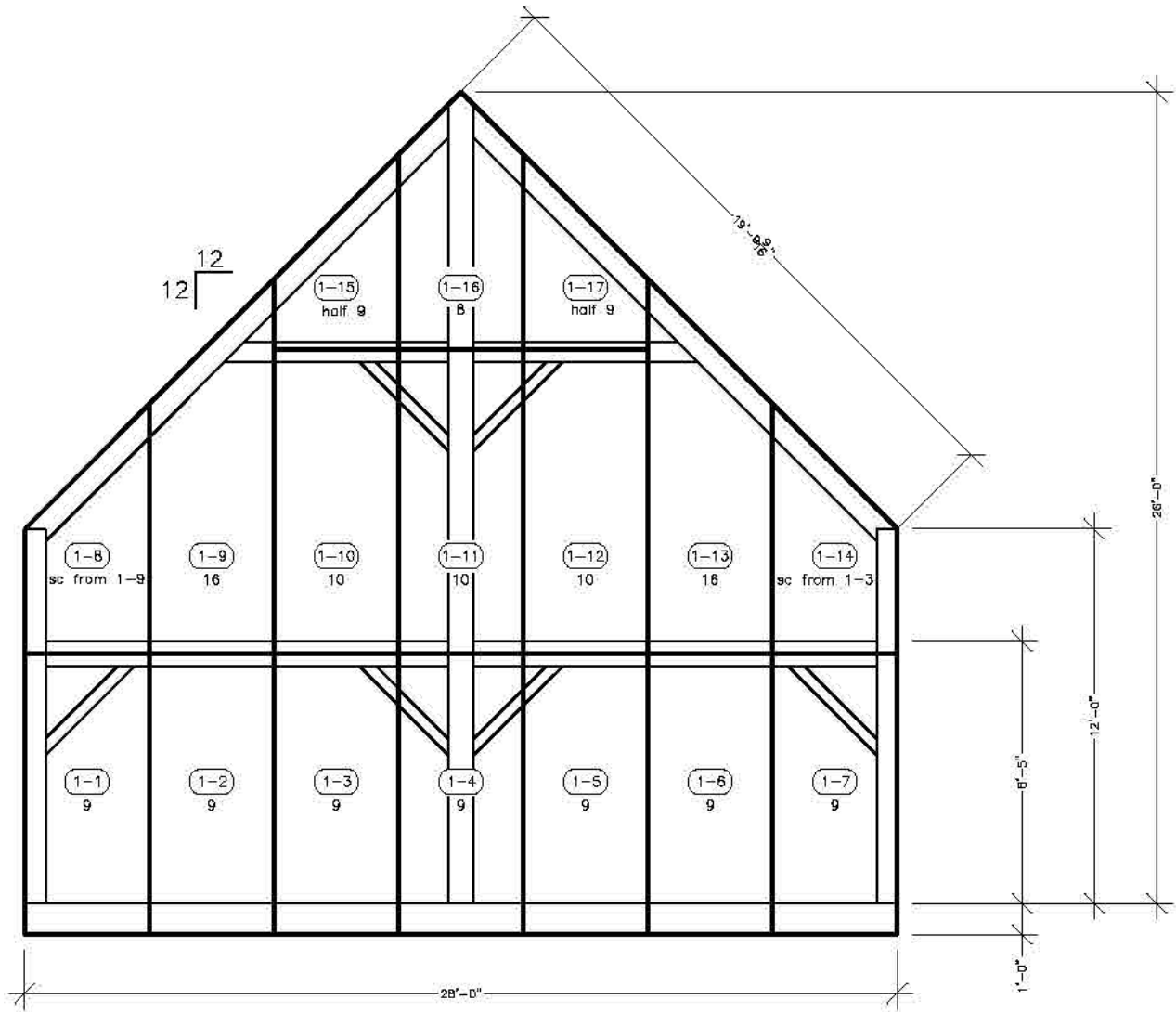


Foard PANEL

STRUCTURAL INSULATED PANELS



Wall Panel Layout – Surface 1

6.5" SIP EPS

GUIDEBOOK

A guide to enclosing your Timber Frame with SIPs





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We encourage contractors and homeowners to use this book as a guide to designing for SIPs, however final construction details may be project specific and will be found on your Foard Panel shop drawings.

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INDUSTRY LEADER

Foard Panel has been manufacturing and installing panels since 1983. Over the years we have gained the expertise to produce superior panels and to develop efficient construction. Our development team works hard to make product improvements that increase the quality of panels for the entire industry. Better components make better panels, better panels make better homes.

Product Innovations

Foard Panel has introduced a variety of innovative products to the industry including:

- SIP Shear Walls & Portal Frames • Embedded Ledgers • XPS Panels •
- Spider Drive for Headlok Panel Screws • Pentalam Panels

Manufacturing Excellence

Our manufacturing process utilizes state of the art technology to assure we produce only the strongest, most energy efficient, materials for your home. Our jiggered vacuum bag presses, computer controlled adhesive applications, and custom engineered milling machines ensure we produce flawless panels that are easy to install. Our technicians are some of the most experienced panel manufacturers in the industry and they take great care in producing the highest quality panel for every customer.

Industry Affiliations

Our staff is actively involved with professional organizations. These affiliations allow us to stay informed about cutting edge building practices and products. We are visionary partners of the Timber Framers Guild and Timber Framers Business Council. We are founding members of the Structural Insulated Panel Association. We are members of the Northeast Sustainable Energy Association.



CODE LISTED PANELS & PROJECT REQUIREMENTS

All Foard Panel SIPs are manufactured in accordance with the standard Foard Panel manufacturing and quality control systems. These systems are approved and audited quarterly by an ISO 17020 accredited 3rd party for compliance with, among other standards, IBC 2012, and ICC-ES AC10 “Acceptance Criteria for Quality Documentation”.



Furthermore, EPS and NEO core SIPs can be stamped as code listed. It is the purchaser’s responsibility to determine if their project requires code listed panels. Similarly, it is the purchaser’s responsibility to determine if their project’s panels meet other local requirements such as energy performance or if they need an engineer’s stamp. If you don’t know, check with your local building official. Feel free to have them contact us directly if they have any questions.



SPECIALIZED SERVICES

Foard Panel offers a wide variety of specialized services for all levels of customers. Some of our customers specify and design for their own projects. Other customers may ask us for help designing and specifying their materials. We can pre-cut your panels to make installation easier for you, or we can come to your site and install the panels for you. Mix and match our services to meet your needs.

Manufacturing to *Your* Order

If you already know what materials you need, just give us a call with your panel lengths and quantities and we will price it for you. Our quotes are always free and quick. When your quote turns into an order, expect top notch technical support and on-time delivery.



Designing Your Enclosure

When you don't know exactly what you need, we can assist you in determining which of our products will work best for your project. We can provide you with CAD plans of your building. These plans are used to minimize panel waste and therefore reduce overall project costs. Fees for this service are priced on a project-to-project basis.

If you want extra help with structural design we can also provide our expert technical advice, or, for an extra fee, we can get our plans stamped by a licensed engineer familiar with SIPs and timber frames.

Precise Pre-Cuts

With adequate planning and accurate drawings, we can pre-cut and rout your panels prior to delivery. Pre-cutting your panels for your project increases the speed of installation, which means your frame will have less exposure to the elements. Pre-cutting at the plant keeps the mess off your property and reduces jobsite waste.



Installation Options

Foard Panel can provide you with full installation or we can provide the technical assistance you might need to install panels yourself.

Deliveries on Self-Unloading Trucks

With Foard Panel's self-unloading trucks you won't need to worry about scheduling other equipment to coincide with your delivery.



FOARD PANEL PRODUCTS

Foard Panels are available with any of our 4 core types. Your FPI Project Manager can help you choose the core material as well as the panel type, thickness, and R-value for your specific design.

Panel Configurations

Various configurations are detailed on pages 7-12.

Core Types

R-value and structural properties are the main considerations when choosing core type and thickness.

EPS: R-value of 3.8 per inch this is the best R-value per dollar option. It has published strength properties and can be code listed. For most projects this is the first choice.

NEO: R-value of 4.7 per inch this core has the same structural properties as EPS with a higher R-value and can be code listed. A great choice to add 20% more R-value without making a thicker panel.

XPS: R-value 5.0 per inch and this is the strongest core type, but there is no third party testing or code listing available. This is a good choice when you need extra R-value and strength in a thin panel.

PIR: R-value of 5.7 per inch. This is the second best R-per dollar. PIR has a lower span capacity than EPS and like XPS there are no third party published structural properties.



APPLICATION MATERIALS

Foard Panel project managers calculate the quantities of application materials that are needed to complete your project. Application materials distributed by Foard Panel are:

Foam Sealant: Foard brand spray foam cans, used in panel to panel connections.

Mastic: Manus SIP Seal, used in panel to wood and wood to wood joints.

Applicator Guns: We offer reusable foam guns for spray foam and sausage tube guns for mastic.

Panel Fasteners: The screws we use most commonly are Headlok screws developed with corrosion resistant coating, shear strength greater than 3/8" lags, and the no-slip spider drive.

Plywood Splines: 5/8", 5-ply CDX plywood strips for splines, used at panel to panel connections.

SIP Tape: SIGA tapes, used only on exposed interior joints with embedded lumber. Common in structural panel houses, they are often unnecessary in timber frames.

Blue board: Foard Panel uses "blue board" for all drywall applications. Unlike most construction, drywall is often exposed to the elements during panel construction. Blue board has a special paper surface that is designed to handle a lot of water and holds up to weather better than other types of drywall. Blue board can be skim-coated, have a plaster veneer applied over it, or simply be painted. Many of our jobs call for pre-applied blue board on the walls. This means that blue board will be hung on the frame independently of structural panels. The blue board is applied horizontally while the panels are applied vertically. This system is preferred by many builders because it keeps the drywall seams horizontal for easier mudding and also the offset seams are stronger and less likely to crack as frames dry to normal moisture content levels.

Structural Insulated Panel

Structural Insulated Panels (SIPs) are an energy efficient alternative to conventional framing, insulation, sheathing and other building systems. They are load-capable insulated panels used as walls, roofs, and floors in residential, commercial and institutional buildings. SIPs provide the exterior sheathing, insulation, and structure in one unit.

Interior and Exterior Skin:

7/16" thick HUD-PS2-grade Oriented Strand Board (OSB)

Core Materials:

EPS: Expanded Polystyrene, 1.0 lb/cuft, 1 in. is R-3.8

XPS: Extruded Polystyrene, 1.6 lb/cuft, 1 in. is R-5.0

NEO: Neopor Polystyrene, 1.15 lb/cuft, 1 in. is R-4.7

PIR: Polyisocyanurate foam, 2.0 lb/cuft, 1 in. is R-5.7

Features:

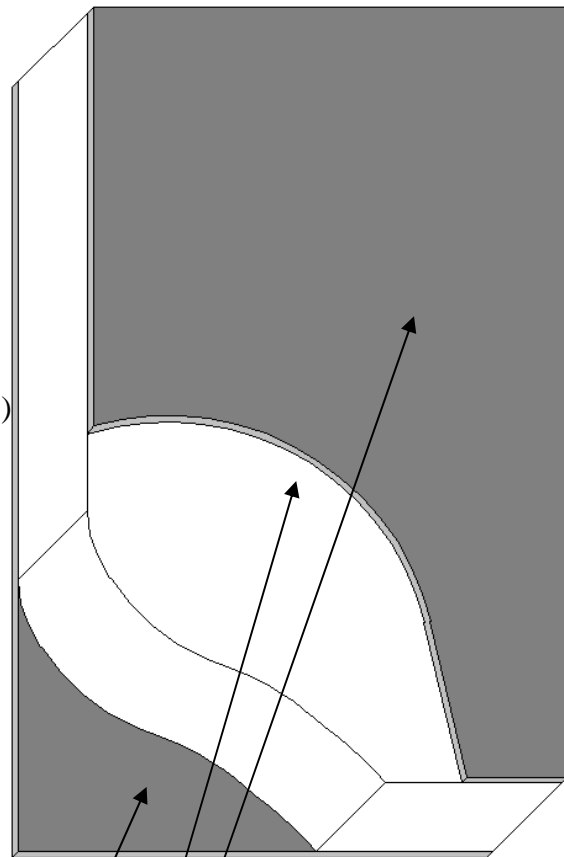
- Reduces Heating and Cooling Costs
- Fast Installation Reduces Labor Costs
- Uses Renewable Wood
- Recycled / Recyclable Foam Insulation

Availability:

- 3.0 through 17.0 inches thick
- 4ft by 6, 7, 8, 9, 10, 12, 14, 16, 18, 20, 22, & 24ft
- 8ft by 8, 10, 12, 14, 16, 18, 20 & 24ft
- Optional pre-cut services
- Optional embedded nailers
- Optional custom skins
- Optional wire chases
- Optional Code Listing NTA FRD-031609-25 (EPS and NEO Only)

Manufacturing & Quality Control:

Foard Panel manufacturing meets ICC-ES AC-10. Independent review and approval of procedures and plant operations by registered, third party, ISO Guide 65/17065:2012 accredited inspection agency.



Interior Skin: 7/16" OSB, PS2

Core: EPS, NEO, XPS, or PIR
In Various Thicknesses

Exterior Skin: 7/16" OSB, PS2

20 Year Limited Warranty:

Foard Panel Inc. warrants to the buyer that Foard Panels will not delaminate in normal use as the result of a defect in materials or manufacturing for 20 years from the date of purchase. See full warranty for details.

Tongue&Groove Clad Panels

Tongue and Groove Clad Structural Panels (T&G Clad) are an energy efficient alternative to conventional framing, insulation, sheathing and other building systems. They are load-capable insulated panels used as walls, roofs, and floors in residential, commercial and institutional buildings. T&G Clad Panels provide the exterior sheathing, insulation, & interior finish in one unit.

Interior and Exterior Skins:

7/16" thick HUD-PS2-grade Oriented Strand Board (OSB)

Interior Finish:

1"x 8" tongue & groove boards. Our preferred board is NELMA Standard grade eastern white pine milled with a v-groove pattern (WP4).

Core Materials:

EPS: Expanded Polystyrene, 1.0 lb/cuft, 1 in. is R-3.8

XPS: Extruded Polystyrene, 1.6 lb/cuft, 1 in. is R-5.0

NEO: Neopor Polystyrene, 1.15 lb/cuft, 1 in. is R-4.7

PIR: Polyisocyanurate foam, 2.0 lb/cuft, 1 in. is R-5.7

Features:

- Reduces Heating and Cooling Costs
- Fast Installation Reduces Labor Costs
- Uses Renewable Wood
- Recycled / Recyclable Foam Insulation

Availability:

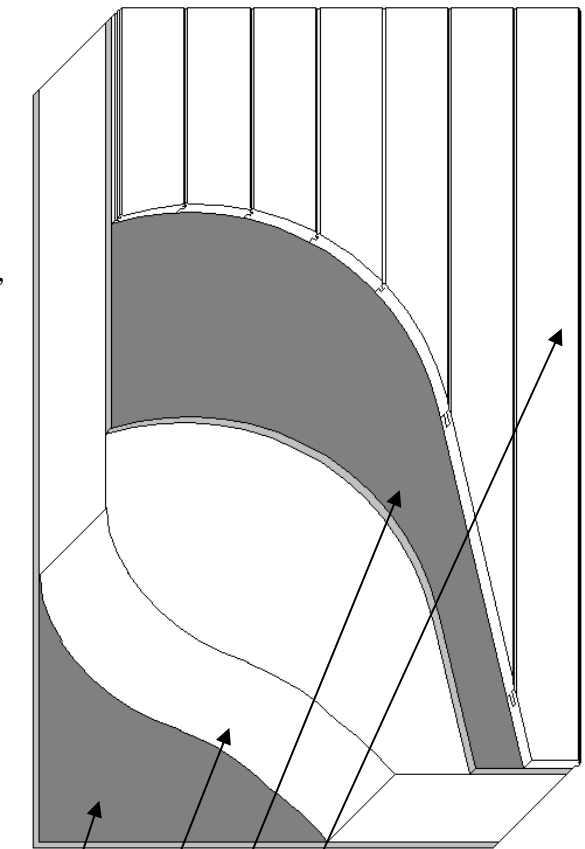
- 3.0 through 17.0 inches thick
- 4ft by 6, 7, 8, 9, 10, 12, 14, 16, 18, 20, 22, & 24ft*
- Optional pre-cut services
- Optional embedded nailers
- Optional custom skins
- Optional wire chases
- Optional Code Listing NTA FRD-031609-25 (EPS and NEO Only)

*Panels over 12ft will have butt joints in finish lumber.

Manufacturing & Quality Control:

Foard Panel manufacturing meets ICC-ES AC-10.

Independent review and approval of procedures and plant operations by registered, third party, ISO Guide 65/17065:2012 accredited inspection agency.



Interior Finish: T&G boards

Interior Skin: 7/16" OSB, PS2

Core: EPS, NEO, XPS, or PIR
In Various Thicknesses

Exterior Skin: 7/16" OSB, PS2

20 Year Limited Warranty:

Foard Panel Inc. warrants to the buyer that Foard Panels will not delaminate in normal use as the result of a defect in materials or manufacturing for 20 years from the date of purchase. See full warranty for details.

Drywall Clad Panel

Drywall Clad Panels (DWC) are an energy efficient alternative to conventional framing, insulation, sheathing and other building systems. They are load-capable insulated panels used as walls, roofs, and floors in residential, commercial and institutional buildings. Providing the exterior sheathing, insulation, structure, & interior base finish in one unit.

Interior and Exterior Skins:

7/16" thick HUD-PS2-grade Oriented Strand Board (OSB)

Interior Finish:

1/2" thick plaster-base gypsum drywall, called blue board

Core Materials:

EPS: Expanded Polystyrene, 1.0 lb/cuft, 1 in. is R-3.8

XPS: Extruded Polystyrene, 1.6 lb/cuft, 1 in. is R-5.0

NEO: Neopor Polystyrene, 1.15 lb/cuft, 1 in. is R-4.7

PIR: Polyisocyanurate foam, 2.0 lb/cuft, 1 in. is R-5.7

Features:

- Reduces Heating and Cooling Costs
- Fast Installation Reduces Labor Costs
- Uses Renewable Wood
- Recycled / Recyclable Foam Insulation

Availability:

- 3.0 through 17.0 inches thick
- 4ft by 6, 7, 8, 9, 10, 12, 14, 16, 18, 20, 22, & 24ft
- 8*ft by 8, 10, 12, 14, 16, 18, 20 & 24ft
- Optional pre-cut services
- Optional embedded nailers
- Optional custom skins
- Optional wire chases
- Optional Code Listing NTA FRD-031609-25 (EPS and NEO Only)

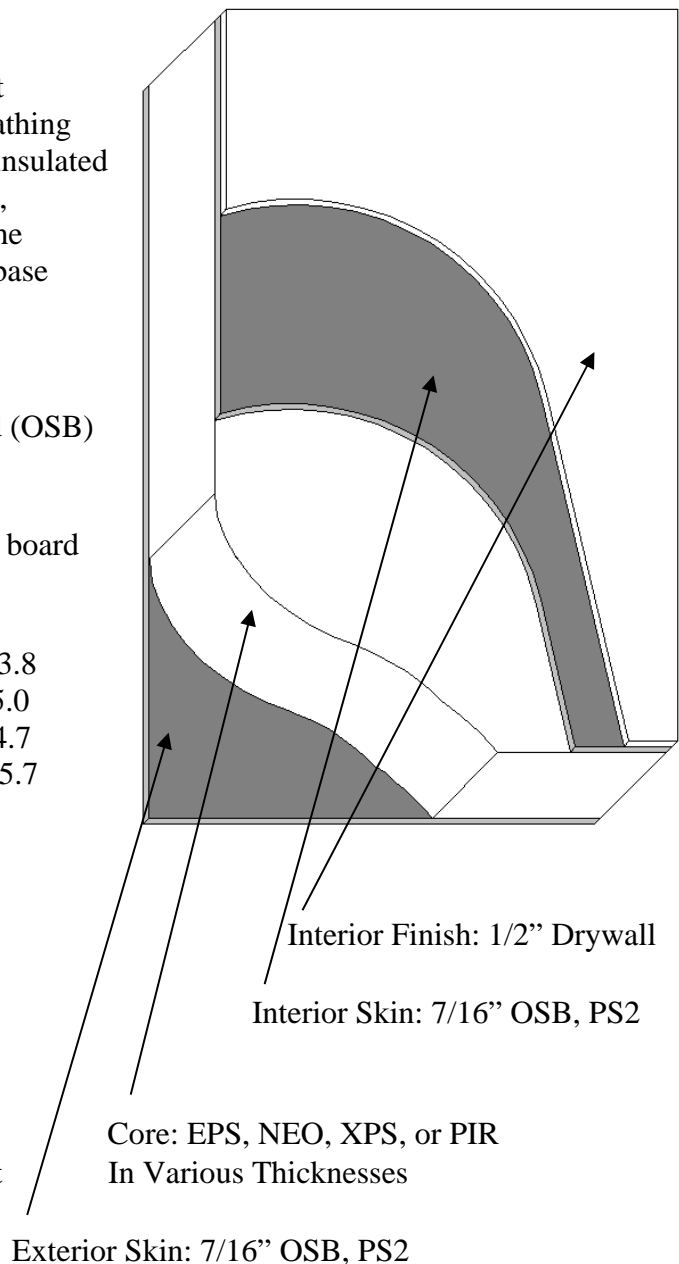
*Drywall only available in 4' widths and up to 16' lengths: 8ft wide panels will have drywall seams and drywall attached by screws not laminated

Manufacturing & Quality Control:

Foard Panel manufacturing meets ICC-ES AC-10. Independent review and approval of procedures and plant operations by registered, third party, ISO Guide 65/17065:2012 accredited inspection agency.

20 Year Limited Warranty:

Foard Panel Inc. warrants to the buyer that Foard Panels will not delaminate in normal use as the result of a defect in materials or manufacturing for 20 years from the date of purchase. See full warranty for details.



Nail Base Sheathing

Nail Base Panels (NB) are a high performance alternative to “wrap and strap” insulation and sheathing systems. They are non-load bearing insulated panels used on walls, and roofs in both residential and commercial buildings. Nail base panels provide the exterior sheathing and insulation in one unit.

Exterior Skin:

7/16” thick HUD-PS2-grade Oriented Strand Board (OSB)

Core Materials:

EPS: Expanded Polystyrene, 1.0 lb/cuft, 1 in. is R-3.8

XPS: Extruded Polystyrene, 1.6 lb/cuft, 1 in. is R-5.0

NEO: Neopor Polystyrene, 1.15 lb/cuft, 1 in. is R-4.7

PIR: Polyisocyanurate foam, 2.0 lb/cuft, 1 in. is R-5.7

Features:

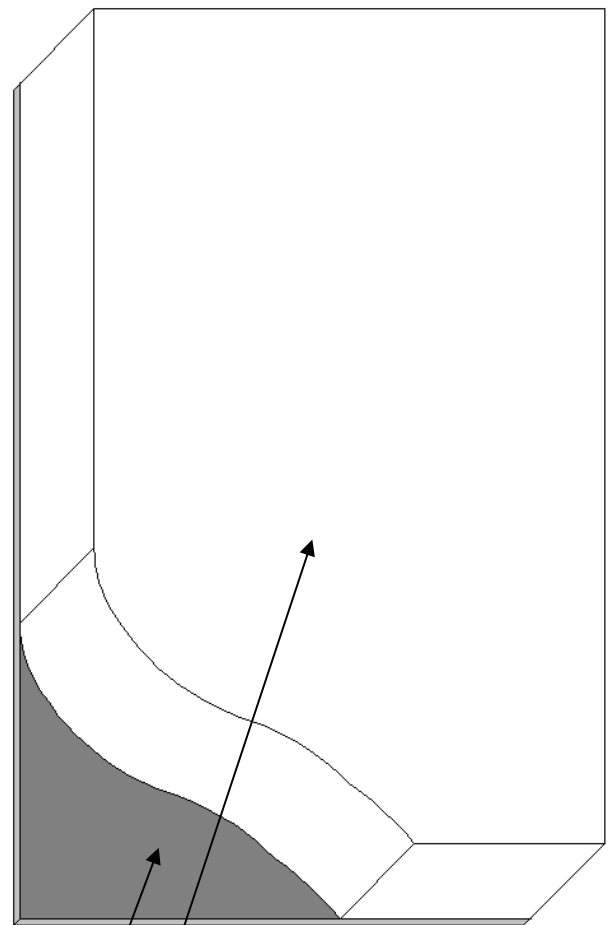
- Reduces Heating and Cooling Costs
- Fast Installation Reduces Labor Costs
- Uses Renewable Wood
- Recycled / Recyclable Foam Insulation

Availability:

- 3.0 through 17.0 inches thick
- 4ft by 6, 7, 8, 9, 10, 12, 14, & 16ft
- Optional pre-cut services
- Optional embedded nailers
- Optional custom skins

Manufacturing & Quality Control:

Foard Panel manufacturing meets ICC-ES AC-10. Independent review and approval of procedures and plant operations by registered, third party, ISO Guide 65/17065:2012 accredited inspection agency.



Core: EPS, NEO, XPS, or PIR
In Various Thicknesses

Exterior Skin: 7/16” OSB, PS2

20 Year Limited Warranty:

Foard Panel Inc. warrants to the buyer that Foard Panels will not delaminate in normal use as the result of a defect in materials or manufacturing for 20 years from the date of purchase. See full warranty for details.

Curtain Wall

Curtain Wall Panels (CW) are an energy efficient alternative to conventional insulation, sheathing and interior finish.

They are used as walls, roofs, and floors with steel and timber framing for residential, commercial and institutional buildings. Curtain Wall Panels provide the exterior sheathing, insulation, and interior finish in one unit and are available 4' wide in a broad range of thicknesses and lengths.

Interior and Exterior Skin:

7/16" thick, HUD-PS2-grade, Oriented Strand Board (OSB)

1/2" thick plaster-base gypsum drywall, called blue board interior skin

Core Materials:

EPS: Expanded Polystyrene, 1.0 lb/cuft, 1 in. is R-3.8

XPS: Extruded Polystyrene, 1.6 lb/cuft, 1 in. is R-5.0

NEO: Neopor Polystyrene, 1.15 lb/cuft, 1 in. is R-4.7

PIR: Polyisocyanurate foam, 2.0 lb/cuft, 1 in. is R-5.7

Features:

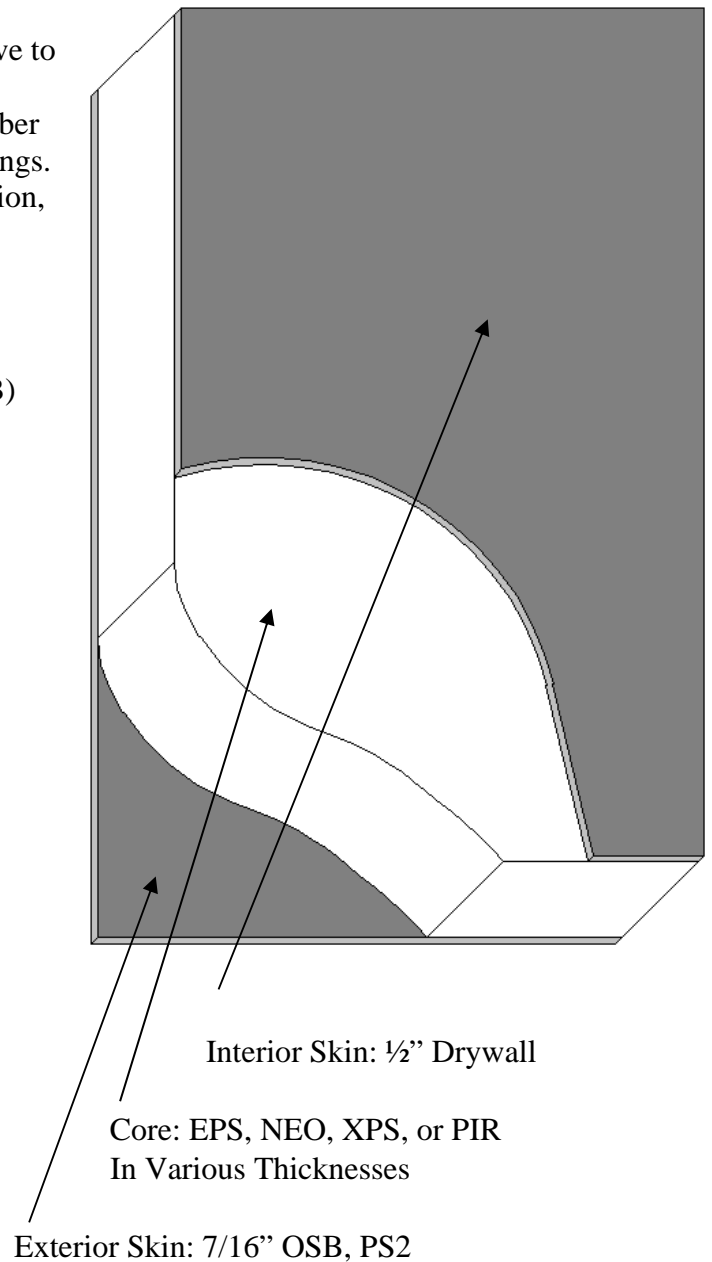
- Reduces Heating and Cooling Costs
- Fast Installation Reduces Labor Costs
- Uses Renewable Wood
- Recycled / Recyclable Foam Insulation

Availability:

- 3.0 through 17.0 inches thick
- 4ft by 6, 7, 8, 9, 10, 12, 14, & 16ft
- Optional pre-cut services
- Optional embedded nailers
- Optional custom skin
- Optional wire chases

Manufacturing & Quality Control:

Foard Panel manufacturing meets ICC-ES AC-10. Independent review and approval of procedures and plant operations by registered, third party, ISO Guide 65/17065:2012 accredited inspection agency.



20 Year Limited Warranty:

Foard Panel Inc. warrants to the buyer that Foard Panels will not delaminate in normal use as the result of a defect in materials or manufacturing for 20 years from the date of purchase. See full warranty for details.

Pentalam Panels

Pentalam Panels (PLP) were introduced by Foard Panel to meet the architecture community's desire for thinner eave and rake profiles. These panels allow for a very thick profile roof panel to become thinner for the exterior eave and rake overhangs. While only the perimeter panels need be Pentalam, the connection point between Pentalams and the main roof still has to be far enough from the eave to provide sufficient back span (2:1 back span to overhang).

Interior, Middle, and Exterior Skins:
7/16" thick HUD-PS2-grade Oriented Strand Board (OSB)

Core Materials:

EPS: Expanded Polystyrene, 1.0 lb/cuft, 1 in. is R-3.8

XPS: Extruded Polystyrene, 1.6 lb/cuft, 1 in. is R-5.0

NEO: Neopor Polystyrene, 1.15 lb/cuft, 1 in. is R-4.7

PIR: Polyisocyanurate foam, 2.0 lb/cuft, 1 in. is R-5.7

*XPS&PIR are used in combination with EPS or NEO, because of limited thickness options of XPS and PIR.

Features:

- Reduces Heating and Cooling Costs
- Fast Installation Reduces Labor Costs
- Uses Renewable Wood
- Recycled / Recyclable Foam Insulation

Availability:

- 8.25 through 17.0 inches thick (Depending on Core types)
- 4ft by 6, 7, 8, 9, 10, 12, 14, & 16ft
- Optional pre-cut services
- Optional embedded nailers
- Optional custom skins
- Optional wire chases
- Optional Code Listing

Manufacturing & Quality Control:

Foard Panel manufacturing meets ICC-ES AC-10. Independent review and approval of procedures and plant operations by registered, third party, ISO Guide 65/17065:2012 accredited inspection agency.

Regular SIP Panel

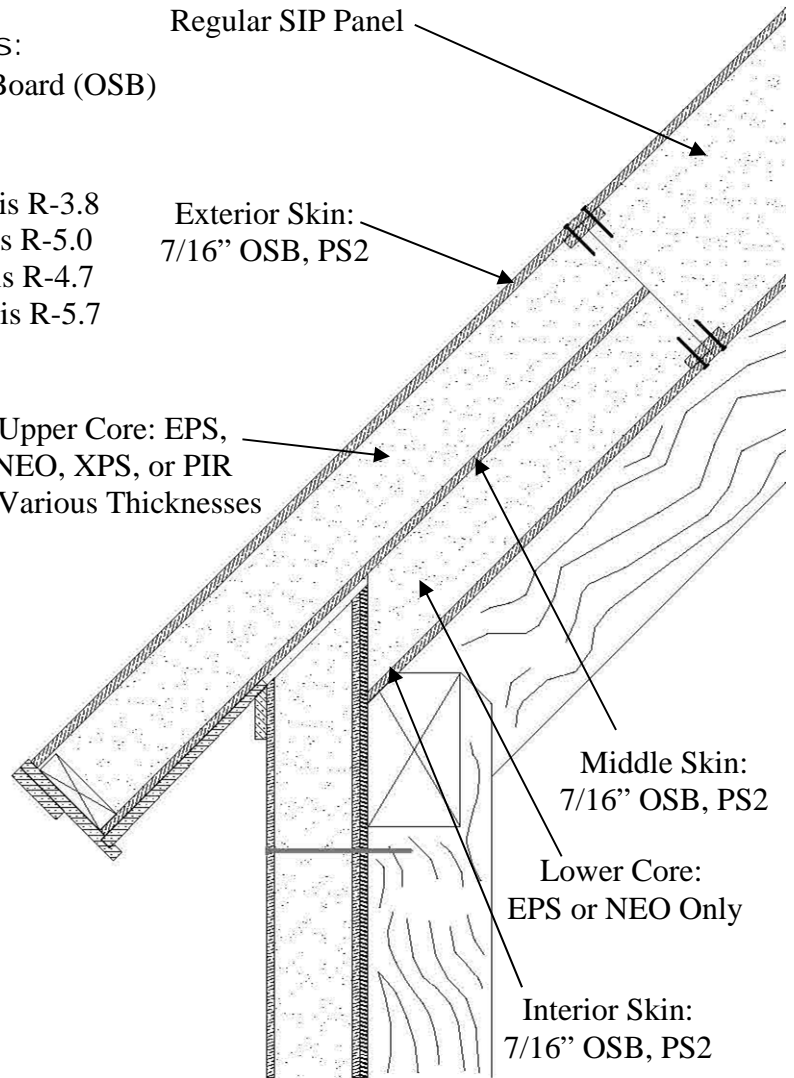
Exterior Skin:
7/16" OSB, PS2

Upper Core: EPS,
NEO, XPS, or PIR
In Various Thicknesses

Middle Skin:
7/16" OSB, PS2

Lower Core:
EPS or NEO Only

Interior Skin:
7/16" OSB, PS2



20 Year Limited Warranty:

Foard Panel Inc. warrants to the buyer that Foard Panels will not delaminate in normal use as the result of a defect in materials or manufacturing for 20 years from the date of purchase. See full warranty for details.

SIP Properties at Standard Thicknesses

Overall Thickness (in)		2.88	4.50	6.50	8.25	10.25	10.50	12.25	12.88	15.00	16.00
Core Thickness (in)		2.00	3.63	5.63	7.38	9.38	9.63	11.38	11.88	14.13	15.13
EPS	R-Value @75°	8.7	15	23	29	37	38	45	47	55	59
	R-Value @40°	9.4	16	25	32	40	41	49	51	60	65
	Permeance (perm)	0.71	0.58	0.47	0.40	0.35	0.34	0.31	0.29	0.26	0.25
	Weight (lb/sqft)	3.0	3.1	3.3	3.4	3.6	3.6	3.7	3.8	4.0	4.1
	Size Availability 4ft Widths	4, 5, 6, 7, 8, 9, 10, 12, 14, 16, 18, 20, 22, and 24ft									
	Size Availability 8ft Widths	8, 10, 12, 14, 16, 18, 20, and 24ft									
XPS	R-Value	11	19	29	37	47	-	57	-	-	-
	Permeance (perm)	0.50	0.36	0.26	0.21	0.18	-	0.15	-	-	-
	Weight (lb/sqft)	3.1	3.3	3.6	3.8	4.1	-	4.3	-	-	-
	Size Availability 4ft Widths	4, 5, 6, 7, 8, 9, 10, 12, 14, 16, 18, 20, 22, and 24ft									
	Size Availability 8ft Widths	8, 10, 12, 14, 16, 18, 20, and 24ft									
NEO	R-Value @75°	10	18	27	36	45	46	54	57	67	72
	R-Value @40°	11	19	29	38	48	49	58	61	72	77
	Permeance (perm)	0.61	0.46	0.36	0.30	0.25	0.24	0.21	0.21	0.18	0.17
	Weight (lb/sqft)	3.1	3.3	3.6	3.9	4.2	4.2	4.5	4.6	4.9	5.1
	Size Availability 4ft Widths	4, 5, 6, 7, 8, 9, 10, 12, 14, 16, 18, 20, 22, and 24ft									
	Size Availability 8ft Widths	8, 10, 12, 14, 16, 18, 20, and 24ft									
PIR	R-Value	12	23	34	44	56	-	67	-	-	-
	Permeance (perm)	0.33	0.22	0.15	0.12	0.10	-	0.08	-	-	-
	Weight (lb/sqft)	3.1	3.4	3.7	4.0	4.4	-	4.7	-	-	-
	Size Availability 4ft Widths	4, 5, 6, 7, 8, 9, 10, 12, 14, 16, 18, 20, 22, and 24ft									
	Size Availability 8ft Widths	8, 10, 12, 14, 16, 18, 20, and 24ft									

SIP Core Properties

		Test Method	EPS	NEO	XPS	PIR
General	Density (lb/cuft)	ASTM D1622 or C303	1.0 ⁵	1.15 ²	1.6	2.0
	Dimensional Stability (% Change)	ASTM D2126	2 ³	<1.5 ²	2	2
	Max. Custom SIP Thickness (in.)	-	25.00	25.00	12.25	12.25
Thermal	R-Value of 1 inch thickness (75 °F)	ASTM C518	3.8 ³	4.7 ⁴	5.0	5.7
	R-Value of 1 inch thickness (40 °F)	ASTM C518 or C578	4.2 ³	5.0 ⁴	5.4	-
	U-Value of 1 inch thickness (75 °F)	ASTM C518	0.26 ³	0.21	0.20	0.17
	U-Value of 1 inch thickness (40 °F)	ASTM C518 or C578	0.24 ³	0.20	0.19	-
Strength	Compressive 10% Deformation (lbs/sqin)	ASTM D1621 or C165	10	14	20	20
	Permeability (perm inches)	ASTM E96	5.0 ³	3.1 ⁴	1.5	<1.0
	Absorption (% volume)	ASTM C272	4.0 ³	1.1 ⁴	0.3	<1.0
	Max. Service Temperature (°F)	ASTM D3278	160	165 ⁵	190 ⁷	250
Fire Characteristics	Rating	-	Class I	Class I	Class I	Class I
	Smoke Developed	E84	125	25 ²	165	220 ⁸
	Flame Spread	E84	15	5 ²	5	50 ⁸
	Toxicity of Combustion Products	Same as wood or Cardboard				

¹ Hunter Panel. Accessed, 5/26/2013. http://www.hpanels.com/images/stories/pdfs/tech_bulls/Hunter_Recycled_Content.pdf

² Opcore G Thermal Insulation, NEO 5300plus from opcodirect.com/library accessed 8/24/2017

http://docs.wixstatic.com/ugd/1c896f_a6b9e13325a649fab9b25535d12d3da4.pdf

³ ASTM International Standards (2006). ICC. pp659-662. West Conshohocken, PA

⁴ BASF Technical Leaflet, January 18th 2016.

⁵ BASF Safety Data Sheet: Styropor BF-222. Revised June 2007, Version 2.1.

⁶ BASF Safety Data Sheet: Neopor 2200. Revised February 2011, Version 2.0.

⁷ Dow Material Safety Data Sheet: Styrofoam 4x48 Inch Panel Coare 20 WN Extruded Polystyrene Foam Insulation. Issued January 2012.

⁸ Hunter Panel Technical Department, October 31, 2014.



R-VALUE EXPLAINED

One of the greatest advantages of SIPs is how well they perform thermally. The tables below compare SIPs with a common competitor; stick frame construction with batt insulation. In order to understand the comparison, the concepts of “Center-of-Cavity” and “Whole-Wall” need to be understood. The term “Whole-Wall” refers to the portion of the whole surface of the building that is not window or door or other penetrations. Center-of-Cavity refers to the part of the Whole-Wall that has insulation, not the studs. Naturally the R-value of the Whole-Wall is slightly lower than the Center-of-Cavity R-value.

A conventionally framed, fiberglass system typically performs at only 70-80% of the stated Center-of-Cavity R-value. Here is the good news! Foard Panel SIPs perform at 85-97% of the stated Center-of-Cavity R-value. Because Whole-Wall performance for these two methods of insulating are so different, it has been difficult for many people to make accurate comparisons and to choose appropriate panels for their projects.

Building codes for R-Value requirements are based on Center of Cavity insulation values. Our experience has been that building inspectors will allow the use of panels that have R-Values lower than code. For example, if the code for roof insulation in your area is R-38, you will likely find that your local inspector will allow the use of an R-30 panel; because an R-30 panel will outperform an R-38 conventional system when a Whole Wall comparison is made.

R-Value Comparison Table: Foard Panel SIPs vs. Conventional Stick Built

Wall Thickness		Fiberglass	Cellulose	EPS SIP	NEO SIP	XPS SIP	PIR SIP
2x4 stud or 4 ½” SIP	Center of Cavity	R-11	R-13	R-15	R-18	R-19	R-23
	Whole Wall	R-9	R-11	R-14	R-17	R-18	R-21
2x6 stud or 6 ½” SIP	Center of Cavity	R-17	R-20	R-23	R-27	R-29	R-34
	Whole Wall	R-14	R-17	R-22	R-26	R-28	R-33
2x8 stud or 8 ¼” SIP	Center of Cavity	R-23	R-26	R-30	R-36	R-37	R-44
	Whole Wall	R-20	R-22	R-29	R-35	R-36	R-43
2x10 rafter or 10 ¼” SIP	Center of Cavity	R-29	R-33	R-37	R-45	R-47	R-56
	Whole Wall	R-25	R-28	R-36	R-43	R-45	R-53
2x12 rafter or 12 ¼” SIP	Center of Cavity	R-35	R-40	R-45	R-54	R-57	R-67
	Whole Wall	R-30	R-34	R-43	R-52	R-56	R-63

Wall Thickness Comparison Table: Foard Panel SIPs vs. Conventional Stick Built

Center of Cavity R-Value	Standard Wall Thickness Needed to Achieve Desired Center-of Cavity Code				
	STICK	EPS SIP	NEO SIP	XPS SIP	PIR SIP
R-19	2x6	4 ½”	4 ½”	4 ½”	4 ½”
R-22	2x8	6 ½”	6 ½”	6 ½”	4 ½”
R-30	2x10	8 ¼”	6 ½”	6 ½”	6 ½”
R-38	2x12	8 ¼”	8 ¼”	8 ¼”	6 ½”
R-49	14” I-Joist	10 ¼”	10 ¼”	10 ¼”	8 ¼”

NOTE – This table provides the wall thicknesses required to meet the same Whole-Wall R-value as a conventional wall with the given Center-of-Cavity number. These are only suggestions based on our understanding of building codes and actual thermal performance. All final assessments are made by local building code officials.



SIPs offer great advantages in thermal bridge free construction and air tightness. There are a few tips for accurately modeling SIPs in various energy models. Whether you are trying to size your heating system or looking for a high performance certification, knowing how to model your SIPs is useful.

Thermal Bridging

The most common advantage of SIPs is reduced thermal bridging. Especially in timber frame construction there is very little thermal bridging in SIP construction. Basically the only thermal bridges are the blocking used around the windows to allow you to attach windows and trim. Depending on the system you are using there are different ways to model. Often the easiest and most accurate way to model SIPs on a timber frame is as continuous insulation. If your software offers you the ability to adjust framing factors then you can model SIPs as having about 3% framing factor to account for the blocking around windows.

Some software does offer an option for SIPs. Usually that is **not** the most accurate way to model SIPs on timber frames. The SIP option includes a fairly high framing factor more comparable with a standard wall. There are several reasons for that, one is that often pre-fabricated conventional walls are mistakenly called SIPs, another is that in a fully structural panel house there will be headers over some windows, and posts under point loads. Because of these and other factors, software makers have chosen not to give SIPs full credit as thermal bridge free construction.

Air Tightness

While air tightness often takes second place to thermal bridging in marketing, air tightness is usually SIPs' most important energy saving feature. While it is possible to air seal conventional construction, Foard Panel typical SIP construction details make it very easy to achieve very low air leakage numbers. With newer codes requiring blower door testing and low air leakage, SIPs are becoming an even more attractive option for simplifying the building process.

For energy models and mechanical system sizing it is generally best to assume an ACH₅₀ of 1 or less. This means for any SIP building you should be planning on a ventilation system that runs whenever the building is occupied, to provide the necessary fresh air. It also means that you **cannot** use conventional rule of thumb sizing for your mechanical systems, because you will severely oversize heating and cooling systems, while under sizing ventilation systems. If your HVAC contractor is not comfortable using modeling software or manual J to size the systems for your building then find another contractor or get someone else to do the modeling and give the contractor more accurate heat loss numbers.

Certifications and Rebates

Many states offer rebates or other incentives for higher performance construction. Foard Panel buildings can help your structure qualify for Energy Star, LEED, Passive House, Net Zero Ready, and many other high performance certifications. Foard Panel would be happy to discuss documentation required to apply for these certifications or incentives.

*Our experienced installation crews can be hired to enclose your structure.
Your Foard Panel project manager will coordinate your installation schedule and details.*

What to Expect from a Foard Panel Installation

- All wall and roof panels installed to Foard Panel specifications
- All window and door rough openings cut, routed, air sealed and fitted with 2x blocking
- All blocking locations secured per Foard Panel specifications
- All spline connections secured per Foard Panel specifications
- All connections air sealed with expanding spray foam or mastic per Foard Panel specifications
- Exceptionally good housekeeping practices
- Crane supplied and operated by Foard Panel

Site Tech Program

For clients farther from our manufacturing facilities it can be more cost effective to hire a Foard Panel site tech to train your own local, skilled labor so they can install panels themselves. Site Techs are available for one or two day training sessions; completion of the job is the responsibility of your crew.

What to expect from a Foard Panel Site Tech

- Reviewing panel plans and details for the job with your crew
- Training your crew on best practices and recommended panel installation techniques
- Being on your job for one or two days to accelerate your crew through the “learning curve”
- Answering questions and observing your crew in action



*The right tools are essential when installing panels correctly and efficiently.
Foard Panel has the tools you need to get the job done right.*

Linear Link Saw

The Linear Link is a modified, worm drive, skill saw with a 14" chain saw bar. This powerful electric saw cuts to the full depth of 13" which makes cutting through most panels, even at 45 degree angles, possible in one pass.



Electric Foam Scoops – For EPS and NEO core panels



Foam scoops are used to rout panel edges wherever 2x material needs to be installed. The foam scoop heats an element that melts the core material as it passes. Foam scoops are available in many sizes ranging from 3 1/2" to 11 1/4" wide. They can be adjusted to a depth of up to 4 1/2". These tools are a lot less messy, and less expensive than mechanical routers but they also operate at a slower pace.

Mechanical Routers

Mechanical routers are custom-built body grinders with special cutting heads designed for full routs or spline and spray foam channel routs. Most contractors who do multiple panel installations will opt for a mechanical router over a foam scoop. Our routers can be shipped with a full set of standard router bits which includes set ups for 3 1/2" and 5 1/2" cores. If you have unique routing configurations, please discuss your needs with your Project Manager.

Pageris Foam Gun

The Pageris Foam gun is compatible with Foard Panel Brand spray foam and is reusable. Unlike the disposable nozzles that come with "straw" foam, guns regulate the ratio of propellant to product as the foam is dispensed. A consistent ratio means greater yield per can as well as a more uniform seal.



Siga Mastic Gun

The Siga mastic gun is a sausage tube caulking gun. The mastic we supply, which is specifically formulated to remain pliable permanently so it can maintain an air tight seal even as lumber shrinks. SIGA mastic comes in a sausage tube rather than a more typical caulking tube. We therefore offer a reusable dispenser that is compatible.

Rental and Purchase Agreements

Foard Panel accepts Visa and MasterCard for tool rental or purchase agreements. The full purchase price of the tools being rented will be charged if the tool is not returned in working condition by the agreed upon time. Ordinarily the tools can be shipped with the truck delivering panels. The costs for other shipping arrangements and return shipping are the renter's responsibility.

Job Site Access is Essential

- Prior to our arrival, plow and sand your driveway as necessary
- Extremely muddy conditions may require your excavator to be available
- Any trees or other obstacles impeding our access to the site must be removed at your expense



One of Foard Panel delivery crane trucks.

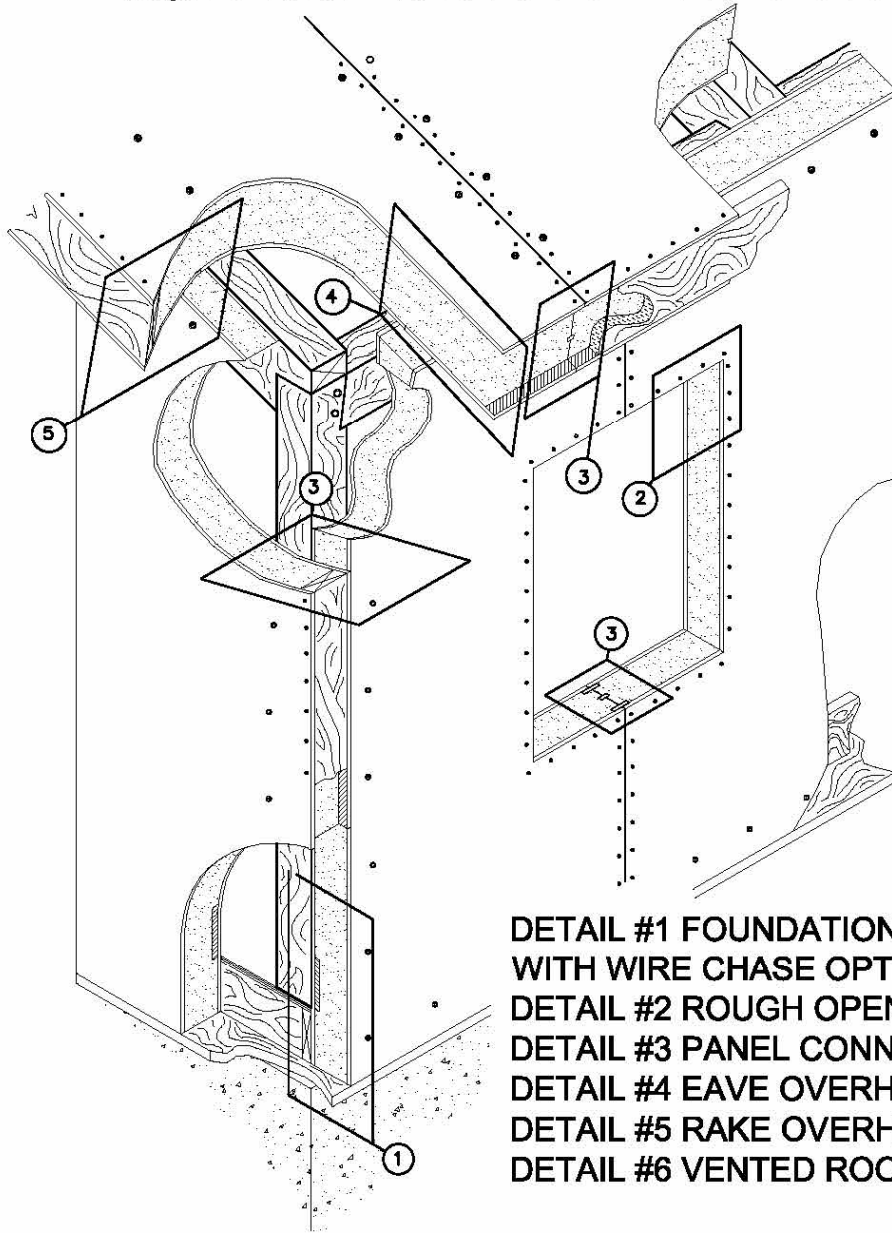


Tough site? Foard Panels being helicoptered to the top of Smugglers Notch Ski Area

Additional Customer Responsibilities

- Have your Construction Manager on site the day we arrive to go over details
- Provide a dumpster
- Provide electrical power. Minimum of two, 20 amp breakers, or minimum 5,000 watt generator with fuel. Please let us know if you have or need a generator
- Jobsite must be back filled prior to our arrival
- If you are getting Pre-Cut panels all rough openings must be confirmed before panels are made, if it is a site cut project (only old timber frames and renovations usually) all decisions must be made before we arrive on site
- Foam balls that protrude from drill & fill holes after sealing are left on the building. Foard Panel does not remove foam balls after installation
- Facilities available on site (temporary or otherwise)
- Panel weather protection after installation is not Foard Panel's responsibility

Use this Isometric drawing to help visualize where details occur. Nine pages of specialized details follow this isometric drawing.

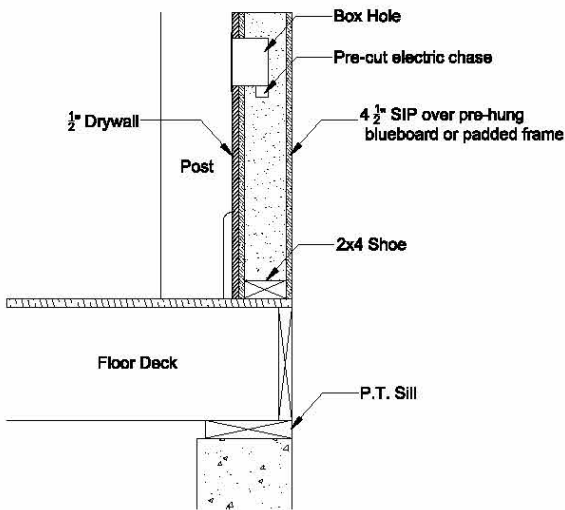


- DETAIL #1 FOUNDATION DETAILS, WITH WIRE CHASE OPTIONS
- DETAIL #2 ROUGH OPENING DETAILS
- DETAIL #3 PANEL CONNECTIONS
- DETAIL #4 EAVE OVERHANG DETAILS
- DETAIL #5 RAKE OVERHANG DETAILS
- DETAIL #6 VENTED ROOF DETAILS

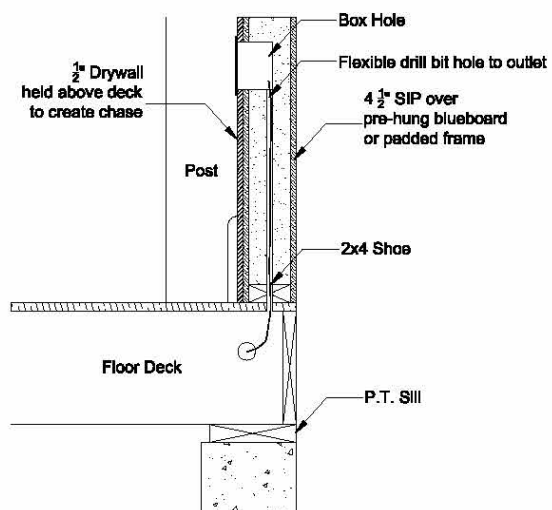
ISOMETRIC
DETAILS

TYPICAL BUILDING SECTION

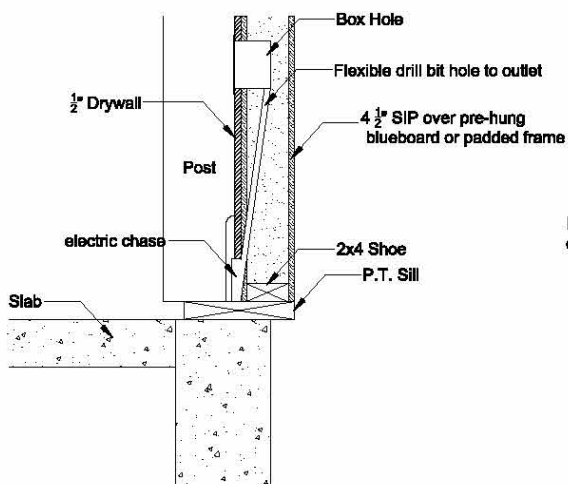
Date: February 2016



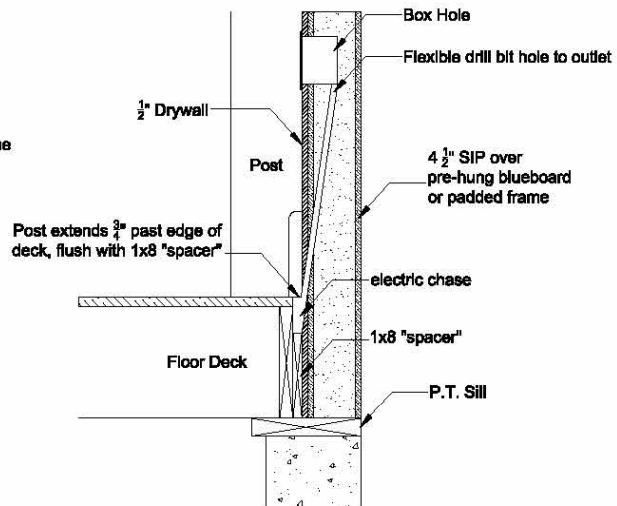
SIP on deck, with wire chase



SIP on deck, with wire chase in deck



SIP on slab, with wire chase behind baseboard trim



SIP "runs by" deck

Note: check your local building code before applying any of these electric details. In general, above examples are not fully detailed and are not for construction.

Detail #

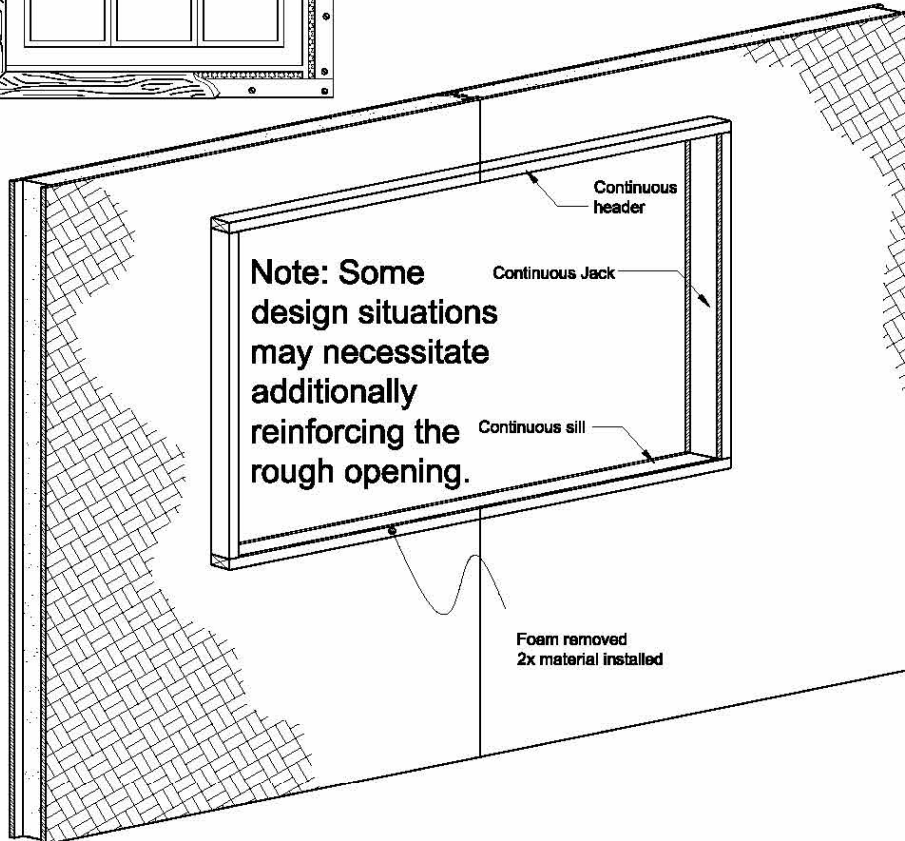
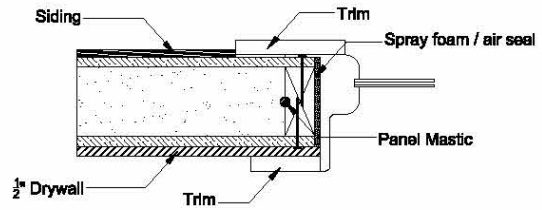
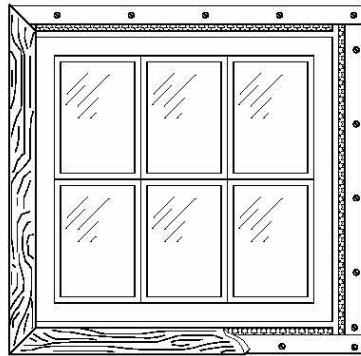
1

FOUNDATION DETAILS


WIRE CHASE OPTIONS

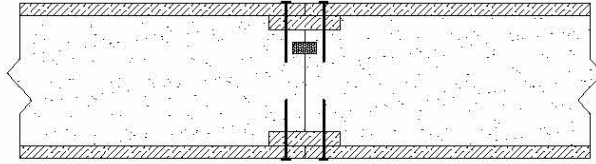
Date: June 2016

Foard
PANEL
STRUCTURAL INSULATED PANELS

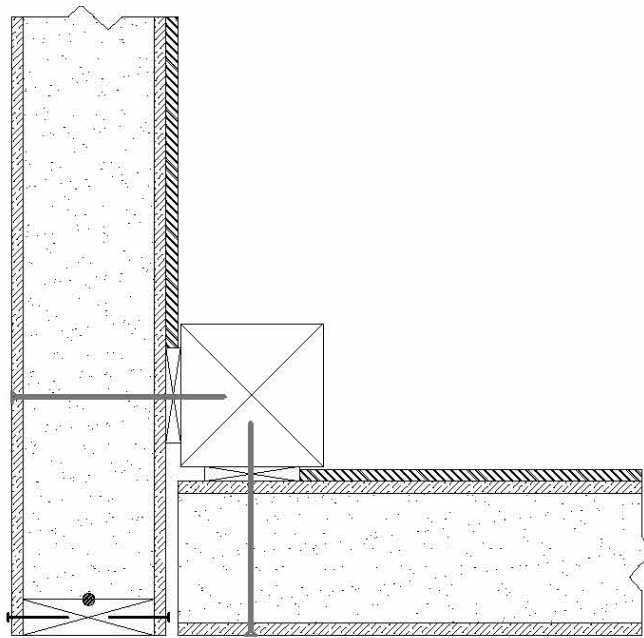


To create a rough opening, the foam core is removed from the perimeter of the opening - typically the rout is $1\frac{1}{2}$ " in depth and the full width of the core thickness. The routed space is then filled with 2x material; sill, header, and jacks. Panel mastic is applied behind the 2x material. The 2x's are secured with nails 6" o.c., finishing the rough opening. The window or door unit is then installed conventionally.


Detail # 2	ROUGH OPENING DETAILS	 STRUCUTRAL INSULATED PANELS
	TYPICAL WALL	
	Date: June 2016	

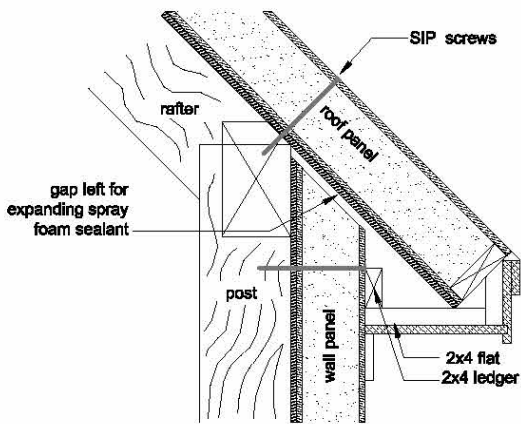


Foard Panels are typically pre-routed to accept $\frac{5}{8}$ " x3" plywood splines, as shown above. The splines are slid into the channels and the skins from both panels are fastened to it at 6" o.c., with screws or nails. A channel is also milled at the joint for expanding foam sealant. Other spline options are available for other design situations.

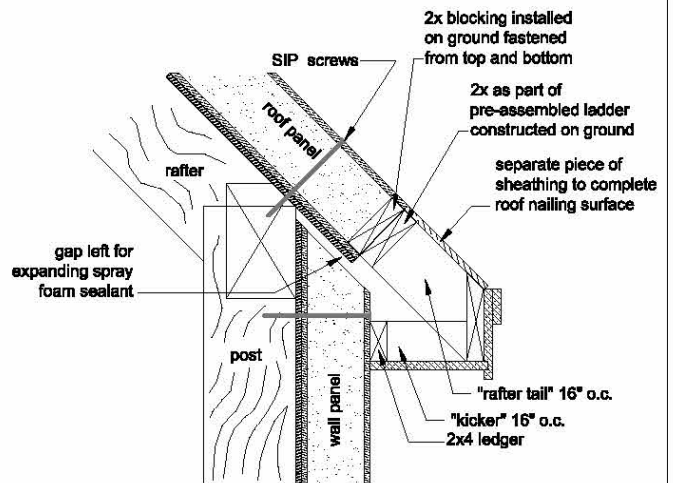


Where panels run by each other, as shown in this outside corner detail, two things happen. First, a $\frac{1}{2}$ " gap is intentionally left between the panels for expanding foam sealant. And second, the overlapping panel is routed for 2x blocking to complete the nailing surface for trim.

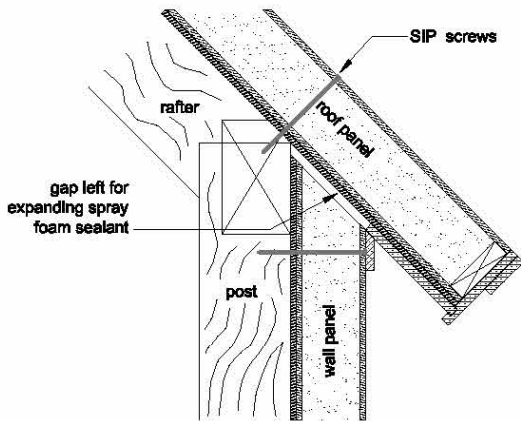
Detail # 3	PANEL CONNECTIONS	 Foard PANEL STRUCTURAL INSULATED PANELS
	SPLINE & CORNER	
	Date: June 2016	



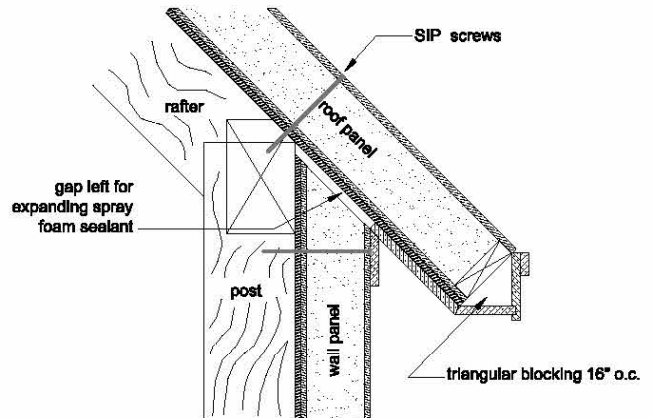
panel supports overhang
plumb fascia with level soffit
drywall-clad roof panel in this example



built out overhang
plumb fascia with level soffit
drywall-clad roof panel in this example




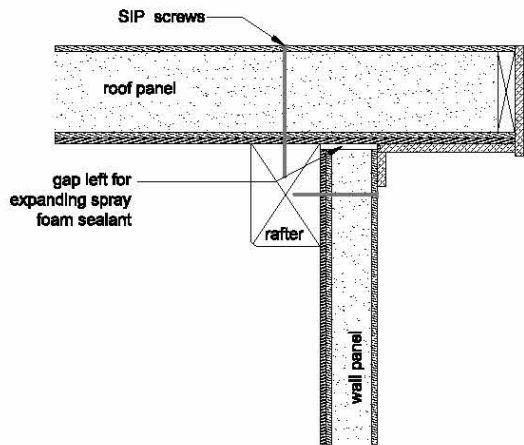
panel overhang
square fascia with open soffit
drywall-clad roof panel in this example



panel supports overhang
plumb fascia with open soffit
drywall-clad roof panel in this example

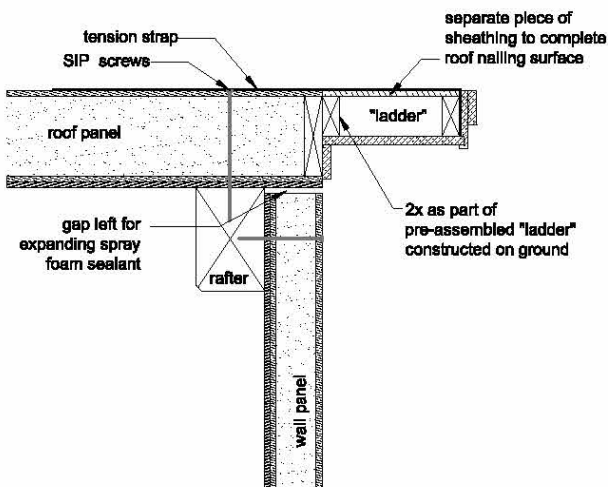
Note: In all examples, amount of overhang is variable depending on design situation. In general, above examples are not fully detailed and are not for construction.

Detail # 4	ROOF OVERHANG DETAILS	
	EAVE	
	Date: June 2016	



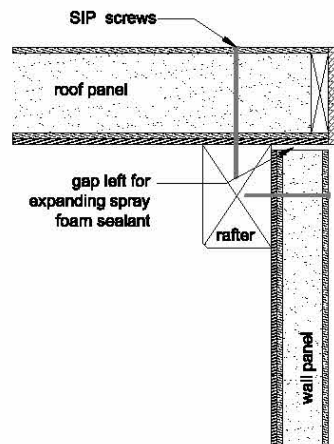
panel supports overhang
simplest, most common option

drywall-clad roof panel in this example



built out overhang reduces rake thickness


drywall-clad roof panel in this example

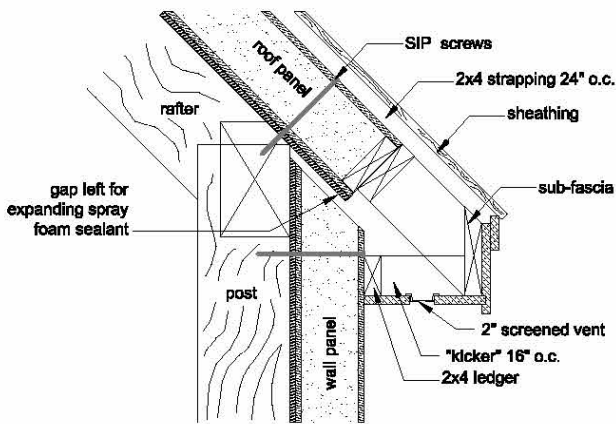


flush overhang

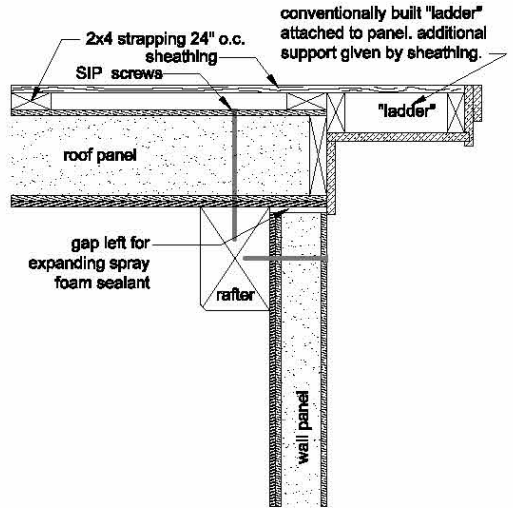
drywall-clad roof panel in this example

Note: In all examples, amount of overhang is variable depending on design situation. In general, above examples are not fully detailed and are not for construction.

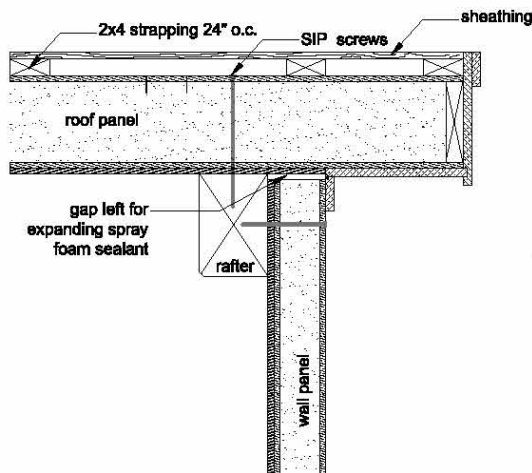
Detail # 5	ROOF OVERHANG DETAILS	 STRUCTURAL INSULATED PANELS
	RAKE	
	Date: June 2016	



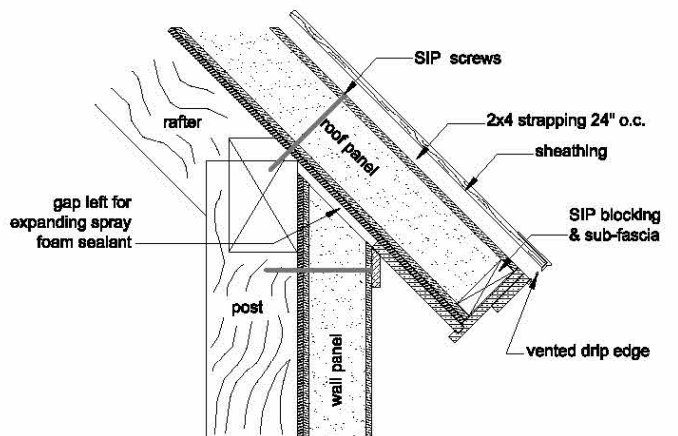
panel supports overhang
plumb fascia with level soffit
 drywall-clad roof panel in this example



built out overhang
square fascia with level soffit
 drywall-clad roof panel in this example




panel overhang
square fascia with open soffit
 drywall-clad roof panel in this example



panel overhang
square fascia with open soffit
 drywall-clad roof panel in this example

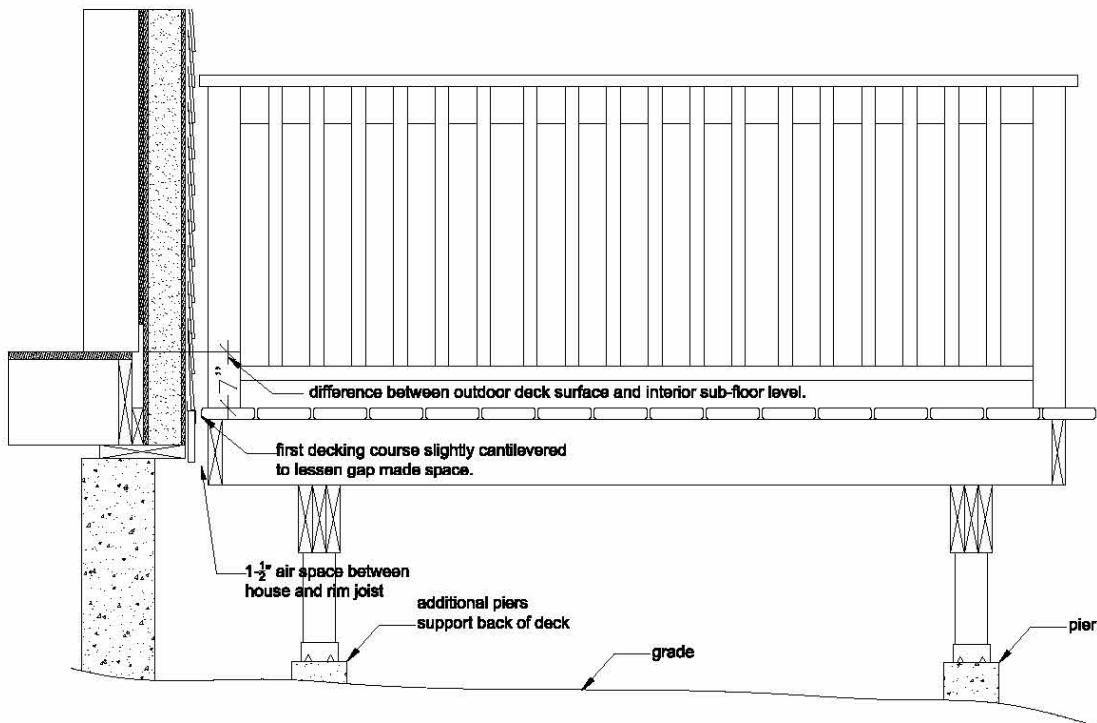
Note: In all examples, amount of overhang is variable depending on design situation. In general, above examples are not fully detailed and are not for construction.

Detail # 6	VENTED ROOF DETAILS	 STRUCUTRAL INSULATED PANELS
	BUILT-UP ROOF	
	Date: June 2016	

OUTDOOR DECK ATTACHMENT

Our recommendation for attaching an outdoor deck is to not attach it at all. The connection between a deck and house when attached directly is a likely site for water damage in both panelized and conventionally built homes.

The detail below incorporates an extra set of piers set nearer to the house. The support of these piers allows the deck to be free standing and independent of the house itself. A 1 ½" space is left between the house and rim joist of the deck. This detail not only helps to create a structurally superior deck, it also ensures that the deck and the house behind it will last a long time.



Detail #

7

OUTDOOR DECK

Date: June 2016

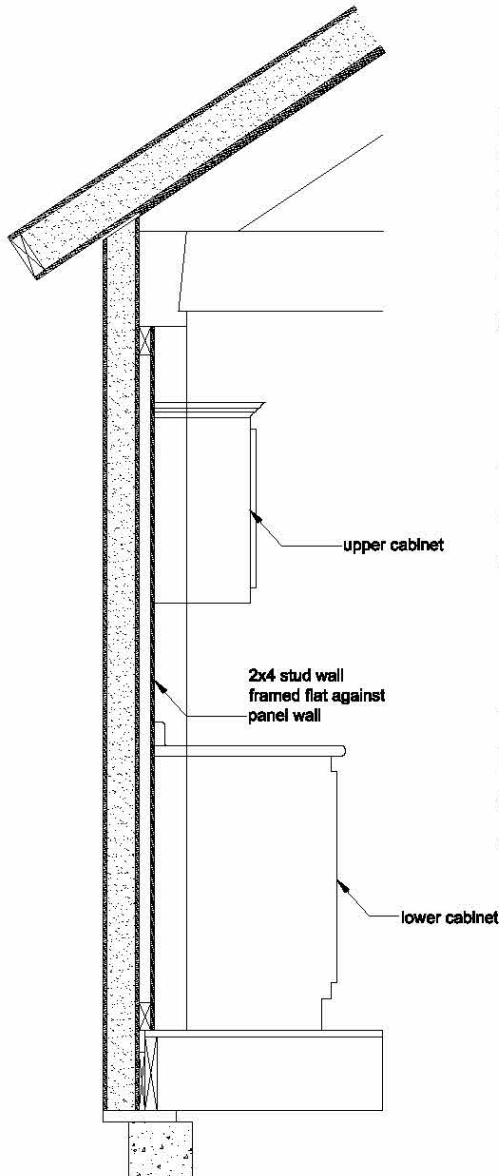
Foard
PANEL
 STRUCTURAL INSULATED PANELS

CABINET MOUNTING

In this example, a 2x4 stick framed wall is installed between the subfloor and the underside of the top plate. The wall here is constructed "flat" against the panel; taking up only 2" of additional floor plan space.

The stud framing creates additional room for above-counter wiring as well as an excellent backing for attaching cabinets.

When a kitchen sink and window are located on an outside wall, an extra deep sill makes more room for plants and other kitchen widgets.



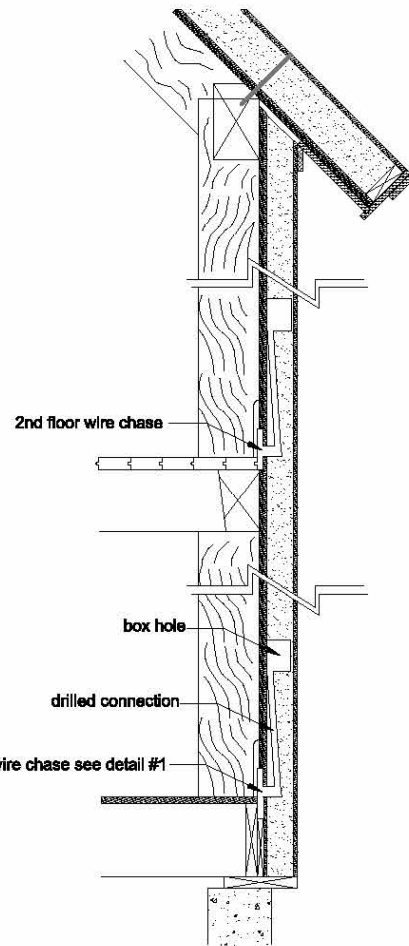
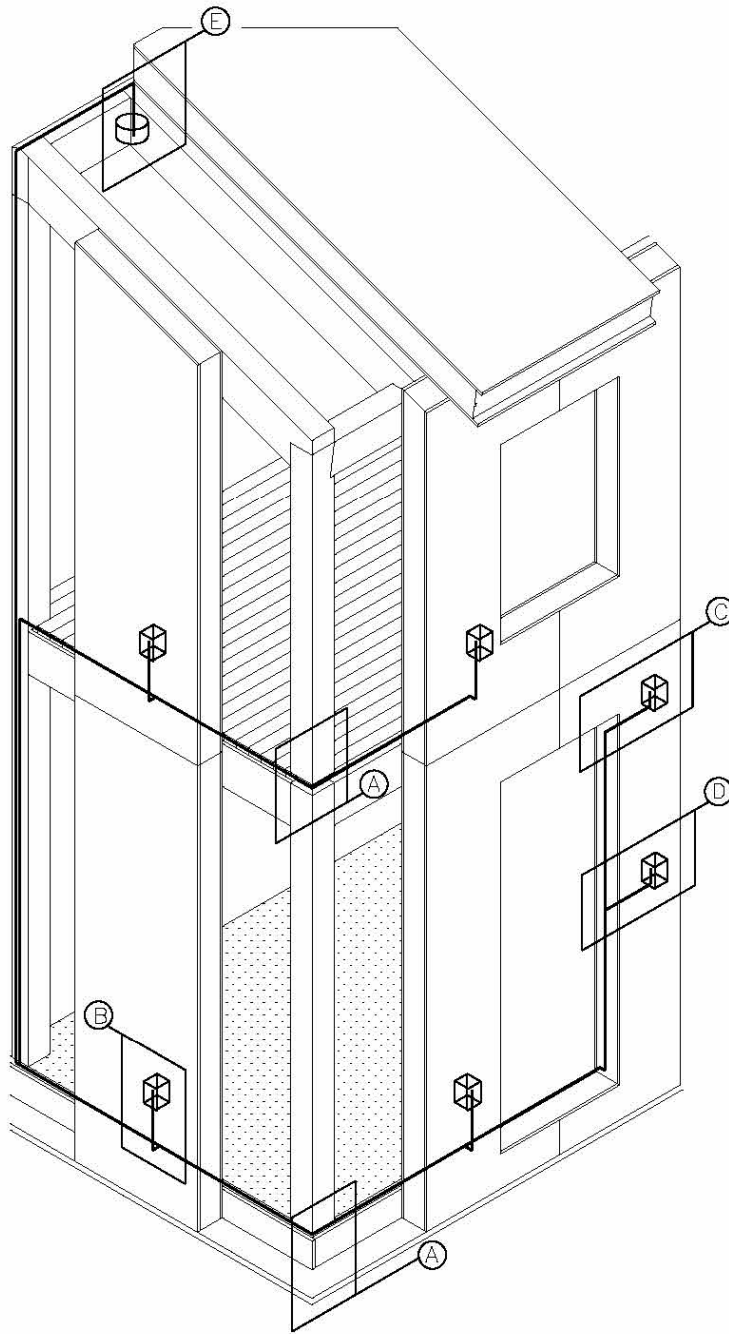
Detail #

8

KITCHEN CABINET

Date: June 2016

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- A. Wire Chase
- B. Perimeter Outlet
- C. Outdoor Fixture
- D. Switch at Door
- E. Ceiling Fixture

Detail #
9

WIRING DETAILS

Date: June 2016

Foard
PANEL
STRUCTURAL INSULATED PANELS



WIRING SOLUTIONS

Wiring panel homes is different than wiring conventional homes, though not any more difficult. Wiring in panels is generally limited to two main elements, 1) perimeter outlets, and 2) switches and fixtures at exterior doors.

Electric Chase:

The wire chase is where your wires originate from to feed perimeter outlets and switches. The details on Detail #9 are drawn with a “deck chase”. This example is just one of many ways to accomplish chasing wires. There are three more methods shown on Detail #1.

Perimeter Outlets:

To install and feed an outlet: 1) An opening the size of the box is cut through the inside skin of the panel and the foam is scooped out to make room for the box. 2) A hole is drilled into the panel at floor level, directly below the box opening. 3) A tunnel is drilled from the box opening to the lower hole behind the panel skin, using a drill with a flexible shaft.

Outdoor Fixture & Switch at Door:

Wires for switches and lights near exterior doors originate from the same chase used for perimeter outlets and are run behind the doors rough opening framing. Again, the box opening is cut through the panel skin and the foam is scooped out. A tunnel is then drilled from the door’s rough opening to the box.

Ceiling Fixture:

Certain fixtures, like a fan suspended from a framing member, will require you to run wires on the outside of the frame prior to panel installation. Consult with Foard Panel before running any of these types of wires. Depending on your specific panel layout there will be good places and bad places to run these wires.

Additional Notes:

Foard Panel always welcomes calls from your electrician to answer any questions they might have.

When wiring is complete, non-expanding spray foam (not the foam supplied by Foard Panel) should be applied to fill any gaps around electrical boxes and tunnels in panels. This is to prevent air infiltration and moisture migration from occurring at these locations.

Foard Panels create a super-tight building envelope which increases your home’s energy efficiency. However, due to the high performance nature of our product, special considerations need to be made to ensure comfort and safety and to prevent potential moisture damage. All of these recommendations are based on studies performed by building science professionals.

Building Science Techniques are used to:

- Improve Air Quality
- Improve Energy Efficiency
- Prevent Moisture Damage (inside or outside)
- Increase the Long Term Durability of the Building Envelope

Overall building science recommendations will vary depending on different environmental and climate conditions. Listed in this guide are best practice solutions for New England, or any climate that is cold season dominated and fairly wet. In warm and mixed climates, as well as dry climates the recommendations may be different. Please ask for climate specific recommendations if you are intending to building somewhere other than the North-East. Also, specific micro climates (like ocean front) might have slightly different recommendations.

We are making these recommendations because we believe that most people building with SIPs are looking for best practice solutions for their buildings. These recommendations are the same for any building in this climate, regardless of what your construction method is. We are providing them all in one place so that this guide can be used as a comprehensive overview of building with SIPs, not because the recommendations themselves are all specific to SIPs.



Foard Panel recommendations are NOT just for SIPs. Any building system in a cold wet climate would benefit from the following recommendations.

There are a great number of options available for siding today; however, no type of siding is completely waterproof. Foard Panel recommends that a building wrap and vented rain screen be specified in your home's construction plans.

Building Wrap

Building wrap is also referred to as a weather resistive barrier, a redundant barrier system, or roofing/siding underlayment. Foard Panel strongly recommends installing felt paper (asphalt impregnated organic felt) and proper flashing between the siding and the sheathing. In most cases felt paper is more effective when combined with a vented rain screen.

If water penetrates felt paper, the felt has the ability to absorb the moisture, speeding up the drying process. Therefore 15# or 30# felt is Foard Panel's recommendation for the product to be used as a building wrap.

Vented Rain Screen

Rain screens, vented walls, and secondary drainage planes; all three terms refer to a wall build-up that allows a small gap between the siding and the structural sheathing. Water can get between your siding and exterior sheathing in many ways. Wind driven rain and capillary action can cause water to run uphill, easily penetrating your siding. Furthermore, when siding is installed directly to the wall, with no air space, a difference in air pressure on either side of the siding will cause water to be drawn to the backside. In order to break the capillary action and pressure difference and provide more air flow for drying, a vented rain screen is recommended. A vented rain screen must have a continuous air gap (1/4" or more) between siding and building wrap, and open vents on two sides (usually top and bottom of the wall). The open vents allow for air flow behind the siding.

Foard Panel Recommends that Walls have a Vented Rain Screen.

Vented rain screen walls can be accomplished in many ways.

Some methods work better for specific finish materials. Below is a list of common finishing materials and suggested venting methods.

1. Clapboard siding (back primed siding recommended):

SIP, #15 tar paper, 1x4 or 2x4 vertical strapping, clapboard -or- SIP, #15 tar paper, Slicker Classic[®], clapboard.

2. Traditional shingle, shake, or vertical board & batten or ship-lap:

SIP, #15 tar paper, 1x4 or 2x4 horizontal strapping, shingle -or- SIP, #15 tar paper, Slicker Classic[®], shingle.

3. Stucco, brick, stone, or fake-stone veneer siding:

SIP, #15 tar paper, 2x4 strapping/furring, PT plywood or fiber-cement panel, masonry finish, functioning top and bottom vents.

For other siding types please contact Foard Panel for appropriate build-up details.

Any roofing material can be used with panel construction design, climate, aesthetics, and budget are the primary factors in determining which material is ultimately selected. Once the material is chosen, proper installation details must be researched and executed.

Foard Panel Strongly
Recommends that
Roofs be Vented.

Venting a roof or wall means that a space is created between the top of the panel and the exterior finish material. This space is for air to flow through. Convection pulls air from vents at the eaves to a vent at the ridge. A vented roof is referred to as a “cold roof”; a non-vented roof is referred to as a “hot roof”.

The single greatest reason to want airflow between panels and exterior finish is to help keep that area dry. Water can be introduced from outside a house as well as from inside. Differences in air pressure on each side of the exterior finish may cause water to be drawn to the backside. Wind driven rain, capillary action, ice damming and snowmelt can also allow water to find its way behind the finish. Moisture migration happens when a positive pressure exists in the house because of differences between indoor and outdoor temperature and humidity. A well-sealed panel installation coupled with a properly designed mechanical air exchange system minimize the likelihood of moisture migration occurring, but nothing can eliminate the risk entirely. No matter how water gains access, the best way to get it back out is to allow airflow into this space. Otherwise, water trapped directly between the top of the panel and the back of the roofing may promote molding or even rot. The second reason to create a vented roof is to substantially lengthen the life time of the roofing.

Venting a roof can be accomplished in many ways. Some methods work better for specific finish materials. Below is a list of common finishing materials and suggested venting methods.

1. Asphalt shingle roofing:
SIP, felt paper, 1x4 or 2x4 strapping/furring, T&G sheathing, any roof underlayment, asphalt shingles
2. Standing seam metal roofing:
SIP, felt paper, standing seam metal roofing
3. Wood shingle roofing:
SIP, felt paper, Cedar Breather[®], wood shingles -or-
SIP, felt paper, horizontal wood furring strips, wood shingles
4. Pre-formed, ribbed metal roofing panels:
SIP, felt paper, steel roofing panels

Directly applied membrane roofs on SIPs are NOT recommended. Impermeable membranes directly applied to high performance wood roofs have a higher probability of failure.

Note: The only building wrap we recommend directly applied to the panels is felt paper (asphalt impregnated organic felt). All other building wraps and membranes are hydrophobic. No-matter how vapor permeable they are if they do not allow liquid water to pass through they will trap any water that gets in against the panel skin.

Proper air sealing of your enclosure system is very important. Expanding spray foam and mastic are meant to stop air infiltration/exfiltration and moisture migration.

Air sealing SIPs properly saves energy by reducing air infiltration. Proper air sealing also makes buildings more durable. Air infiltration and exfiltration carry large volumes of water vapor through the envelope's barrier. In northern climates, air exfiltration allows condensation within the envelope, particularly near the exterior sheathing. Long term water accumulation can lead to expensive and recurring repairs.

Air sealing done properly eliminates both the energy consumption and the durability problems. To meet these needs, the air sealing system must remain robust for decades, be easy to assemble on the job site (under New England's weather conditions), and be cost-effective. Unfortunately, there doesn't seem to be one material or solution that meets these needs for all the different types of panel joinery. The following list illustrates the best sealing system for different types of connections.

Seal Type	Connection Type
Spray Foam Drill & Fill	Surface Spline Joints (Panel to Panel Connection)
Panel Mastic	Shoe-, Plate-, Roof-Edge-, & RO-Blocking-to- Panel Core Foam Structural Splines & I-Joist Splines Structural Corners Structural Eave & Rake Connections Ridge, Hip, & Valley Joints with Embedded Lumber
Spray Foam Gap	Timber-Frame-Style Corners Timber-Frame-Style Eave & Rake Connections Bottom Supported Ridge, Hip, & Valley Joints Mechanical Penetrations

Spray Foam Drill and Fill

The goal with the Drill & Fill method is to create a continuous seal at panel to panel connections. For best results, ensure that all splines are fastened before air sealing begins. Drill 1/2" dia. holes into the panel joint, through the spline, and to the foam channel. Drilling beyond the foam channel is not harmful. Insert the foam gun nozzle into the hole down to the depth drilled. Inject foam into the joint with a 2 to 4 second blast. As the spray foam is being injected, withdraw the foam gun, pausing at the foam channel. The ideal duration of the foam blast depends on temperature and humidity. The goal is to fill the joint with



enough foam so, as it finishes expanding, foam backs up out of the hole to form golf ball sized “plugs” on top of each hole. The best way to gauge foam blast duration is to experiment on scrap panel. It is critical that the foam chemistry be kept above 60 degrees F. The panels don't have to be that warm, but the cans of foam must be. The foam plugs should be left in place for at least 24 hours because the foam in the middle of the panel can take hours to cure.

Spray Foam Gap

For some ridges, hips, valleys, and corners, intentional gaps are left between panels to be filled with spray foam. Fill the full depth of the gap with spray foam. Once filled, leave the foam 24 hours to harden before breaking off any protruding foam.

Panel Mastic

Panel mastic is applied in a single, straight bead on the mating surface of one component, often wood, and then the opposing component is installed so that the bead is compressed in between over the whole length of the joint. Bringing both mating materials into firm contact with the bead of mastic is critical. In cases where conditions prevent this, see the spray foam alternate to panel mastic.

Spray Foam Alternative to Mastic

In cases where panel mastic is called for, but the joint will not fit tightly enough for panel mastic to be practical, spray foam can be used. Fully assemble and fasten the connection. Drill 1/2” dia. holes at an angle to access the void space and inject foam using the same basic method as the Spray Foam Drill & Fill method described above. Use enough spray foam to completely fill the void in the connection. Use the size of the foam balls created at the injection sites as a guide for foam volume and blast length.



MOISTURE MIGRATION

In super tight homes, indoor humidity, left unchecked, can build up to ultra-high levels. Particularly during the heating season, when indoor humidity is higher than outdoor humidity, a house develops a positive vapor pressure. The pressure seeks the path of least resistance in order to equalize, just like water running downhill. Vapor finds its way out through panel joints or minor spaces around door and window openings or other penetrations. In doing so, it may condense into water upon reaching the dew point; either near the cold side of the wall, but still within the wall, or just behind your building paper. For obvious reasons, water in either of those places is not a good thing.

Moisture Migration is referred to often throughout our recommendations. There are five very important things that you can do to help prevent this issue from ever becoming a problem in your home.

- 1) Be sure to properly seal all panel connections, window and door openings and other penetrations.
- 2) Keep indoor humidity to less than 40% during the heating season.
- 3) Incorporate an appropriate air exchange system into your design.
- 4) Vent your roof, and vent walls when appropriate.
- 5) Use only felt paper in contact with SIPs, not other hydrophobic underlayments.

Good builders recognize that proper flashing details are critical to keeping water from leaking in around window and door openings and potentially causing expensive and frustrating damage. At Foard Panel, we are concerned with the quality of your home even after your panels are purchased and installed. We understand that all siding, no matter how well installed, will allow some water to get behind it. Therefore, we offer the following flashing instructions to stop water at that point. When applying felt paper and flashing, try to think like water; overlap paper and flashings so that water will always have a way to run down without getting behind any of your materials.

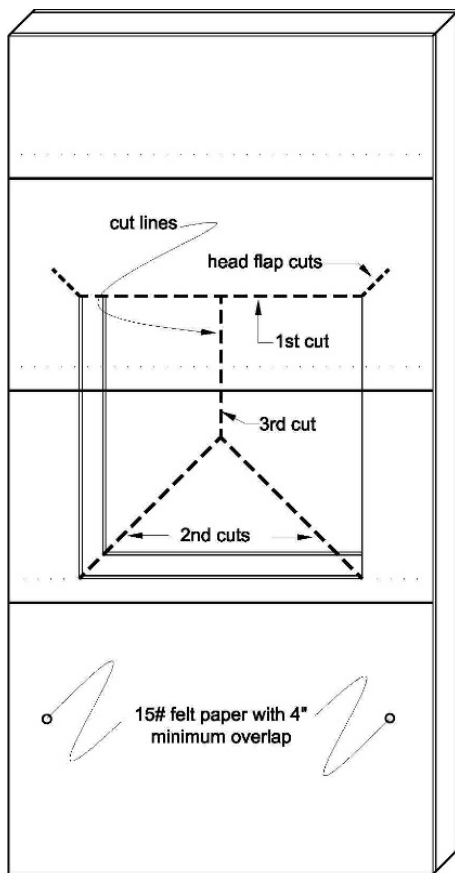


Figure 1

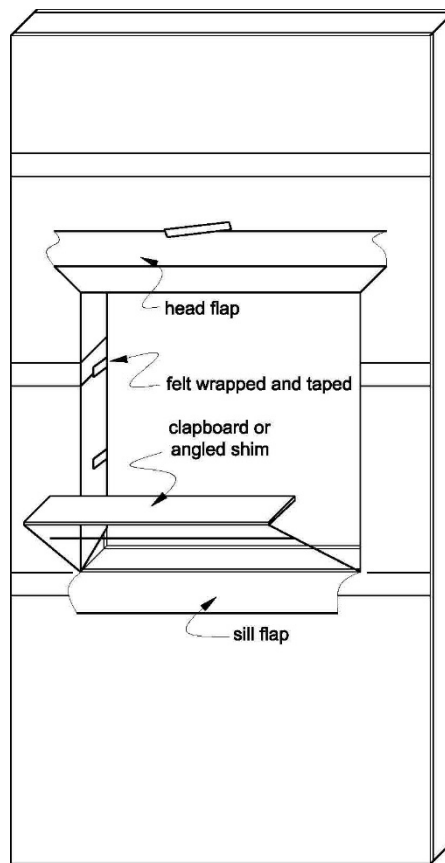


Figure 2

Figure One shows a rough opening behind properly installed 15# felt paper. The dashed lines indicate where the paper should be cut so that it can be wrapped into the opening. The first cut is made across the top (head) and is flush with the edge of the opening. The next cuts are done diagonally from the lower corners to an intersecting point. A vertical cut from that point to the head is then made. And finally two diagonal cuts are made above the head, six or eight inches long. After these cuts are made, wrap the paper on the sides into the rough opening, trim off excess, and tape these flaps back to keep them out of your way.

Figure Two shows a piece of clapboard going in on the sill. The clapboard (or angled shim piece) should be installed with the thick edge toward the inside. This “slope” will help any water that might still get in around the opening to drain out. After the clapboard is installed, pull the lower paper over it and tape it back like you did on the sides. Tape the head flap out of the way, for later steps.

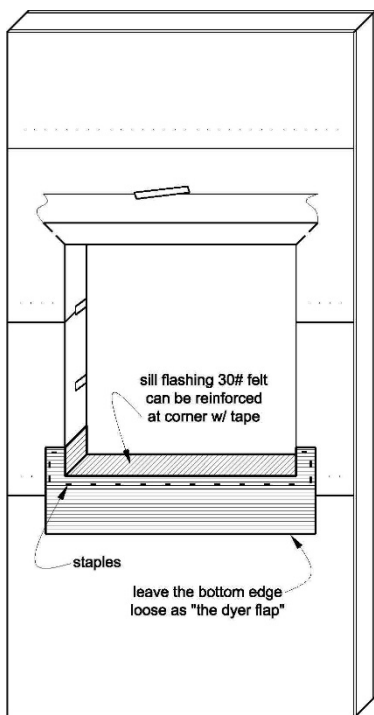


Figure 3

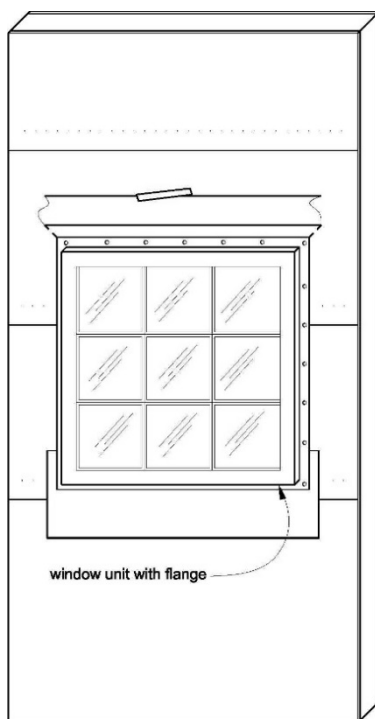


Figure 4

Figure Three shows 30lb felt, being used as flashing, installed on the sill. The flashing should be cut about a foot longer than the width of the rough opening so that it can be wrapped up each side at least six inches. Because, the bottom corners of the window are the weakest point of the flashing process, it is possible to further reinforce the corners using flexible tapes. Staple the flashing as shown in figure three. Leave the bottom loose. If you are using horizontal siding, the first course, below the window, will be installed behind this flap. This technique is known as “The Dyer Flap”.

Figure Four shows a flange mounted window unit installed. This same flashing works just as well with European style windows that install directly to the edge blocking around the Rough Opening.

Figures Five and Six show the head flap let down and then covered with a separate piece of 15# felt. It is important to make sure that this extra application of felt gets tucked up under the course above it and extends all the way down to the top of the window unit. Temporarily taping the seams of this paper would be a good idea to keep it in place until the siding is applied. Be sure to remove any tape from the bottom edge, however, before the siding or trim is fastened over it.

Note: Foard Panel does not recommend “butyl” based flashings on the sill because of the possibility of moisture migration from inside the building, water could become trapped behind it, potentially causing damage.

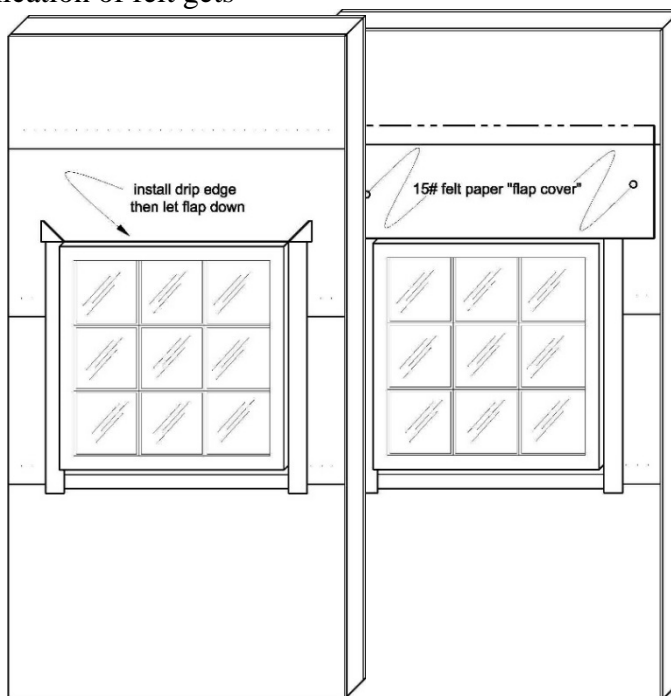


Figure 5

Figure 6

Foard Panel buildings are super tight and therefore require ventilation to meet code requirements of sufficient fresh air. Ventilation also helps control indoor air quality by bringing in fresh air and removing normal indoor pollutants from cleaning and cooking. It also prevents excessive humidity which can lead to serious problems such as staining, mold and even rot.

Listed below are several methods of ventilation. Discuss these options with your HVAC contractor and remind him that a typical SIP building tests around 1 ACH₅₀ or 0.14ACH_n.

The American Lung Association and ASHREA (American Society of Heating, Refrigerating and Air-Conditioning Engineers) recommend 0.35 to 0.5 ACH_n for healthy air.

1. **Exhaust – Only Ventilation:** A **continuous** (not just a fan turned on when you cook or shower) low speed exhaust fan generally located in a utility area, with passive inlet vents in bedroom and living areas. Exhaust only systems may create a slight negative pressure. Exhaust only is usually the cheapest option. However, there is no control as to where the outside air is coming from or what temperature and humidity it is.
2. **Intake – Only Ventilation:** Also known as “blending ventilation system”, this is a continuous low speed fan that brings outdoor air into a central plenum and recirculates it to bedrooms and living spaces. Intake only systems may create a slight positive pressure. Intake only systems control where the outside air comes from, but they do not control temperature or humidity of the air, which increase the risk of excessive humidity levels and possibility of moisture damage on the inside of your wall system.
3. **Balanced Ventilation Systems:** Continuous fans exhaust stale air from bathroom and kitchen areas and bring in fresh air, that is distributed to bedrooms and living areas, in equal amounts. These systems provide the best quality fresh air and keep the building at a neutral pressure. They may require slightly more ducting than either the exhaust only or the intake only systems. They do not attempt to control the temperature or humidity of the air. When an integrated bath fan or exhaust fan is kicked into high speed the entire system produces more air flow to maintain the balanced air flow.
4. **Heat Recovery Ventilation Systems (HRVs):** This is a specific type of balanced ventilation system that runs incoming and outgoing air through a heat exchanger allowing some of the heat from the warmer air to be transferred to the cooler air. These systems provide the same high quality air as any balanced system, but they also pre-warm or pre-cool the incoming air which saves some energy for the heating and cooling systems.
5. **Enthalpy Recovery Ventilation Systems (ERVs):** Often used interchangeably with HRVs, these systems are balanced ventilation systems that have a special heat exchanger that also takes some of the moisture out of the warmer and more humid air and transfers it to the cooler and less humid air. This can be very useful in the summer to keep humidity levels lower and reduce load on air conditioners. It can also help keep the indoor air from getting super dry in the winter.

For your safety and for maximum energy efficiency, always provide an outdoor air supply to heating sources such as furnaces, wood stoves and fireplaces.

*Panels DON'T attract pests any more than conventional construction.
The solutions to pest problems are the same however your build.*

1. Correct any moisture problems such as leaky roofs, leaky vents, and blocked gutters. Check outdoor faucets for leaks or drips. Ants do not live more than 6ft from a water source.
2. Trim tree limbs and other vegetation so that they do not touch or hang over your structure; pests may use vegetation as path and cover to get to your building.
3. Check exhaust system filters, stove hoods and grill hoods for cleanliness.
4. Ensure good ventilation throughout your home, including storage areas.
5. Keep floors free of food particles.
6. Foam, caulk or screen possible entry points such as door frames, windows, and pipes. Use wood blocking over any exposed insulation cavities.
7. Foundation insulation should not be exposed above ground level.
8. Foundation treatments or interior dustings can be administered by a pest control professional.
9. Store firewood away from your house.
10. Do not leave garden hoses laying across the lawn when not in use. Ants may follow hose back to your house.

When Breaking ground for any new project carpenter ants may be displaced. These ants would be especially eager for a new place to live. If you are building in an area prone to carpenter ants, we advise having the area treated by pest control professionals prior to beginning construction. Thereafter, regular preventative maintenance is the best approach.

If ants or other pests do get into your building they can still be dealt with successfully. Panels are not a food source for pests. Therefore, baiting with poisoned food or eliminating water sources work to exterminate all insects in these nests. Once these creatures are gone we suggest you continue with regular pest control maintenance.



WARRANTY

20 YEAR LIMITED WARRANTY

Foard Panel, Inc. ("Foard") warrants to the original building owner, (CLIENT NAME), (the "Buyer") that, subject to the conditions of this Limited Warranty, Foard's structural insulated panels ("SIPs") for the (JOB NAME), located in (CITY, STATE) will not delaminate or fail in normal use as a result of a defect in materials for 20 years from (DATE OF DELIVERY) (the "Warranty Term").

Conditions

1. Foard's SIPs must be installed in accordance with our installation criteria or by a Foard installation crew. Under no circumstances shall the performance of Foard's SIPs be required to exceed the American Society of Heating, Refrigerating and Air-Conditioning Engineers ("ASHRAE") Standard 62.2 regarding air flow and infiltration.
2. The structure in which the Foard SIPs are installed must meet air exchange standards set by ASHRAE that are in effect at the time of installation.
3. A Foard SIP shall not be considered "defective" for purposes of this Warranty as long as the SIP meets ASHRAE Standard 62.2 regarding air flow and infiltration and provided that the SIP satisfies the structural capacity requirements of the applicable building code at the time and location of installation.
4. Foard's obligations under this Limited Warranty shall be void if Foard SIPs are intermixed with any other panel manufacturer's SIPs. In such case, Buyer will remain subject to the limitations on remedies and warranties provided for herein.
5. This Limited Warranty is effective only with respect to SIPs for which Foard has been paid in full.
6. This Limited Warranty covers only manufacturing defects and does not apply to SIPs subjected to damage due to mishandling, abnormal use, misuse, the improper application of other materials to its surfaces, physical damage due to fire, exposure to chemicals or unusual force or pressure.
7. This Limited Warranty does not cover the quality of installation of the SIPs or damage caused by the installer.

Procedures

To make a claim under this Limited Warranty the Buyer must provide the following information in writing prior to the expiration of the Warranty Term, to Warranty Claims, Foard Panel, Inc., P.O. Box 185, West Chesterfield, NH 03466:

1. The Buyer's name, address and telephone number.
2. The location and date of installation of the Foard SIP(s).
3. A description of the problem or alleged defect.

Warranty claims must be received by Foard no later than thirty (30) days after the Buyer learns of the facts upon which the warranty claim is based, or such warranty claim shall be deemed waived. Time is of the essence in this Limited Warranty. After Foard's receipt of the warranty claim, the Buyer shall permit Foard's authorized agents with access to the building and a reasonable opportunity to inspect the structure and the SIPs that are alleged to be defective and to take any other action which Foard deems necessary to meet its obligations under this Limited Warranty.

Limitation of Remedies

Foard is a supplier and installer of SIPs and shall not be responsible for the action or inaction of a general contractor, structural engineer, architect or any other third party. Foard's sole and exclusive responsibility for any breach of this Limited Warranty shall be the replacement, without charge to the

Buyer, of the Foard SIPs found to be defective. The obligation of Foard to replace defective SIPs shall not include any obligation to remove or dismantle the defective SIPs or to install the replacement SIPs. Foard shall not be responsible, under any circumstances, for any labor or related demolition or construction costs and the Buyer bears sole responsibility for such costs. No remedy, other than as set forth in this Limited Warranty, shall be available to Buyer including, without limitation, claims for direct, indirect, special, incidental, or consequential damages, or claims for lost profits, lost sales, business interruption, injury to persons or property, or any other incidental or consequential loss, whether or not resulting from the fault or negligence of Foard, even if Foard has been advised of the possibility of such damages. This limitation of remedy applies to all claims and for any cause, regardless of the form of action, whether in contract or in tort, or pursuant to statute, including claims of strict liability, negligence, breach of contract or breach of warranty. Incidental and consequential damages shall not be recoverable even if the replacement remedy provided by this Limited Warranty fails to remedy any defect alleged by Buyer.

NO OTHER WARRANTIES OR GUARANTEES

THIS LIMITED WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER GUARANTEES OR WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND THIS LIMITED WARRANTY IS THE BUYER'S EXCLUSIVE WARRANTY FROM FOARD PANEL, INC.

Jurisdiction/Arbitration

This Limited Warranty shall be governed exclusively by the laws of the state of New Hampshire, without giving effect to its conflict of laws principles. Any controversy or claim arising out of or relating to this Limited Warranty shall be settled by arbitration before a single arbitrator in Manchester, NH, in accordance with the rules, then obtaining, of the American Arbitration Association. The arbitrator in any arbitration arising hereunder shall not have authority to award attorney's fees and costs to any prevailing party. Judgment upon any award rendered by the arbitrator may be entered exclusively in the Cheshire County, New Hampshire Superior Court. The Buyer irrevocably consents to the exclusive jurisdiction of and venue in the Cheshire County Superior Court for the enforcement of any arbitration award.

Severability

In the event any provision of this Limited Warranty shall be deemed to be invalid or unenforceable, in whole or in part, the remainder of this Limited Warranty or such provision shall not be affected and shall continue in full force and effect to the fullest extent permitted by New Hampshire law. In the event the application of any provision of this Limited Warranty to any person(s) or event shall to any extent be invalid or unenforceable, then its application to such person(s) or events other than those to which it is held invalid or unenforceable shall not be affected thereby. Each term, covenant, and condition of this Limited Warranty shall be valid and enforced to the fullest extent permitted by New Hampshire law. In no event shall Foard's liability exceed the total sum of all payments received by Foard under the contract giving rise to the Limited Warranty.

Entire Agreement; No Verbal Modification

This Limited Warranty contains the entire understanding and agreement of the Buyer and Foard with regard to the subject matter hereof and there have been no promises, representations, agreements or undertakings, either oral or written, except as set forth herein. No representative, employee or agent of Foard, or any other person, has any authority to assume for Foard any additional or other liability or responsibility of Foard with respect to Foard SIPs. Any changes or modifications to this Limited Warranty must be in writing and signed by an authorized employee of Foard.

No Assignment

This Limited Warranty is not transferable and shall not be assigned by the Buyer and may be invoked only once.



STRUCTURAL DATA

Foard Panel takes no responsibility for engineering of structural systems.

STRUCTURAL DATA is from NTA Code Listing FRD031609-25
 This data applies to Structural Panels with EPS and NEO Cores ONLY.
 For more information please See Full Code Listing Report.
 (Available on website or by request)

Basic Properties:

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

Section Properties:

Panel Thickness, h (in.)	Core Thickness, C (in.)	Dead Weight, W_d (psf)	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.)
4.625	3.75	3.2	50.3	46.0	19.9	2.09
6.50	5.625	3.3	72.8	96.5	29.7	3.03
8.25	7.375	3.5	93.8	160.2	38.8	3.91
10.25	9.375	3.6	117.8	252.7	49.3	--
12.25	11.375	3.8	141.8	366.3	59.8	--

Allowable Uniform Transverse Loads (psf):

Panel Length (ft)	4-5/8" Thick SIP			6-1/2" Thick SIP		
	Deflection Limit			Deflection Limit		
	L/180	L/240	L/360	L/180	L/240	L/360
8 WAB	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	--

Allowable Uniform Transverse Loads (psf):

Panel Length (ft)	8-1/4" Thick SIP			10-1/4" Thick SIP			12-1/4" Thick SIP		
	Deflection Limit			Deflection Limit			Deflection Limit		
	L/180	L/240	L/360	L/180	L/240	L/360	L/180	L/240	L/360
8 WAB	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	54.4	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

Allowable Axial Loads (plf):

Lateral Brace Spacing (ft)	Panel Thickness		
	4-5/8"	6-1/2"	8-1/4"
8 WAB	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

Allowable In-Plane Shear Strength (plf) for SIP Shear Walls in Seismic design Categories A,B, and C):

Spline Type	Min. Nominal SIP Thickness (in.)	Minimum Facing Connections			Shear Strength (plf)
		Chord	Plate	Spline	
Block or Surface Spline	4.5	0.131"x2-1/2" nails, 6"o.c.	0.131"x2-1/2" nails, 6"o.c.	0.131"x2-1/2" nails, 6"o.c.	380
	8.25	0.131"x2-1/2" nails, 6"o.c.	0.131"x2-1/2" nails, 6"o.c.	0.131"x2-1/2" nails, 6"o.c.	400

Allowable In-Plane Shear Strength (plf) for SIP Shear Walls in Seismic design Categories D,E, and F):

Spline Type	Min. Nominal SIP Thickness (in.)	Minimum Facing Connections			Shear Strength (plf)
		Chord	Plate	Spline	
Block or Surface Spline	6.5	0.131"x2-1/2" nails, 3"o.c. (3/8" edge distance)	0.131"x2-1/2" nails, 3"o.c. (3/8" edge distance)	0.131"x2-1/2" nails, 3"o.c. (23/32" thick, 3" wide spline)	900

Foard **PANEL** STRUCTURAL INSULATED PANELS



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