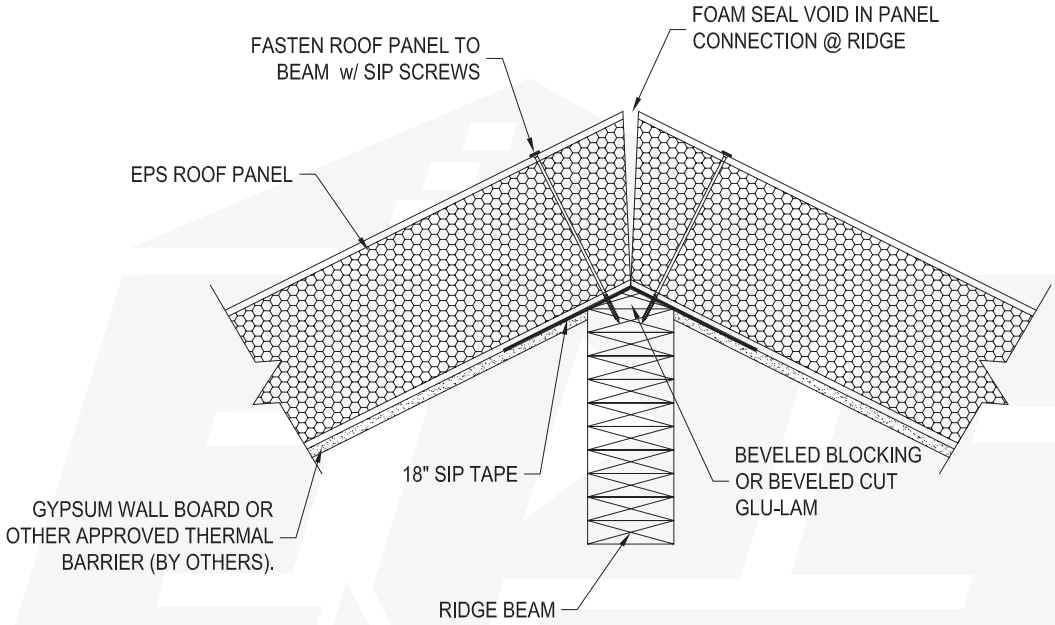


NOTE: CHECK WITH EPS ON BEVELED GLU-LAM AVAILABILITY

DETAIL:	ROOF PANEL/RIDGE BEAM/FOAM CAP	
SCALE:	N.T.S.	DETAIL#
UPDATED:	1/26/16	RB0

ENERGY PANEL STRUCTURES, 102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

NOTE: SEE FASTEN SCHEDULE FOR ALL CONNECTIONS

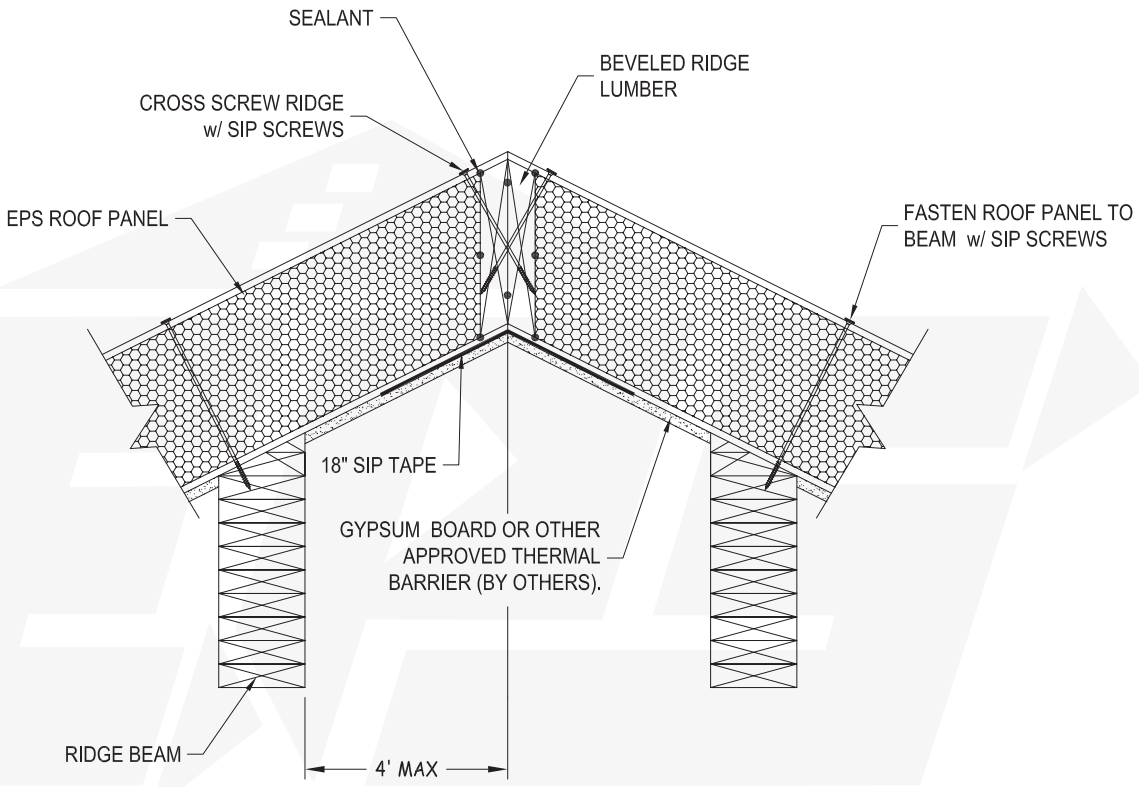


NOTE: CHECK WITH EPS ON BEVELED GLU-LAM AVAILABILITY

DETAIL:	ROOF PANEL/RIDGE BEAM	
SCALE:	N.T.S.	DETAIL#
UPDATED:	1/26/16	RB1

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

NOTE: SEE FASTEN SCHEDULE FOR ALL CONNECTIONS

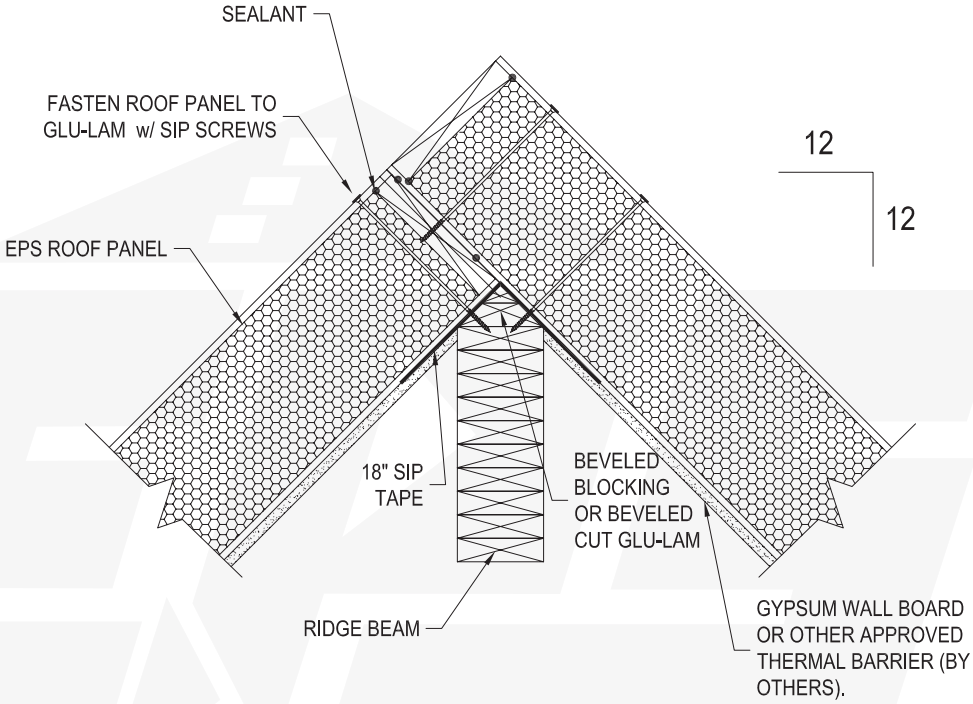


NOTE: CHECK WITH EPS ON BEVELED GLU-LAM AVAILABILITY

DETAIL:	ROOF PANEL W/ LUMBER/RIDGE BEAM	
SCALE:	N.T.S.	DETAIL#
UPDATED:	1/26/16	RB2

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

NOTE: SEE FASTEN SCHEDULE FOR ALL CONNECTIONS

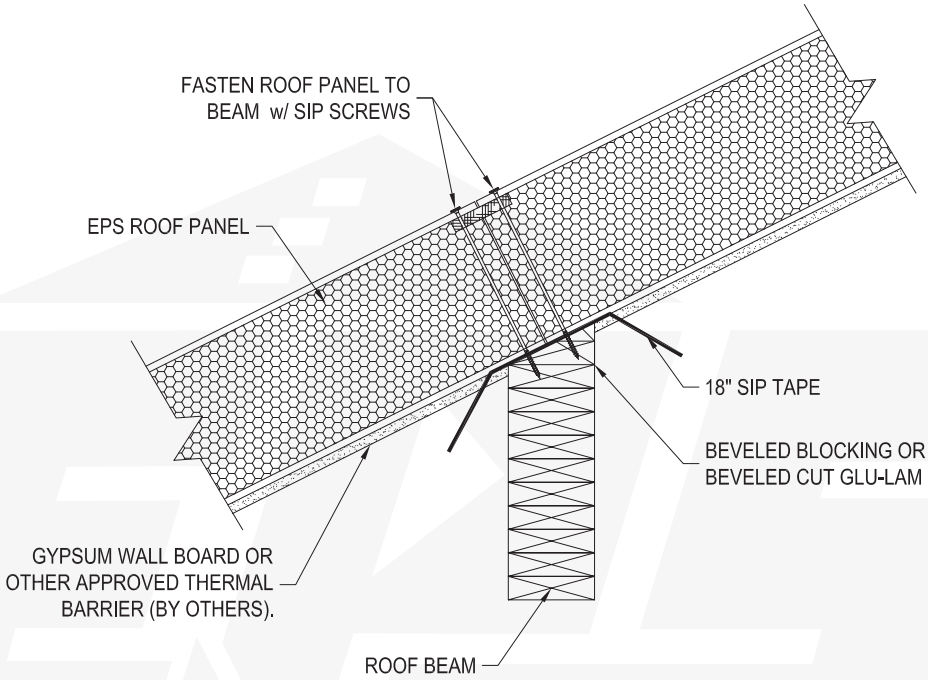


NOTE: CHECK WITH EPS ON BEVELED GLU-LAM AVAILABILITY

DETAIL:	ROOF PANEL OVERLAY/RIDGE BEAM	
SCALE:	N.T.S.	DETAIL#
UPDATED:	1/26/16	RB3

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

NOTE: SEE FASTEN SCHEDULE FOR ALL CONNECTIONS

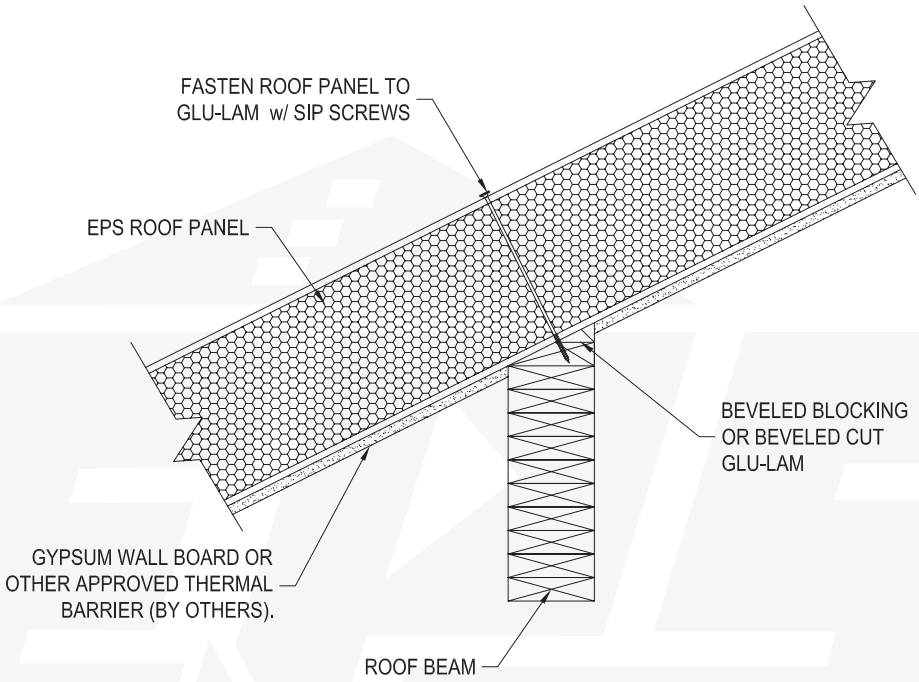


NOTE: CHECK WITH EPS ON BEVELED GLU-LAM AVAILABILITY

DETAIL:	ROOF PANEL SPLINE AT MIDSPAN BEAM	
SCALE:	N.T.S.	DETAIL#
UPDATED:	1/26/16	RB4

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

NOTE: SEE FASTEN SCHEDULE FOR ALL CONNECTIONS

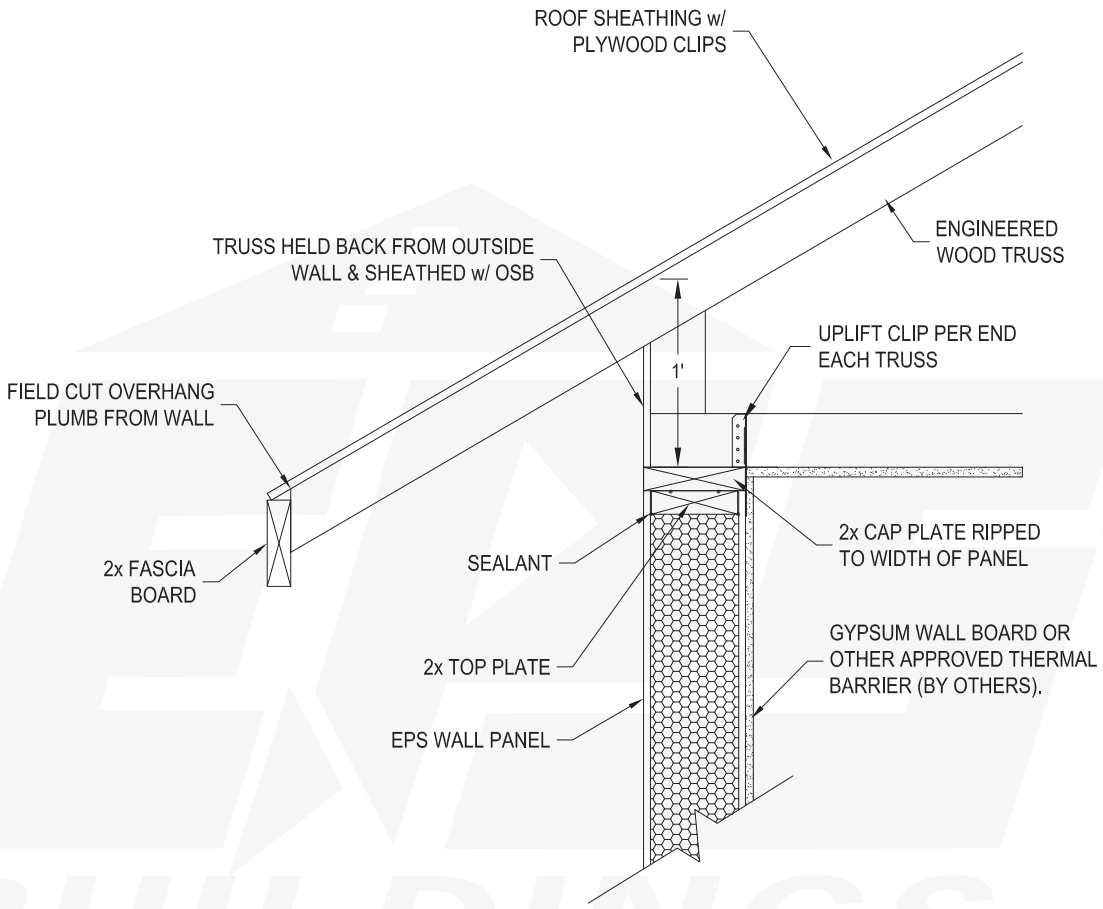


NOTE: CHECK WITH EPS ON BEVELED GLU-LAM AVAILABILITY

DETAIL:	ROOF PANEL/MIDSPAN BEAM	
SCALE:	N.T.S.	DETAIL#
UPDATED:	1/26/16	RB5

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

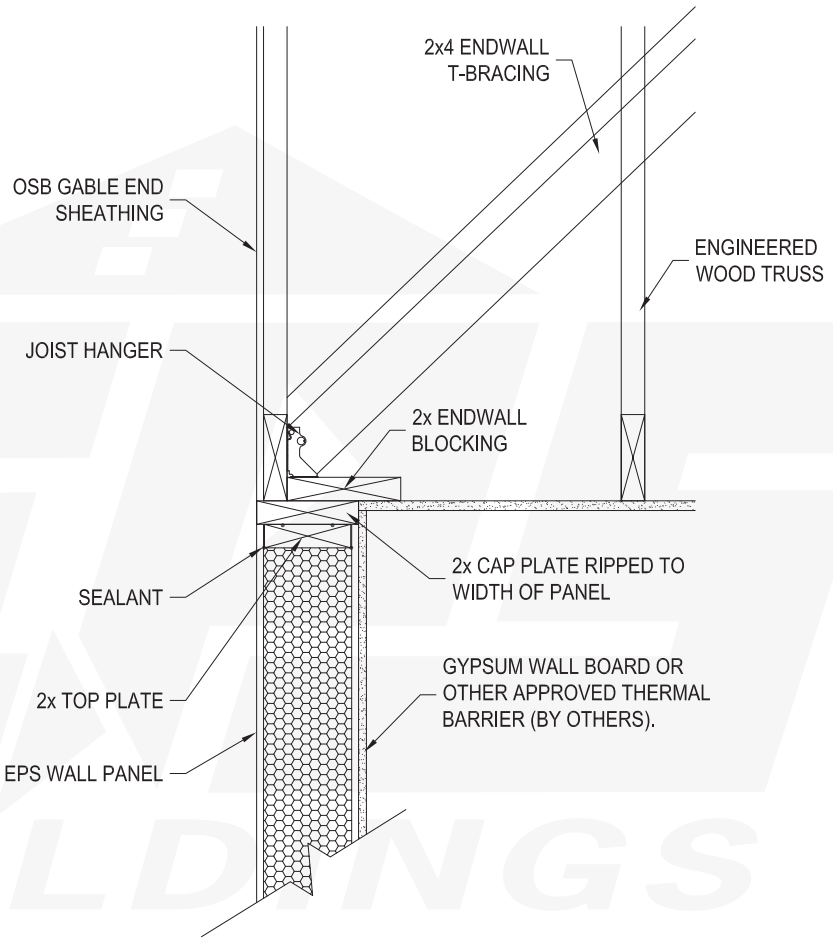
NOTE: SEE FASTEN SCHEDULE FOR ALL CONNECTIONS



DETAIL:	DBL. TOP PLATE/TYPICAL ROOF TRUSS
SCALE: N.T.S.	DETAIL# RT1
UPDATED: 1/26/16	

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

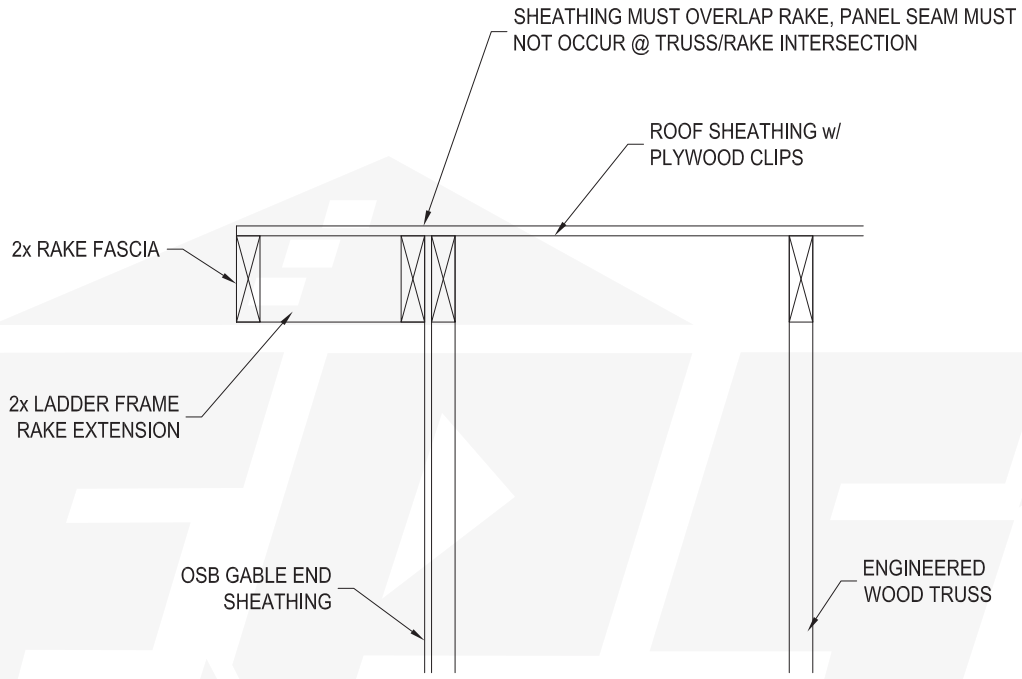
NOTE: SEE FASTEN SCHEDULE FOR ALL CONNECTIONS



DETAIL:	DBL. TOP PLATE/TYPICAL ENDWALL ROOF TRUSS
SCALE: N.T.S.	DETAIL#
UPDATED: 1/26/16	RT2

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

NOTE: SEE FASTEN SCHEDULE FOR ALL CONNECTIONS



NOTE: 1'-0" MAXIMUM RAKE EXTENSION

DETAIL: TYPICAL ROOF TRUSS RAKE

SCALE: N.T.S.

DETAIL# RT3

UPDATED: 1/26/16

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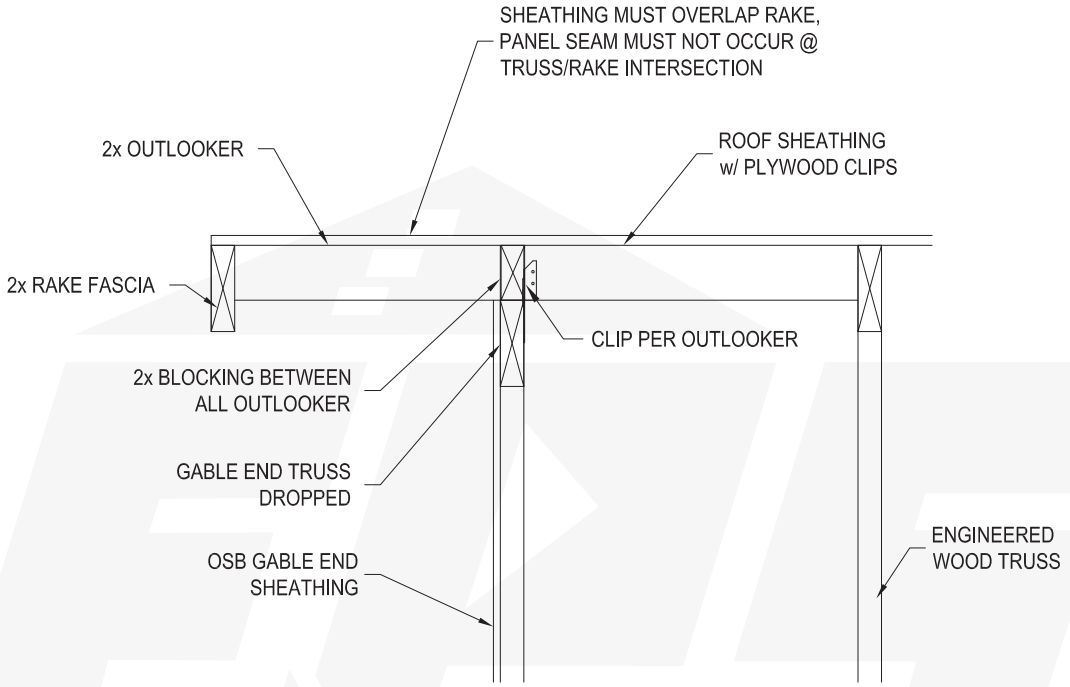
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

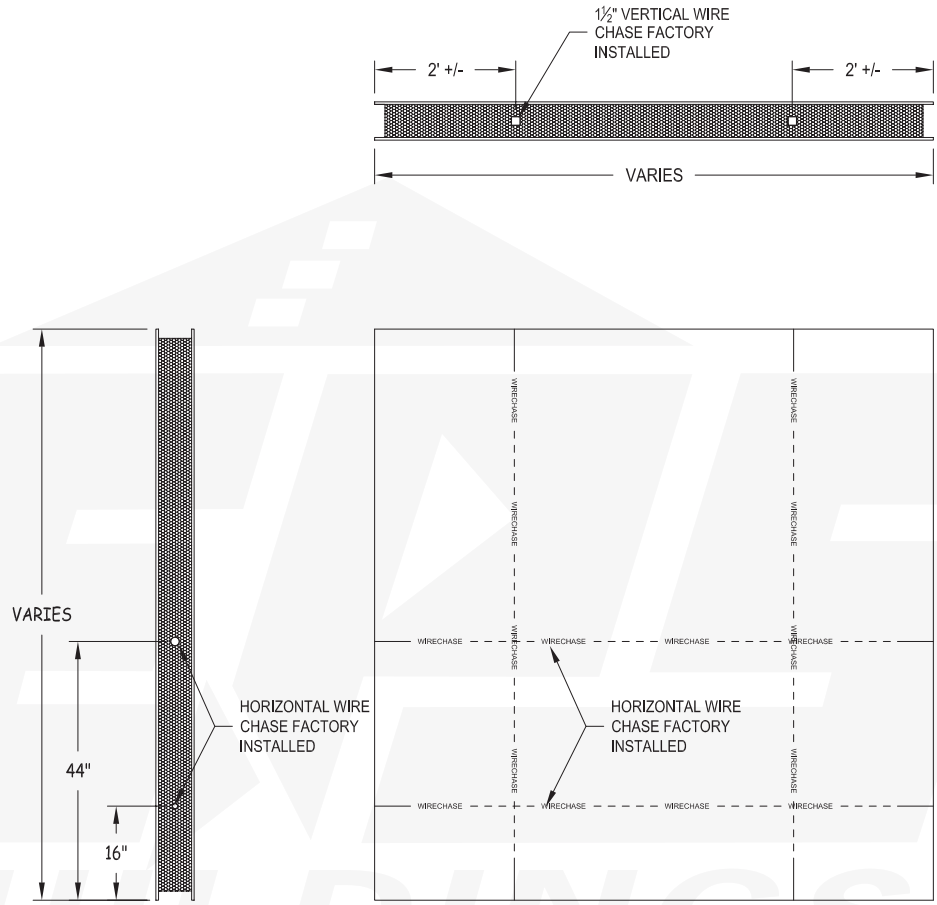
NOTE: SEE FASTEN SCHEDULE FOR ALL CONNECTIONS



DETAIL:	TYPICAL ROOF DROPPED TRUSS	
SCALE:	N.T.S.	DETAIL#
UPDATED:	1/26/16	RT4

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

NOTE: HOLES MUST BE DRILLED INTO TOP AND BOTTOM PLATES TO GIVE ACCESS TO CHASES AFTER PANELS ARE SET.



DETAIL: VERTICAL WIRE CHASE ALIGNMENT

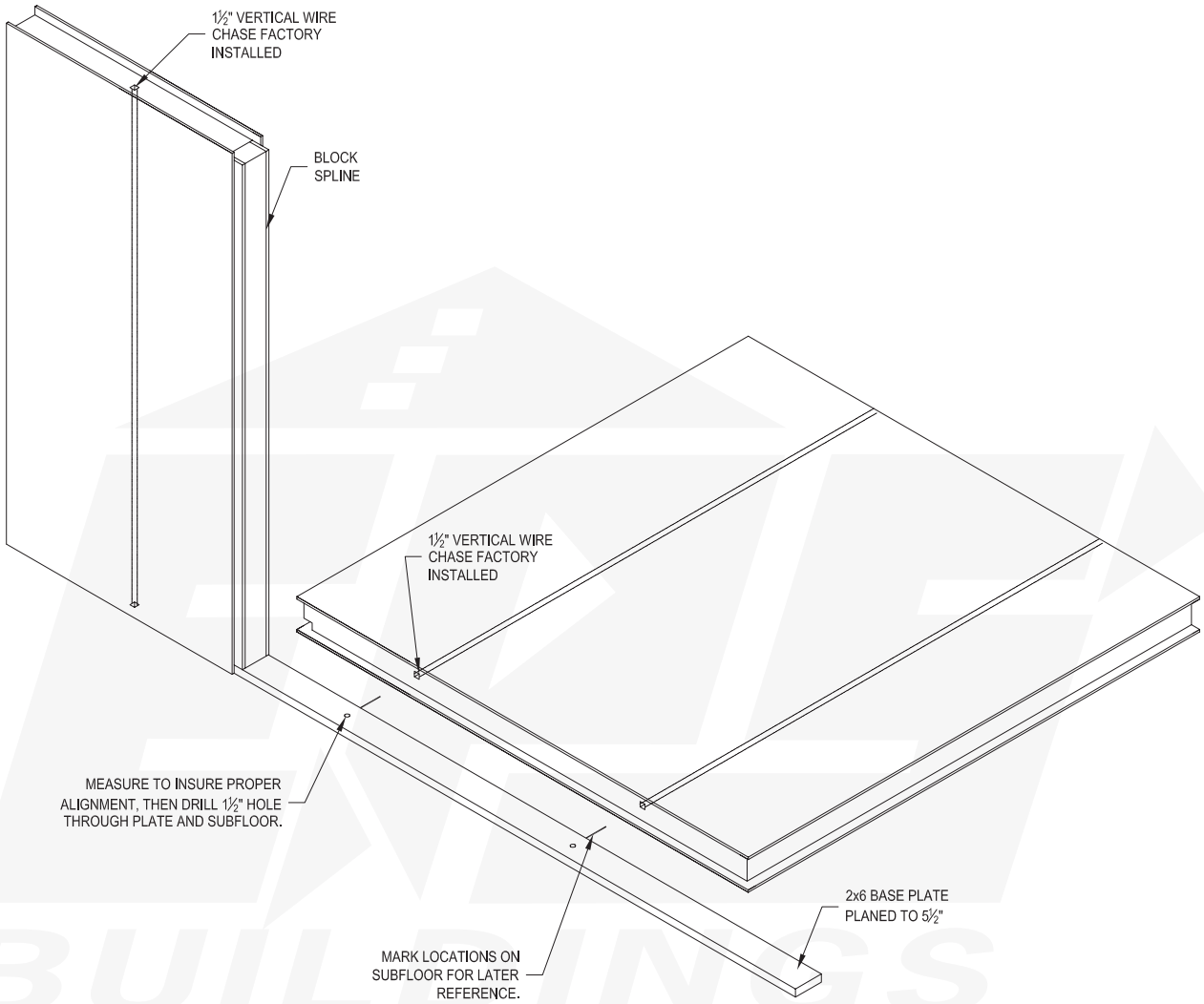
SCALE: N.T.S.

DETAIL# WC1

UPDATED: 1/26/16

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

NOTE: HOLES MUST BE DRILLED INTO TOP AND BOTTOM PLATES TO GIVE ACCESS TO CHASES AFTER PANELS ARE SET.

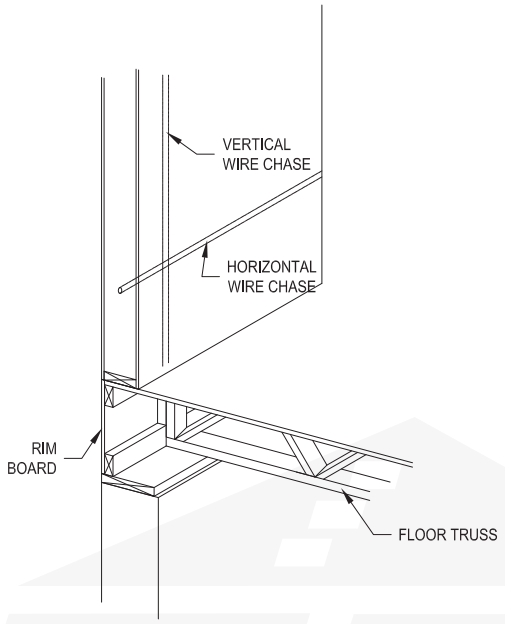


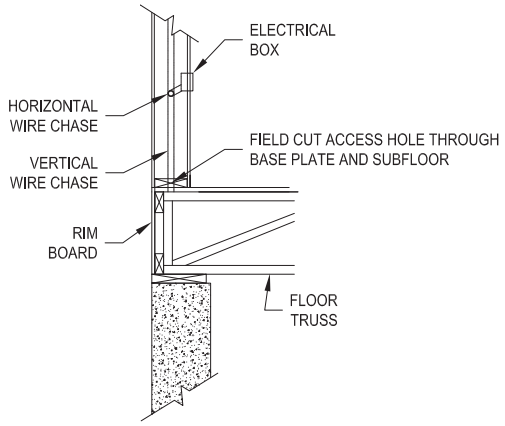
NOTE: IF PANELS RUN PAST FLOOR YOU MAY NEED TO MARK THE SILL PLATE FOR LATER REFERENCE

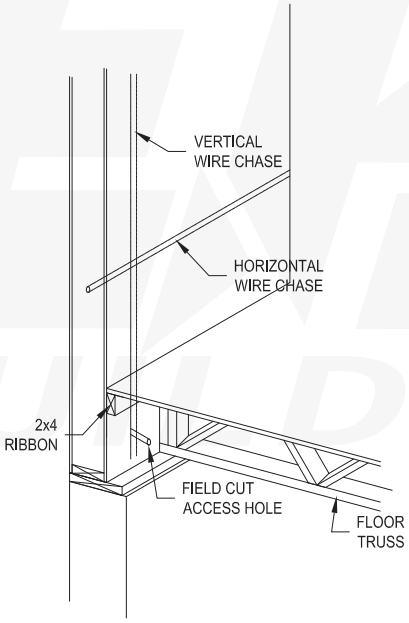
DETAIL:	VERTICAL WIRE CHASE ALIGNMENT	
SCALE:	N.T.S.	DETAIL#
UPDATED:	1/26/16	WC2

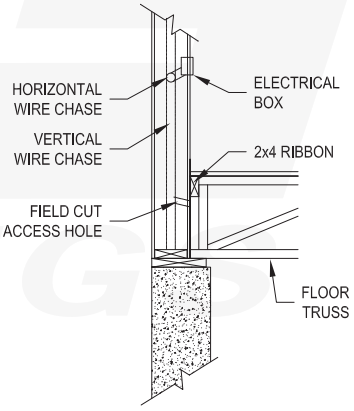
ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

NOTE: HOLES MUST BE DRILLED INTO TOP AND BOTTOM PLATES TO GIVE ACCESS TO CHASES AFTER PANELS ARE SET.









DETAIL: VERTICAL WIRE CHASE ALIGNMENT

SCALE: N.T.S.

DETAIL# WC3

UPDATED: 1/26/16

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
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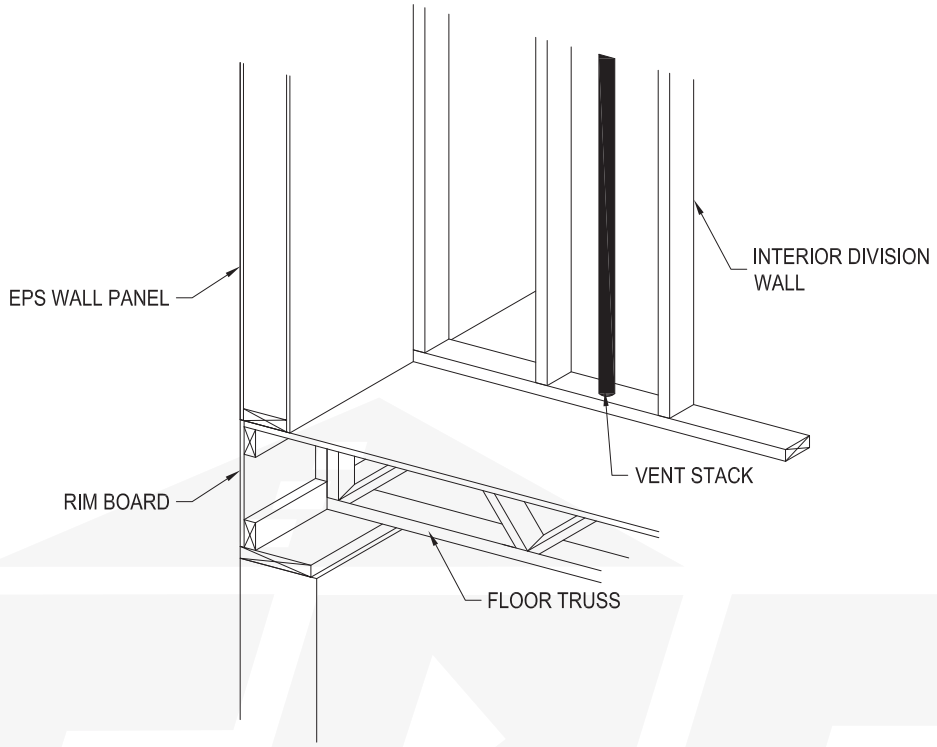
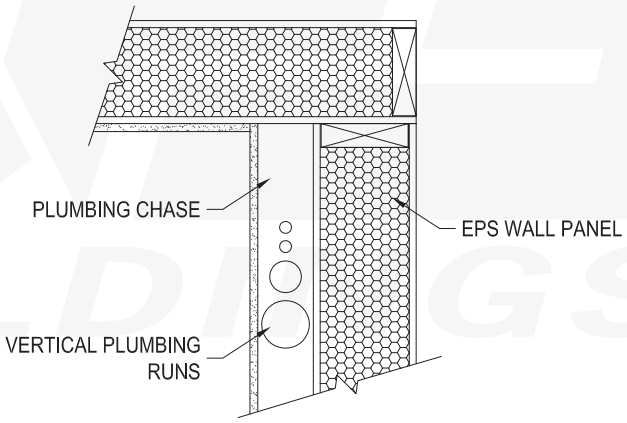
NOTE: RUNNING PLUMBING LINES IN SIP WALLS IS NOT RECOMMENDED





DETAIL: PLUMBING DETAIL

SCALE: N.T.S.

DETAIL# PL1

UPDATED: 1/26/16

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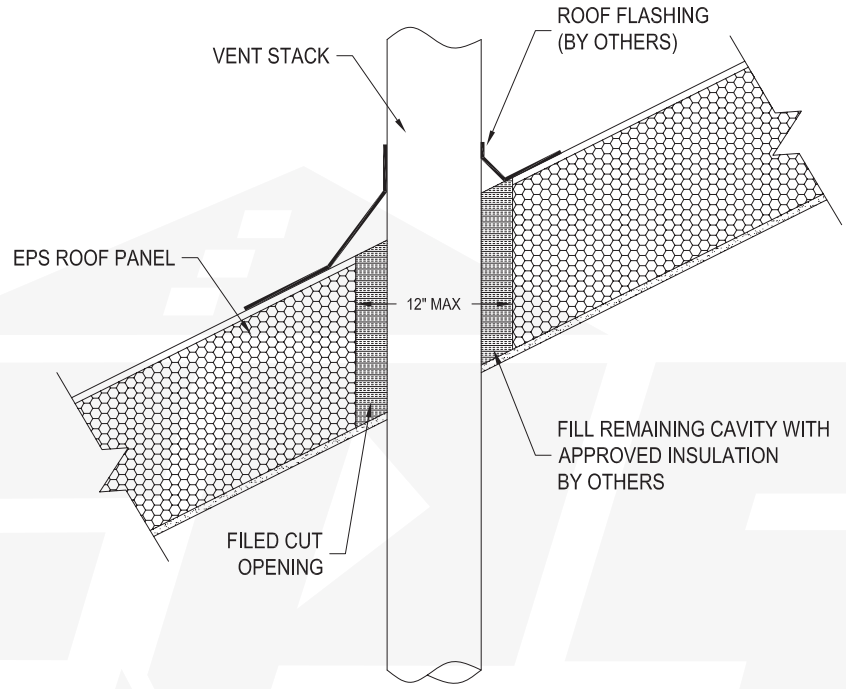

NOTE: HIGH TEMPERATURE INSULATION IS REQUIRED IN ANY APPLICATION WHERE TEMPERATURES EXCEED 160° F.

DETAIL:	ROOF PENETRATION	
SCALE:	N.T.S.	DETAIL#
UPDATED:	1/26/16	PL2

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
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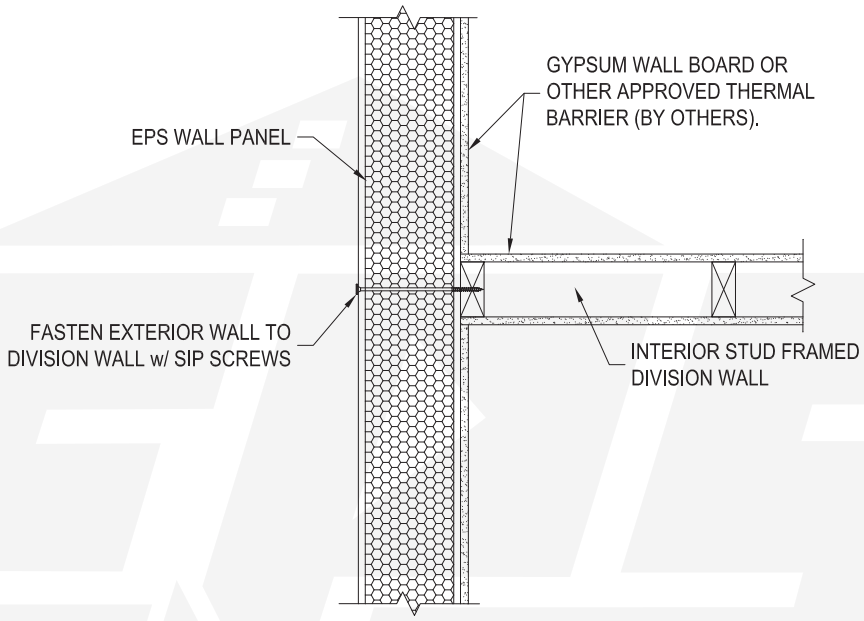
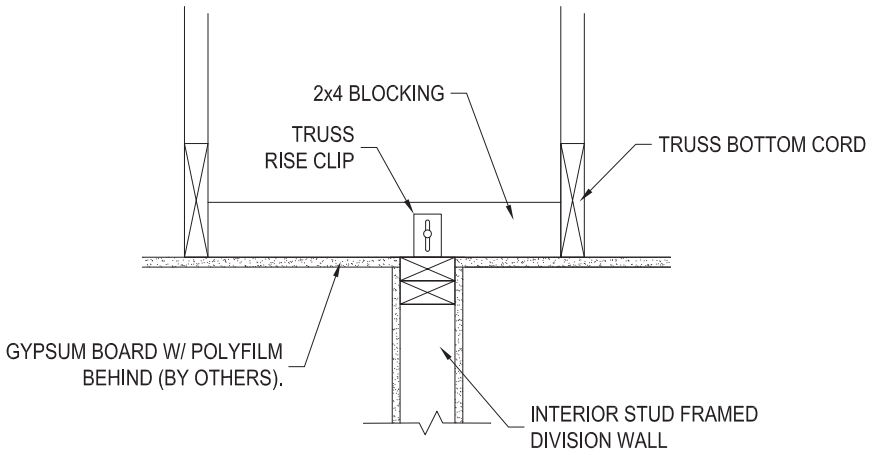
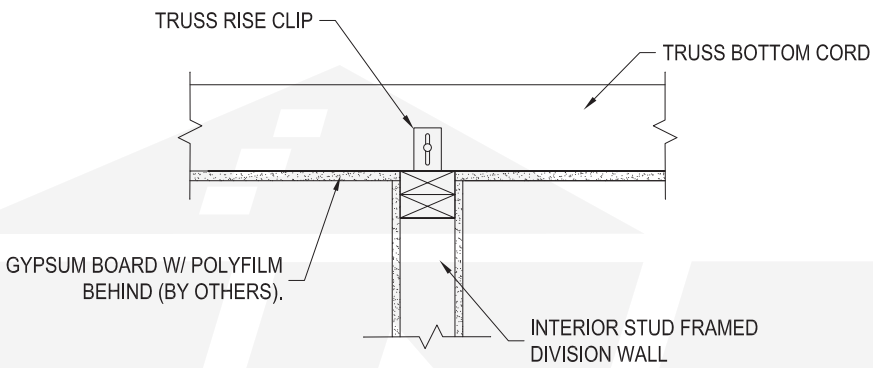


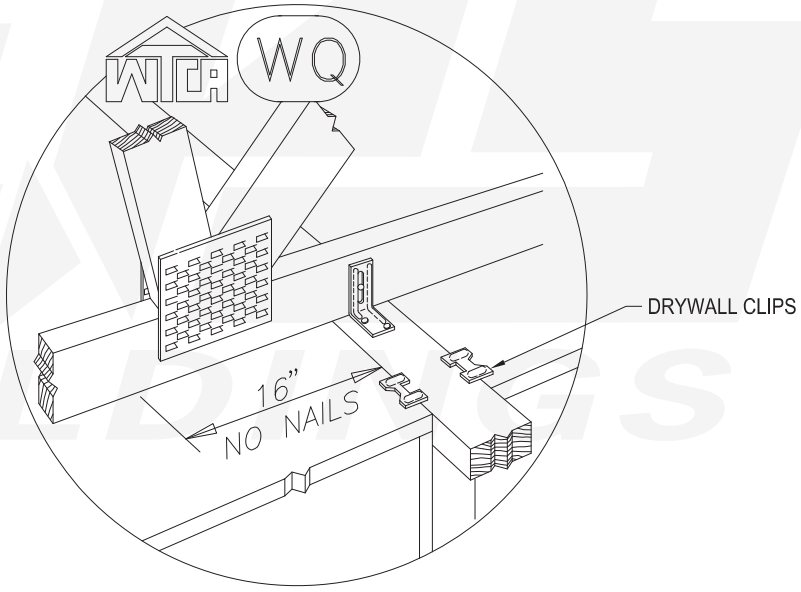
NOTE: FLOATING DRYWALL CORNERS ARE RECOMMENDED TO REDUCE POSSIBLE CORNER CRACKING

DETAIL:	PANEL TO DIVISON WALL	
SCALE:	N.T.S.	DETAIL#
UPDATED:	1/26/16	DW1

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM







NOTE: DO NOT FASTEN DRYWALL TO BLOCKING OR TRUSS WITHIN 16" OF WALL.

EPS BUILDINGS

DETAIL: ROOF TRUSS TO DIVISON WALL

SCALE: N.T.S.

DETAIL# DW2

UPDATED: 1/26/16

ENERGY PANEL STRUCTURES,102 EAST INDUSTRIAL PARK, GRAETTINGER, IA 51342
PHONE: (712) 859-3219 FAX: (712) 859-3275 WWW.EPSBUILDINGS.COM

PRODUCT: Structural Insulated Panels (SIPs)
DIVISION: Wood and Plastics (06)
SECTION: Structural Panels (06 12 16)

Report Holder
Structural Insulated Panel Association (SIPA)
P.O. Box 39848
Fort Lauderdale, FL 33339

Manufacturing Locations

Energy Panel Structures, Inc. (NTA Plant #549)
102 East Industrial Park
Graettinger, IA 51342

Energy Panel Structures, Inc. (NTA Plant #3324)
10269 Old Route 31
Clyde, NY 14433

1. SUBJECT

***1.1. Energy Panel Structures Structural Insulated Panels.* Wall and Roof Panels 8 ft to 20 ft long, 4-5/8 in. to 12-1/4 in. thick.**

2. SCOPE

NTA, Inc. has evaluated the above product for compliance with the applicable sections of the following codes:

2.1. 2000, 2003, 2006, 2009, 2012, 2015 International Building Code (IBC)

2.2. 2000, 2003, 2006, 2009, 2012, 2015 International Residential Code (IRC)

NTA, Inc. has evaluated the above product in accordance with:

2.3. NTA IM 014 Structural Insulated Panel Evaluation

2.4. NTA IM 036 Quality System Requirements

NTA, Inc. has evaluated the following properties of the above product:

2.5. Structural performance under axial, transverse and in-plane shear loads.

To obtain the most current NTA Listing Report visit https://online.ntainc.com/public/certification/reports/

3. USES

3.1. General. *Energy Panel Structures Structural Insulated Panels are* used as structural insulated roof and wall panels capable of resisting transverse, axial and in-plane shear loads.

3.2. Construction Types. *Energy Panel Structures Structural Insulated Panels* shall be considered combustible building elements when determining the Type of Construction in accordance with IBC Chapter 6. (IM 014 NACU1)

3.3. Fire Resistive Assemblies. *Energy Panel Structures Structural Insulated Panels* shall not be used as part of a fire-rated assembly unless suitable evidence and details are submitted and approved by the authority having jurisdiction. (IM 014 ACU14)

4. DESCRIPTION

4.1. General. *Energy Panel Structures Structural Insulated Panels* are factory-assembled, engineered-wood-faced, structural insulated panels (SIPs) with an expanded polystyrene (EPS) foam core. The product is intended for use as load-bearing or non-load bearing wall and roof panels. *Energy Panel Structures Structural Insulated Panels* are available in 4-5/8 in. through 12-1/4 in. overall thicknesses and are custom made to the specifications for each use. The maximum product size is 8 ft wide and up to 20 ft in length

4.2. Materials.

4.2.1. Facing. The facing consists of two single-ply oriented strand board (OSB) facings a minimum of 7/16 in. thick conforming to 2009 IRC Table 613.3.2 and DOC PS 2-04, Exposure 1, Rated Sheathing with a span index of 24/16. Panels may be manufactured with the facing strength axis oriented in either direction with respect to the direction of product bending provided the appropriate design values are used. (IM 014 ACU4)

4.2.2. Core. The core material is EPS foam plastic insulation conforming to ASTM C578, Type I. The foam core, up to 4 in. thickness, has a flame spread rating not exceeding 75 and a smoke-developed rating not exceeding 450 when tested in accordance with ASTM E84.

4.2.3. Adhesive. Facing materials are adhered to the core material using a thin-film adhesive. The adhesive is applied during the lamination process in accordance with the in-plant quality system documentation.

4.2.4. Material Sources. The facing, core and adhesive used in the construction of *Energy Panel Structures Structural Insulated Panels must* be materials from approved sources as identified in the in-plant quality system documentation. A list of material suppliers is provided in Table 9.

4.2.5. Splines. *Energy Panel Structures Structural Insulated Panels* are interconnected with surface splines or block splines (Figure 1). Connections using dimensional lumber splines or engineered structural splines are not specifically addressed in this report and must be designed in accordance with accepted engineering practice to meet applicable code requirements. (IM 014 ACU 20)

4.2.5.1. Surface Splines. Surface splines (Figure 1) consist of 3 in. wide by 7/16 in. thick or thicker OSB. At each panel joint, one surface spline is inserted into each of two tight-fitting slots in the core. The slots in the core are located just inside the facing.

4.2.6. Block Splines. Block splines (Figure 1) are manufactured in the same manner as the SIP except with an overall thickness that is 1 in. less than the overall thickness of the panels to be joined.

5. DESIGN

5.1. Overall Structural System. The scope of this report is limited to the evaluation of the SIP component. Panel connections and other details related to incorporation of the product into the overall structural system of a building are beyond the scope of this report. (IM 014 NACU3)

5.2. Design Approval. Where required by the authority having jurisdiction, structures using *Energy Panel Structures Structural Insulated Panels* shall be designed by a registered design professional. Construction documents, including engineering calculations and drawings providing floor plans, window details, door details and connector details, shall be submitted to the code official when application is made for a permit. The individual preparing such documents shall possess the necessary qualifications as required by the applicable code and the professional registration laws of the state where the construction is undertaken. Approved construction documents shall be available at all times on the jobsite during installation. (IM 014 NACU4)

5.3. Design Loads. Design loads to be resisted by the product shall be as required under the applicable code. Loads on the panels shall not exceed the loads noted in this report. Where loading conditions result in superimposed stresses, the sum of the ratio of actual loads over allowable loads shall not exceed one. Calculations demonstrating that the loads applied are less than the allowable loads described in this report shall be submitted to the code official for approval. (IM 014 NACU5)

5.4. Allowable Loads. Allowable axial, transverse, and in-plane shear loads may be calculated using the panel properties provided in Tables 1 and 2 or selected from Tables 3 through 7. For loading conditions not specifically addressed herein, structural members designed in accordance with accepted engineering practice shall be provided to meet applicable code requirements.

5.5. Concentrated Loads. Axial loads shall be applied to the product through continuous members such as structural insulated roof or floor panels or repetitive members such as joists, trusses or rafters spaced at regular intervals of 24 in. on center or less. Such members shall be fastened to a rim board or similar member to distribute the load to the product. For other loading conditions, reinforcement shall be provided. This reinforcement shall be designed in accordance with accepted engineering practice. (IM 014 ACU12)

5.6. Eccentric and Side Loads. Axial loads shall be applied concentrically to the top of the product. Loads shall not be applied eccentrically or through framing attached to one side of the panel (such as balloon framing) except where additional engineering documentation is provided. (IM 014 ACU13)

5.7. Openings. Openings in panels shall be reinforced with wood or steel designed in accordance with accepted engineering practice to resist all loads applied to the opening as required by the adopted code. Details for door and window openings shall be provided to clarify the manner of supporting axial, transverse and/or in-plane shear loads at openings. Such details shall be subject to approval by the local authority having jurisdiction. (IM 014 ACU8)

5.8. In-Plane Shear Design. Shear walls utilizing block or surface splines shall be sized to resist all code required wind and seismic loads without exceeding the allowable loads provided herein. Shear wall chords, hold-downs and connections to transfer shear forces between the wall and surrounding structure shall be designed in accordance with accepted engineering practice. (IM 014 ACU17) Allowable strengths for SIP shear walls with structural splines along each panel edge shall be designed in accordance with accepted engineering practice and are subject to the limitations for wood sheathed shear walls.

5.8.1. Seismic Design Categories A, B and C. Use of the shear wall configurations in Table 6 is limited to structures in Seismic Design Categories A, B and C. Where SIPs are used to resist seismic forces the following factors shall be used for design: Response Modification Coefficient, R = 2.0; System Overstrength Factor, Ω_0 = 2.5; Deflection Amplification Factor, C_d = 2.0. (IM 014 ACU16) The maximum panel height-to-width ratio shall be 2:1. (IM 014 ACU17)

5.8.2. Seismic Design Categories D, E, and F. Use of the shear wall configurations in Table 7 are permitted in Seismic Design Categories D, E and F. Such walls shall be designed using the seismic design coefficients and limitations provided in ASCE 7-05 for light-framed walls sheathed with wood structural panels rated for shear resistance (SFRS A13) and the following factors for design: Response Modification Coefficient, R = 6.5; System Overstrength Factor, Ω_0 = 3.0; Deflection Amplification Factor, C_d = 4.0. (IM 014 ACU16) The maximum panel height-to-width ratio shall be 1:1. (IM 014 ACU17)

5.8.3. Adhesives and Sealants. Adhesives and sealants shall not be applied at wood-to-wood or spline-to-facing interfaces in shear walls in Seismic Design Categories D, E and F. (IM 014 NACU10) Adhesives and sealants may be applied to wood-to-foam or facing-to-foam interfaces. Flexible SIP tape may be applied over panel joints.

5.9. Horizontal Diaphragms. Horizontal diaphragms shall be sized to resist all code required wind and seismic loads without exceeding the allowable loads provided herein. Diaphragm chords and connections to transfer shear forces between the diaphragm and surrounding structure shall be designed in accordance with accepted engineering practice. The maximum diaphragm length-to-width ratio shall not exceed 3:1. (IM 014 ACU18)

5.10. Combined Loads. Panels subjected to any combination of transverse, axial or in-plane shear loads shall be analyzed utilizing a straight line interaction in accordance with *NTA IM 014 TIP 01 SIP Design Guide*.

6. INSTALLATION

6.1. General. *Energy Panel Structures Structural Insulated Panels* shall be fabricated, identified and erected in accordance with this report, the approved construction documents and the applicable codes. In the event of a conflict between the manufacturer's published installation instructions and this report, this report shall govern. Approved construction documents shall be available at all times on the jobsite during installation. (IM 014 NACU7)

6.2. Splines. *Energy Panel Structures Structural Insulated Panels* are interconnected at the panel edges through the use of a spline. The spline type may be of any configuration listed in Section 4.2.5 as required by the specific design. The spline shall be secured in place with not less than 0.131 in. x 2-1/2 in. nails, spaced 6 in. on center on both sides of the panel, or an approved equivalent fastener. All joints shall be sealed in accordance with the SIP manufacturer's installation instructions. Alternate spline connections may be required for panels subjected to in-plane shear forces. Such panels shall be interconnected exactly as required in Tables 6 or 7 or as directed by the designer.

6.3. Plates. The top and bottom plates of the panels shall be dimensional or engineered lumber sized to match the core thickness of the panel. The plates shall be secured using not less than 0.131 in. x 2-1/2 in. nails, spaced 6 in. on center on both sides of the panel or an approved equivalent fastener. A second top plate of 1-1/8 in. minimum thickness dimensional or engineered lumber with a specific gravity of 0.42 that is cut to the full thickness of the panel shall be secured to the first top plate using 0.131 in. x 3 in. nails or an approved equivalent fastener.

6.4. Cutting and Notching. No field cutting or routing of the panels shall be permitted except as shown on approved construction documents. (IM 014 NACU6)

6.5. Protection from Decay. SIPs that rest on exterior foundation walls shall not be located within 8 in. of exposed earth. SIPs supported by concrete or masonry that is in direct contact with earth shall be protected from the concrete or masonry by a moisture barrier. (IM 014 ACU6)

6.6. Protection from Termites. In areas subject to damage from termites, SIPs shall be protected from termites using an approved method. Panels shall not be installed below grade or in contact with earth. (IM 014 ACU7) (IM 014 ACU22)

6.7. Heat-Producing Fixtures. Heat-producing fixtures shall not be installed in the panels unless protected by a method approved by the code official or documented in test reports. This limitation shall not be interpreted to prohibit heat-producing elements with suitable protection. (IM 014 NACU9)

6.8. Voids and Holes

6.8.1. Voids in Core. In lieu of openings designed in accordance with section 5.7, the following voids are permitted. Voids may be provided in the panel core during fabrication at predetermined locations only. Voids parallel to the panel span shall be limited to a single 1 in. maximum diameter hole. Such voids shall be spaced a minimum of 4 ft on center measured perpendicular to the panel span. Two 1/2 in. diameter holes may be substituted for the single 1 in. hole provided they are maintained parallel and within 2 in. of each other. (IM 014 ACU11) Voids perpendicular to the panel span shall be limited to a single 1 in. maximum diameter hole placed not closer than 16 in. from the support. Additional voids in the same direction shall be spaced not less than 28 in. on center.

6.8.2. Holes in Panels. Holes may be placed in panels during fabrication at predetermined locations only. Holes shall be limited to 4 in. by 4 in. square. The minimum distance between holes shall not be less than 4 ft on center measured perpendicular to the panel span and 24 in. on center measured parallel to the panel span. Not more than three holes shall be permitted in a single line parallel to the panel span. The holes may intersect voids permitted elsewhere in this report. (IM 014 ACU15)

6.9. Panel Cladding

6.9.1. Roof Covering. The roof covering, underlayment and flashing shall comply with the applicable codes. All roofing materials must be installed in accordance with the manufacturer's installation instructions. The use of roof coverings requiring the application of heat during installation shall be reviewed and approved by a registered design professional.

6.9.2. Exterior Wall Covering. Panels shall be covered on the exterior by a water-resistive barrier as required by the applicable code. The water-resistive barrier shall be attached with flashing in such a manner as to provide a continuous water-resistive barrier behind the exterior wall veneer. (IM 014 ACU9) The exterior facing of the SIP wall shall be covered with weather protection as required by the adopted building code or other approved materials. (IM 014 ACU10)

6.9.3. Interior Finish. The SIP foam plastic core shall be separated from the interior of the building by an approved thermal barrier of 1/2 in. gypsum wallboard or equivalent thermal barrier where required by IBC Section 2603.4.

7. CONDITIONS OF USE

Energy Panel Structures Structural Insulated Panels as described in this report comply with the codes listed in Section 2 above, subject to the following conditions:

7.1. Installation complies with this report and the approved construction documents.

7.2. This report applies only to the panel thicknesses specifically listed herein. (IM 014 ACU3)

7.3. In-use panel heights/spans shall not exceed the values listed herein. Extrapolation beyond the values listed herein is not permitted. (IM 014 ACU2)

7.4. The panels are manufactured in the production facilities listed in this report. (IM 014 NACU8)

8. EVIDENCE SUBMITTED

NTA, Inc. has examined the following evidence to evaluate this product:

8.1. Review of each plant's quality assurance manual in accordance with NTA IM 036.

8.2. Plant certification inspection of each manufacturer's production facilities, test procedures, frequency and quality control sampling methods, test equipment and equipment calibration procedures, test records, dates and causes of failures when applicable in accordance with NTA IM 036.

8.3. Qualification test data in accordance with NTA IM 014 Standard Evaluation Plan (SEP) 01.

8.4. Periodic quality assurance audits of the production facilities.

8.5. Periodic verification testing in accordance with NTA IM 014 SEP 01.

Evaluation evidence and data are on file with NTA, Inc. NTA, Inc.is accredited by the International Accreditation Service (IAS) as follows:

ISO17020 Inspection Agency (AA-682)
ISO17025 Testing Laboratory (TL-259)
ISO Guide 65 Product Certification Agency (PCA-102)

The scope of accreditation related to testing, inspection or product certification pertain only to the test methods and/or standard referenced therein. Design parameters and the application of building code requirements, such as special inspection, have not been reviewed by IAS and are not covered in the accreditation. Product evaluations are performed under the direct supervision of Professional Engineers licensed in all jurisdictions within the United States as required by the building code and state engineering board rules.

9. FINDINGS

All products referenced herein are manufactured under an in-plant Quality Assurance program to insure that the production quality meets or exceeds the requirements of the codes noted herein and the criteria as established by NTA, Inc. Furthermore, product must comply with the conditions of this report.

This report is subject to annual review.

10. IDENTIFICATION

Each eligible product shall be permanently marked to provide the following information:

10.1. The NTA, Inc. listing mark, shown below
10.2. NTA's Listing No. EPS102108-21
10.3. In-plant quality assurance stamp
10.4. Identifier for production facility
10.5. Project or batch number

LISTED
EPS102108-21

Table 1: Basic Properties[1, 2]

Property	Weak-Axis Bending	Strong-Axis Bending
Allowable Tensile Stress, F_t (psi)	245	495
Allowable Compressive Stress, F_c (psi)	340	580
Elastic Modulus (Bending), E_b (psi)	738900	658800
Shear Modulus, G (psi)	270	405
Allowable Core Shear Stress, F_v (psi)	4.5	5.0
Core Compressive Modulus, E_c (psi)	360	360
Reference Depth, h_o (in.)	4.625	4.625
Shear Depth Factor Exponent, m	0.84	0.86

[1] All properties are based on a minimum panel width of 24 in.
[2] Refer to *NTA IM14 TIP 01 SIP Design Guide* for details on engineered design using basic panel properties.

Table 2: Section Properties

Panel Thickness, h (in.)	Core Thickness, c (in.)	Dead Weight, w_d (psf)	Facing Area, A_f (in.^{2}/ft)	Shear Area, A_v (in.^{2}/ft)	Moment of Inertia, I (in.^{4}/ft)	Section Modulus, S (in.^{3}/ft)	Radius of Gyration, r (in.)	Centroid-to-Facing Dist., y_c (in.)
4.625	3.75	3.2	10.5	50.3	46.0	19.9	2.09	2.31
6.50	5.625	3.3	10.5	72.8	96.5	29.7	3.03	3.25
8.25	7.375	3.5	10.5	93.8	160.2	38.8	3.91	4.13
10.25	9.375	3.6	10.5	117.8	252.7	49.3	--	--
12.25	11.375	3.8	10.5	141.8	366.3	59.8	--	--

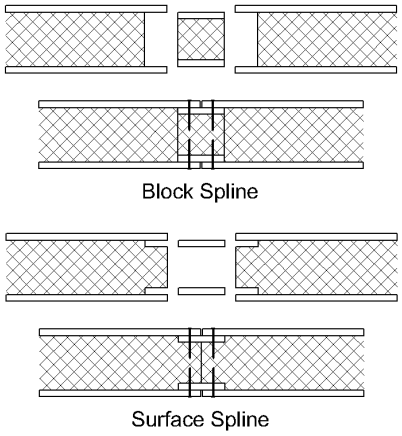


Figure 1: SIP Spline Types

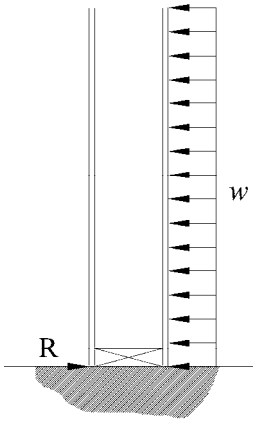


Figure 2: Zero Bearing Support

Table 3: Allowable Uniform Transverse Loads (psf) [1, 4]

Panel Length (ft)	4-5/8 inch Thick SIP			6-1/2 inch Thick SIP		
	Deflection Limit[2]			Deflection Limit[2]		
	L/180	L/240	L/360	L/180	L/240	L/360
8 WAB[3]	50.8	40.9	27.3	73.8	64.7	43.1
8	68.8	51.6	34.4	80.6	80.6	56.6
10	45.1	33.8	22.5	62.0	57.9	38.6
12	30.8	23.1	15.4	50.4	40.9	27.3
14	21.7	16.3	--	39.6	29.7	19.8
16	--	--	--	29.4	22.1	14.7
18	--	--	--	22.4	16.8	--

See Table 4 for notes.

Table 4: Allowable Uniform Transverse Loads (psf) [1, 4]

Panel Length (ft)	8-1/4 inch Thick SIP			10-1/4 inch Thick SIP			12-1/4 inch Thick SIP		
	Deflection Limit[2]			Deflection Limit[2]			Deflection Limit[2]		
	L/180	L/240	L/360	L/180	L/240	L/360	L/180	L/240	L/360
8 WAB[3]	81.4	81.4	58.3	89.9	89.9	75.9	98.6	98.6	93.6
8	88.5	88.5	78.4	97.3	97.3	97.3	106.4	106.4	106.4
10	67.4	67.4	54.8	73.1	73.1	73.1	78.8	78.8	78.8
12	54.4	54.4	39.6	58.6	58.6	54.6	62.5	62.5	62.5
14	45.6	43.9	29.3	48.8	48.8	41.1	51.9	51.9	51.9
16	39.3	33.2	22.1	41.9	41.9	31.5	44.3	44.3	41.7
18	34.1	25.6	17.1	36.7	36.7	24.6	38.7	38.7	32.9
20	26.7	20.0	13.4	32.6	29.2	19.5	34.3	34.3	26.3

[1] Table values assume a simply supported panel with 1.5 in. of continuous bearing on facing at supports (C_v = 1.0) with solid wood plates at bearing locations. Values do not include the dead weight of the panel. For wall panel capacities (4-5/8 in., 6-1/2 in. and 8-1/4 in. thickness panels only) utilizing a zero bearing configuration (Figure 2), the allowable load shall be determined using C_v = 0.4.
[2] Deflection limit shall be selected by building designer based on the serviceability requirements of the structure and the requirements of adopted building code. Values are based on loads of short duration only and do not consider the effects of creep.
[3] Tabulated values are based on the strong-axis of the facing material oriented parallel to the direction of panel bending. WAB indicates weak-axis bending of the facing material; the strong-axis of the facing material is oriented perpendicular to the direction of panel bending.
[4] Permanent loads, such as dead load, shall not exceed 0.50 times the tabulated load.

Table 5: Allowable Axial Loads (plf) [1,2,3,4]

Lateral Brace Spacing (ft)	Panel Thickness		
	4-5/8 inch	6-1/2 inch	8-1/4 inch
8 WAB[5]	2320	2470	2530
8	3630	4070	4240
10	3260	3890	4130
12	2810	3660	4000
14	--	3390	3830
16	--	3090	3640
18	--	2790	3430
20	--	--	3190

[1] Permanent loads, such as dead load, shall not exceed 0.50 times the tabulated load.
[2] All values are for normal duration and may not be increased for other durations.
[3] Axial loads shall be applied concentrically to the top of the panel through repetitive members spaced not more than 24 in. on center. Such members shall be fastened to a rim board or similar member to distribute along the top of the SIP.
[4] The ends of both facings must bear on the supporting foundation or structure to achieve the tabulated axial loads.
[5] Tabulated values are based on the strong-axis of the facing material oriented parallel to the direction of panel bending. WAB indicates weak-axis bending of the facing material; the strong-axis of the facing material is oriented perpendicular to the direction of panel bending.

Table 6: Allowable In-Plane Shear Strength (Pounds per Foot) for SIP Shear Walls (Wind and Seismic Loads in Seismic Design Categories A, B and C) [1, 3]

Spline Type[4]	Minimum Nominal SIP Thickness (in.)	Minimum Facing Connections[3,5]			Shear Strength (plf)
		Chord[3]	Plate[3]	Spline[4]	
Block or Surface Spline	4.625	0.131"x 2-1/2" nails, 6" oc	0.131"x 2-1/2" nails, 6" oc	0.131"x 2-1/2" nails, 6" oc	380
	6.625	0.131"x 2-1/2" nails, 6" oc	0.131"x 2-1/2" nails, 6" oc	0.131"x 2-1/2" nails, 6" oc	380
	8.375	0.131"x 2-1/2" nails, 6" oc	0.131"x 2-1/2" nails, 6" oc	0.131"x 2-1/2" nails, 6" oc	400

See Table 7 for notes.

Table 7: Allowable In-Plane Shear Strength (Pounds per Foot) for SIP Shear Walls (Wind and Seismic Loads in Seismic Design Categories D, E and F) [2, 3]

Spline Type[4]	Minimum Nominal SIP Thickness (in.)	Minimum Facing Connections[3,5]			Shear Strength (plf)
		Chord[3]	Plate[3]	Spline[4]	
Block or Surface Spline	6.5	0.131"x 2-1/2" nails, 3" oc (3/8" edge distance)	0.131"x 2-1/2" nails, 3" oc (3/8" edge distance)	0.131"x 2-1/2" nails, 3" oc (23/32" thick, 3" wide spline)	900

[1] Maximum shear wall dimensions ratio shall not exceed 2:1 (height: width) for resisting wind or seismic loads.
[2] Maximum shear wall dimension ratio shall not exceed 1:1 (height: width) for resisting wind or seismic loads.
[3] Chords, hold downs and connections to other structural elements must be designed by a registered design professional in accordance with accepted engineering practice.
[4] Spline type at interior panel-to-panel joints only. Solid chord members are required at each end of each shear wall segment.
[5] Required connections must be made on each side of the panel. Dimensional or engineered lumber shall have an equivalent specific gravity of 0.42 or greater.

**Table 8: Allowable In-Plane Shear Strength (Pounds per Foot)
for Horizontal Diaphragms Subjected to Wind or Seismic Loading**

Minimum Nominal SIP Thickness (in.)	Minimum Connections			Shear Strength (plf)	Max. Aspect Ratio
	Block Spline[1] (Figure 3a)	Boundary[2] (Figure 3b)			
		Support	Spline		
8.25	0.131" x 2-1/2" nails, 6" oc 7/16" x 3" x 7-3/8" OSB Surface Spline	10" Length, 0.190" shank diameter, 0.255" thread o.d., 2.750" thread length 0.625" head diameter SIP Screw 6" oc	0.131" x 2-1/2" nails, 6" oc	265	3:1
	0.131" x 2-1/2" nails, 4" oc 7/16" x 3" x 7-3/8" OSB Surface Spline	10" Length, 0.190" shank diameter, 0.255" thread o.d., 2.750" thread length 0.625" head diameter SIP Screw 4" oc	0.131" x 2-1/2" nails, 4" oc	330	3:1
	0.131" x 2-1/2" nails, 2" oc staggered 3/8" (Figure 3c) 7/16" x 3" x 7-3/8" OSB Surface Spline	10" Length, 0.190" shank diameter, 0.255" thread o.d., 2.750" thread length 0.625" head diameter SIP Screw 3" oc	0.131" x 2-1/2" nails, 2" oc staggered 3/8" (Figure 3c)	575	3:1

[1]Top spline or block spline only at interior panel-to-panel joints. Specified fasteners are required on both sides of panel joint through the top surface only, as shown in Figure 3a.
[2] Boundary spline shall be solid lumber 1.5 in. wide minimum and have a specific gravity of 0.42 or greater. Specified fasteners are required through both facings as shown in Figure 3b.

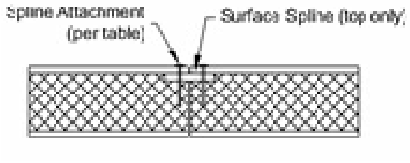


Figure 3a: Surface Spline

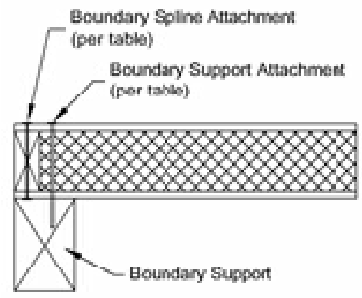


Figure 3b: Boundary

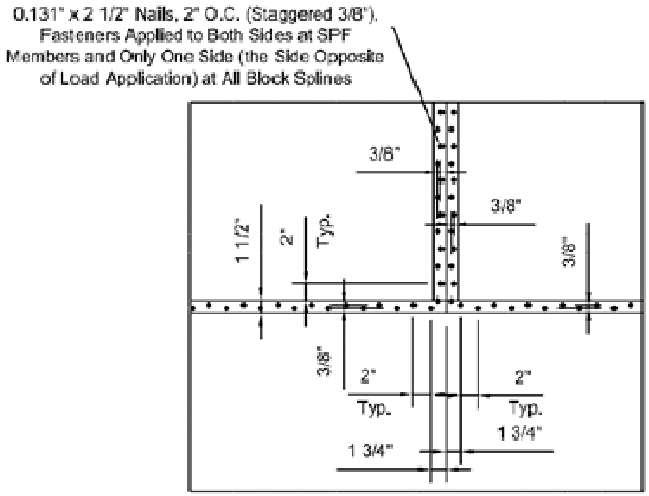


Figure 3c: Boundary Splines

Table 9: Component Material Sources

Facing	Core	Adhesive
Norbord, Inc. 1 Toronto Street, Suite 600 Toronto ON, Canada M5C 2W4	ACH Corporation Plant U-37 - Fond du Lac, WI	Ashland Specialty Chemical Company 5200 Blazer Parkway Dublin, OH 43017
Georgia-Pacific 9918 Buford Bridge Road Fairfax, SC 29827	Atlas EPS, A Division of Atlas Roofing Corporation 8240 Byron Center Road SW Byron Center, MI 49315	Foam Supplies, Inc. 4387 N. Rider Trail Earth City, MO 63045
Louisiana-Pacific Corporation Sagola, MI Distributed by: Viking Forest Products, LLC 7615 Smetana Lane Eden Prairie, MN 55344	Benchmark Foam, Inc. 401 Pheasant Ridge Drive Watertown, SD 57201	Rohm and Haas Company 5005 Barnard Mill Road Ringwood, IL 60072
Tolko Industries, Ltd. 3203 30th Avenue Vernon BC, Canada V1T 6M1	Creative Packaging Company 6301 Midland Industrial Drive Shelbyville, KY 40065	
	FMI EPS, LLC 9456 North McGuire Road Post Falls, ID 83854	
	Insulfoam, a Carlisle Company 1507 Sunburst Lane Mead, NE 68041 (I-41)	
	Iowa EPS Products, Inc. 5554 N.E. 16th Street Des Moines, IA 50313	
	OPCO, Inc. P.O. Box 101 Latrobe, PA 15650	
	Plymouth Foam 1 Southern Gateway Drive Gnadenhutten, OH 44629	
	Polar Industries, Inc. 32 Gramar Avenue Prospect, CT 06712	
	Thermal Foams, Inc. 2101 Kenmore Avenue Buffalo, NY 14207	

LISTING INFORMATION OF Energy Panel Structures - Structural Insulated Panels (SIPs)

SPEC ID: 35046

Energy Panel Structures, Inc.
603 N. Van Gordon Avenue
Graettinger, IA 51342

Structural Insulated Panels are factory-assembled, engineered-wood-faced, structural insulated panels (SIPs) with an expanded polystyrene (EPS) foam core. The panels are intended for use as load-bearing or non-load bearing wall and roof panels. The panels are custom made to the specifications for each use and are assembled under factory-controlled conditions.

RATINGS

ASTM E119 / CAN/ULC S101	Fire-Resistance Rating	Design Number
6-1/2 in. SIP Wall Assembly	1-hour rating	EPS/CWP 60-02
4-1/2, 6-1/2 or 8-1/4 in. SIP Wall Assembly	1-hour rating	EPS/CWP 60-01
SIP Wood Roof/Ceiling Assembly	1-hour rating	EPS/CRP 60-01
SIP Steel Roof/Ceiling Assembly	1-hour rating	EPS/CRP 60-02

Attribute	Value
Criteria	CAN / ULC S101 (2007)
Criteria	ASTM E119 (2012)
CSI Code	06 12 00 Structural Panels
Fire Resistance	1 Hour Fire Rating
Intertek Services	Certification
Listed or Inspected	LISTED
Listing Section	BUILDING PANELS
Report Number	ITSCERT001-001
Spec ID	35046

DRAWING INDEX

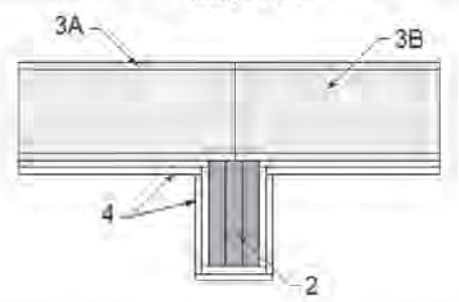
EPS/CRP 60-01
EPS/CRP 60-02
EPS/CWP 60-01
EPS/CWP 60-02

EPS/CRP 60-01

Division 7 - Thermal and Moisture Protection
07 40 00 Roofing and Siding Panels
07 41 43 Composite Roof Panels

Page 1 of 2

Design Number: EPS / CRP 60-01
ROOF-CEILING SYSTEMS
Energy Panel Structures, Inc.
Energy Panel Structures 4½ to 10½ in. Structural Insulated Panels
ASTM E 119 – 2012 Edition
CAN/ULC S 101 – 2007 Edition
Restricted Superimposed Load: See Item 1
Rating – 1 Hour



ITEM 1

1. CEILING ASSEMBLY: Construct a ceiling assembly using elements described in Items 2 through 5 with a maximum restricted superimposed load of 40% of the allowable capacity of the panel.

2. WOOD BEAMS/JOIST: Use minimum 4-1/2 in. wide x 9-1/2 in. deep engineered wood beam/joist spaced in accordance with manufacturer's design specifications and building code requirements.

3. CERTIFIED COMPANIES: Energy Panel Structures, Inc.

   CERTIFIED PRODUCT: Energy Panel Structures Structural Insulated Panels

   ROOF PANELS: Install Energy Panel Structures Structural Insulated Panels consisting of the following elements:

   A. FACING: Nominal 7/16 in. thick OSB skins factory bonded to interior and exterior sides of EPS foam core (Item 3B) conforming and identified as meeting DOC PS 2-04, Exposure 1, Rated Sheathing with a span index of 24/16 and/or CAN/CSA O325.0, Exterior Grade Sheathing with a span index of 1R24/2F16.

   B. CORE: Use ASTM C578 compliant and Listed Type I EPS (min. 0.9 pcf) with a flame spread rating not exceeding 75 and smoke-developed rating not exceeding 450 per ASTM E84 and/or CAN/ULC S701 compliant and Listed Type 1 EPS with a flame spread rating not exceeding 500 per CAN/ULC S102.2.

   C. ADHESIVE (Not Shown): Facing materials are adhered to the core material using a structural adhesive. The adhesive is applied during the

Date Revised: August 7, 2013
Revised: March 23, 2015

EPS/CRP 60-01 (page 2 of 2)

lamination procedure in accordance with the in-plant quality system documentation.

D. SPLINE (Not Shown): Structural Insulated Panels are interconnected with surface splines or block splines.

Surface splines typically consist of 3 in. wide by 7/16 in. thick OSB. At each panel joint, one surface spline is inserted into each of two tight-fitting slots in the core. The slots in the core are located just inside the facing.

Block splines are manufactured in the same manner as the SIP except with an overall thickness that is 1 in. less than the overall thickness of the panel to be joined.

4. GYPSUM BOARD: Apply two (2) layers of 5/8 in. thick, Type X gypsum board to the interior side of the ceiling assembly (Item 1) oriented with the long dimension oriented perpendicular to the wood beams (Item 2). Secure the base layer using 1-1/4 in. long, bugle head self-drilling screws spaced nominally 8 in. on center (oc) around the perimeter and 12 in. oc in the field. Secure the second layer using 2 in. long bugle head self-drilling screws spaced nominally 8 in. oc around the perimeter and 12 in. oc in the field. Stagger joints of base layer and second layer.

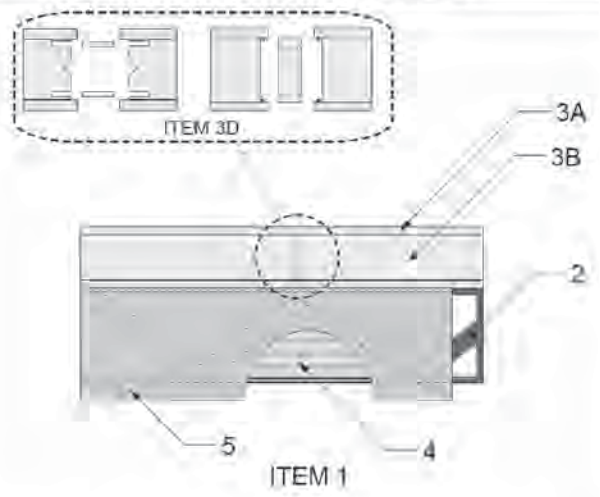
   A. JOINT TAPE AND COMPOUND – (Not Shown) Apply a level 2 finish of vinyl or casein, dry or premixed joint compound applied in two coats to all exposed fastener heads and gypsum board joints. Embed minimum 2 in. wide paper, plastic, or fiberglass tape in first layer of compound over joints in gypsum board (Item 3).

5. ROOF COVERING (Not Shown): Use a Class A, B, or C hot mopped or cold applied roof covering, or use a ballasted, adhered or mechanically attached single ply roofing membrane.

EPS/CRP 60-02

Division 7 - Thermal and Moisture Protection
07 40 00 Roofing and Siding Panels
07 41 43 Composite Roof Panels

Design Number: EPS/CRP 60-02
ROOF-CEILING SYSTEMS
Energy Panel Structures, Inc.
Energy Panel Structures 4½ to 10½ in. Structural Insulated Panels
ASTM E 119 – 2012 Edition
CAN/ULC S 101 – 2007 Edition
Rating – 1 Hour
Restricted Superimposed Load: See Item 1



ITEM 1

1. CEILING ASSEMBLY: Construct ceiling assembly using the elements described in Items 2 through 6 with a maximum restricted superimposed load of 57% of the allowable capacity of the panel.

2. STEEL JOIST: Use minimum Type 10K1 open-web steel joist constructed and spaced in accordance with manufacturer's design specifications and building code requirements.

3. CERTIFIED COMPANIES: Energy Panel Structures, Inc.

CERTIFIED PRODUCT: Energy Panel Structures Structural Insulated Panels

ROOF PANELS: Install Energy Panel Structures Structural Insulated Panels consisting of the following elements:

A. FACING: Nominal 7/16 in. thick OSB skins factory bonded to interior and exterior sides of EPS foam core (Item 3A) conforming and identified as meeting DOC PS 2-04, Exposure 1, Rated Sheathing with a span index of 24/16 and/or CAN/CSA

Date Created: June 26, 2013
Revised: March 23, 2015

EPS/CRP 60-02 (page 2 of 2)

O325.0, Exterior Grade Sheathing with a span index of 1R24/2F16.

B. CORE: Use ASTM C578 compliant and Listed Type I EPS (min. 0.9 pcf) with a flame spread rating not exceeding 75 and smoke-developed rating not exceeding 450 per ASTM E84 and/or CAN/ULC S701 compliant and Listed Type 1 EPS with a flame spread rating not exceeding 500 per CAN/ULC S102.2.

C. ADHESIVE (Not Shown): Facing materials are adhered to the core material using a structural adhesive. The adhesive is applied during the lamination procedure in accordance with the in-plant quality system documentation.

D. SPLINE: Structural Insulated Panels are interconnected with surface splines or block splines.

Surface splines typically consist of 3 in. wide by 7/16 in. thick OSB. At each panel joint, one surface spline is inserted into each of two tight-fitting slots in the core. The slots in the core are located just inside the facing.

Block splines are manufactured in the same manner as the SIP except with an overall thickness that is 1 in. less than the overall thickness of the panel to be joined.

4. METAL LATH: Install 3/8 in. expanded galvanized steel mesh weighing 3.4 lb/yd. to cover the exposed side of the steel joist (Item 2). Secure the lath using No. 20 SWG steel tie wire at the mid-point of alternate web members. Install the lath on the bottom of the roof panels (Item 3) using 1-1/2 in. deep x 15/16 in. wide C-pint staples spaced 7 in. on center (oc).

5. SPRAY APPLIED FIBER: Apply to the wetted surfaces of steel joist and panels, a minimum 11 pcf dry density Listed spray applied fiber (CAFCO BLAZE-SHIELD Type DC-F) to the metal lath (Item 6). Apply at a minimum thickness of 2-1/4 in. to all mesh surfaces. Please reference the CAFCO BLAZE-SHIELD Type DC-F Code Evaluation Report for more details.

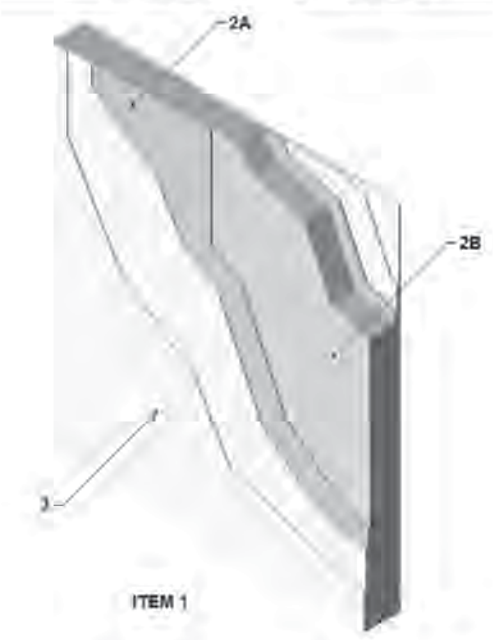
6. ROOF COVERING (Not Shown): Use a Class A, B, or C hot mopped or cold applied roof covering, or use a ballasted, adhered or mechanically attached single ply roofing membrane.

EPS/CWP 60-01

Division 7 - Thermal and Moisture Protection
07 42 00 Wall Panels
07 42 43 Composite Wall Panels

Page 1 of 2

Design Number: EPS/CWP 60-01
EXTERIOR WALL SYSTEMS
Energy Panel Structures, Inc.
Energy Panel Structures 4¼, 6½ or 8¼ in. Structural Insulated Panels
ASTM E 119 – 2012 Edition
CAN/ULC S 101 – 2007 Edition
Rating – 1 Hour
Restricted Superimposed Load: See Item 1



ITEM 1

1. WALL ASSEMBLY: Construct a wall assembly using elements described in Items 2 through 4 up to a maximum of 9 feet in height with a maximum restricted superimposed load of 82% of the allowable capacity of the panel.
2. CERTIFIED COMPANIES: Energy Panel Structures, Inc.

Date Created: August 7, 2013
Revised: March 23, 2015

CERTIFIED PRODUCT: Energy Panel Structures Structural Insulated Panels

WALL PANELS: Install Energy Panel Structures Structural Insulated Panels consisting of the following elements:

A. FACING: Nominal 7/16 in. thick OSB skins factory bonded to interior and exterior sides of EPS foam core

EPS/CWP 60-01 (page 2 of 2)

(Item 2B) conforming and identified as meeting DOC PS 2-04, Exposure 1, Rated Sheathing with a span index of 24/16 and/or CAN/CSA O325.0, Exterior Grade Sheathing with a span index of 1R24/2F16.

B. CORE: Use ASTM C578 compliant and Listed Type I EPS (min. 0.9 pcf) with a flame spread rating not exceeding 75 and smoke-developed rating not exceeding 450 per ASTM E84 and/or CAN/ULC S701 compliant and Listed Type 1 EPS with a flame spread rating not exceeding 500 per CAN/ULC S102.2.

C. ADHESIVE (Not Shown): Facing materials are adhered to the core material using a structural adhesive. The adhesive is applied during the lamination procedure in accordance with the in-plant quality system documentation.

D. SPLINE (Not Shown): Structural Insulated Panels are interconnected with surface splines or block splines.

Surface splines typically consist of 3 in. wide by 7/16 in. thick OSB. At each panel joint, one surface spline is inserted into each of two tight-fitting slots in the core. The slots in the core are located just inside the facing.

Block splines are manufactured in the same manner as the SIP except with an overall thickness that is 1 in. less than the overall thickness of the panel to be joined.

3. GYPSUM BOARD: Apply two (2) layers of 5/8 in. thick, Type X gypsum board to the interior and exterior side of the wall assembly (Item 1) oriented vertically with the joints staggered 16 in. on center (oc). Secure the base layer using 1-5/8 in. long, bugle head self-drilling screws spaced nominally 12 in. oc around the perimeter and 24 in. oc in the field. Secure the second layer using 2 in. long bugle head self-drilling screws spaced nominally 12 in. oc around the perimeter and 24 in. oc in the field.

A. JOINT TAPE AND COMPOUND – (Not Shown) Apply a level 2 finish of vinyl or casein, dry or premixed joint compound applied in two coats to all exposed fastener heads and gypsum board joints. Embed minimum 2 in. wide paper, plastic, or fiberglass tape in first layer of compound over joints in gypsum board (Item 3).

4. BEARING PLATES (Not Shown): Install nominal No. 2 lumber plates to the top and bottom of the wall panels (Item 2) in the pre-cut channel in the foam core covering the entire surface area and secure to the skins (Item 2A) using 8d common nails spaced nominal 6 in. oc. Prior to installing, apply a layer of acrylic latex caulk across the mating face with the EPS foam core (Item 2B).

EPS/CWP 60-02

Division 7 - Thermal and Moisture Protection
07 42 00 Wall Panels
07 42 43 Composite Wall Panels

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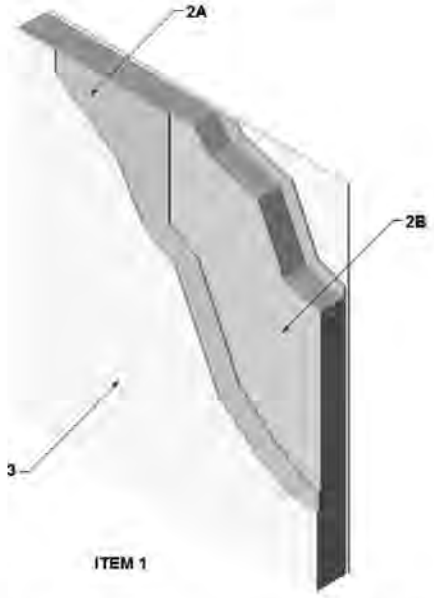
Design Number: EPS / CWP 60-02
EXTERIOR WALL SYSTEMS
Energy Panel Structures, Inc.
Energy Panel Structures 6½ in. Structural Insulated Panels
ASTM E 119 – 2012 Edition
CAN/ULC S 101 – 2007 Edition
Rating – 1 Hour
Restricted Superimposed Load: See Item 1



ITEM 1

1. WALL ASSEMBLY: Construct a wall assembly using elements described in Items 2 through 4 up to a maximum of 10 feet in height with a maximum restricted superimposed load of 60% of the allowable capacity of the panel.
2. CERTIFIED COMPANIES: Energy Panel Structures, Inc.

CERTIFIED PRODUCT: Energy Panel Structures Structural Insulated Panels

WALL PANELS: Install Energy Panel Structures Structural Insulated Panels consisting of the following elements:

A. FACING: Nominal 7/16 in. thick OSB skins factory bonded to interior and exterior sides of EPS foam core

Date Created: August 7, 2013
Revised: March 23, 2015

EPS/CWP 60-02 (page 2 of 2)

(Item 2B) conforming and identified as meeting DOC PS 2-04, Exposure 1, Rated Sheathing with a span index of 24/16 and/or CAN/CSA O325.0, Exterior Grade Sheathing with a span index of 1R24/2F16.

B. CORE: Use ASTM C578 compliant and Listed Type I EPS (min. 0.9 pcf) with a flame spread rating not exceeding 75 and smoke developed rating not exceeding 450 per ASTM E84 and/or CAN/ULC S701 compliant and Listed Type 1 EPS with a flame spread rating not exceeding 500 per CAN/ULC S102.2.

C. ADHESIVE (Not Shown): Facing materials are adhered to the core material using a structural adhesive. The adhesive is applied during the lamination procedure in accordance with the in-plant quality system documentation.

D. SPLINE (Not Shown): Structural Insulated Panels are interconnected with nominal 2 x 6 No. 2 lumber splines. At each panel joint, one 2 x 6 spline is installed in the precut channels in the foam core of the panel and secured to the skins (Item 2A) using 1-5/8 in. long ring shank steel nails spaced at a nominal 12 in. oc.

3. GYPSUM BOARD: Apply one (1) layer of 5/8 in. thick, Listed Type C gypsum board to the interior and exterior side of the wall assembly (Item 1) oriented vertically. Secure the gypsum board using 1-5/8 in. long, bugle head self-drilling screws spaced nominally 8 in. on center (oc) around the perimeter and 12 in. oc in the field.

A. JOINT TAPE AND COMPOUND – (Not Shown) Apply a level 2 finish of vinyl or casein, dry or premixed joint compound applied in two coats to all exposed fastener heads and gypsum board joints. Embed minimum 2 in. wide paper, plastic, or fiberglass tape in first layer of compound over joints in gypsum board (Item 3).

4. BEARING PLATES: Panels are attached to nominal 2 x 6 No. 2 lumber top and bottom plates recessed into the precut channel in the foam core. Skins (Item 2A) are attached to the panels usingusing 8d common nails spaced nominal 6 in. oc. Prior to installing, apply a layer of acrylic latex caulk across the mating face with the EPS foam core (Item 2B).

NOTES

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NOTES

Efficiency Solutions | NFBA | SIPA Structural Insulated Panel Association | APA The Engineered Wood Association | WTCA Wood Truss Council of America 608/274-4849 www.woodtruss.com | LEARN MORE AT energystar.gov | NAHB National Green Building Program™

EPS BUILDINGS

epsbuildings.com

Energy Panel Structures
603 N. Van Gordon Ave.
Graettinger, IA 51342
712-859-3219

Additional Manufacturing Locations:

Perryville, MO 63775
573-547-8187

Clyde, NY 14433
315-923-7775

100% EMPLOYEE OWNED 100% QUALITY COMMITTED

REV0 3.16