4' Frost Footing Foundation
For Garages or LT Commercial
6" SIPs
Detail Manual
(On Concrete Footings)

Pinnacle
ENGINEERING

EXTREME PANEL
TECHNOLOGIES

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I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

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Date: 2025.01.24 16:07:04 -05'00'

4' Frost Footing Foundation
SIPs
(On Concrete Footings)

1. The type of soil is a factor in determining foundation construction details such as footing design, backfill, and drainage provisions. Soils are classified by their composition and how they drain. Soil classifications for most areas are listed in the standard series of soil surveys published by the U.S. Department of Agriculture's Soil Conservation Service. Extreme's Foundation SIPs may be built in Group I, II, or III soils. Group IV soils are generally not recommended for Extreme's Foundation SIPs, unless special measures are taken. For building sites in areas where expansive clay soils in Group II, III or IV occur, a licensed soils engineer should be consulted to determine modifications required for foundation footings, drainage, soil moisture control, and back fill around the foundation. In such cases, special design considerations and construction details may be needed to avoid soil expansion or shrinkage which might otherwise affect foundation and floor performance. For garage type foundations, a drainage path to a sump is recommended if it is attached to a house. (Refer to attached "Table 1-Types of soils and related design properties" from Southern Pine Council PWF Design & Construction Guide. www.southernpine.com)

2. Granular materials are recommended for footings under Extreme's Foundation SIPs, but continuous poured concrete may also be used for footings. Granular materials are to be used for a portion of the backfill to provide an optimum drainage system. The granular material may be crushed stone, gravel or sand, and must be clean and free of silt, clay, and organic material. Limitations are:

- Maximum of 1/2" for crushed stone
- Maximum of 3/4" for gravel
- Minimum of 1/16" for sand

3. Footings need to be placed on undisturbed soil and the footing excavation should extend below the frost line. To achieve proper frost protection for low backfill heights, either the footing needs to be excavated to the proper depth or refer to section R403.3 of the IRC code book or refer to the "Revised Builder's Guide to Frost Protected Shallow Foundations". This can be determined for site specific situations.

4. For concrete footings, typically minimum size of 8" thick x 16" wide and a minimum compressive strength of 2500 lbs., it is recommended to place the footing on 4" of granular material. In Goup I and II soils, place a minimum of 4" of granular fill and for Group III soils, use a minumum of 6" of granular fill under the slab.

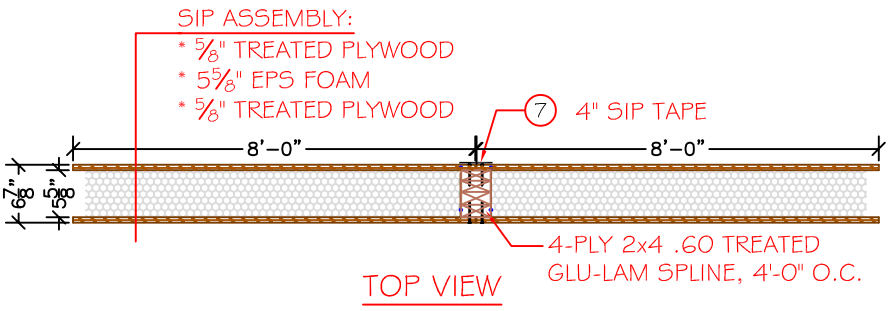
5. Anchor the .60 CCA treated 2x6 to the concrete footing using 1/2” x 8” galvanized anchor bolts 4' o.c. and located within 12” from the end of each plate section. Remember to set the plates in 5/8” from outer dimensions of the structure to allow for exterior skin of SIP to fit on the outside of the plate.

6. Install Extreme's Foundation SIPs according to the SIP shop drawings provided. Use SIP Adhesive/Sealant for all wood to wood connections and for all wood to foam or foam to foam connections. Refer to Extreme Panel's Construction Detail Manual for placement of these products. Nail all SIP connections using 2” stainless steel (type 304 or 316) ring shank nails 8” o.c.. These materials are supplied by Extreme Panels. Any other alternative products need to be approved by Extreme Panels. Note: If a pneumatic nailer is used, do not drive the heads of the nails in any deeper than 1/8”. Top plates (typically not treated) are to be installed with the ends of the top plates staggered to not fall on the seam of a SIP vertical connection. The use of Simpson Strong-Tie MASBZ mudsill anchor using 6) 0.148 x 1 ½" nails when used as shown in detail on page 3 & using 6) #9 x 1 ½" BTX screws or 3) 3" stainless steel construction lag screws into vertical glulams either 4' or 8' o.c. when used as shown in detail on page 4. This assists in tying the concrete slab in with the SIP.

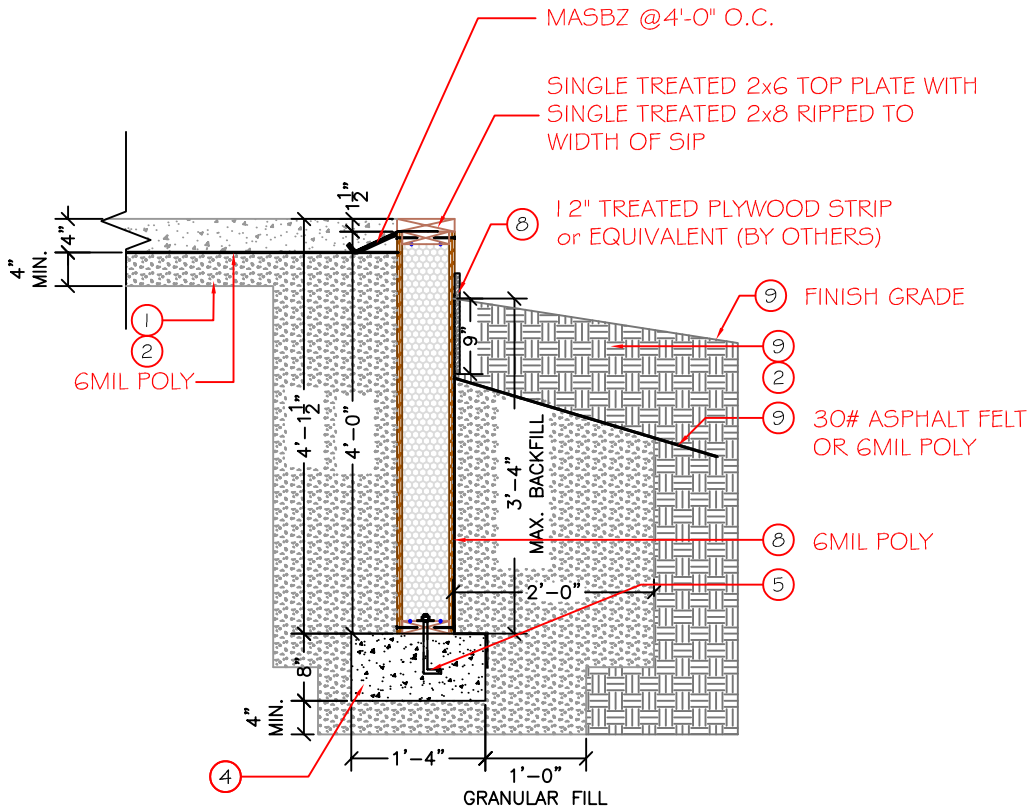
7. Seal exterior joints in the plywood using 4” SIP Flashing which is supplied by Extreme Panels. SIP Adhesive/Sealant can also be used.

8. Below grade moisture barrier: 6 mil poly is to be applied over the below grade portion of the foundation. A single layer is adequate, but 2 layers is suggested for extra protection on the exterior when backfilling. Poly is to be draped over the footing, but is not to extend over the drainage tile. Joints in the poly are to be lapped a minimum of 6” and sealed with SIP Adhesive/Sealant. The top edge of the poly is to be bonded to the SIP to create a seal. This is to be achieved by using at least a 12” treated plywood strip or other strips can be used for architectural treatment. Before strip is installed, a continuous seal of SIP Adhesive/Sealant is to be applied between the wall and strip. The strip needs to extend at least 9” below grade.

9. Backfilling: Backfilling to a maximum backfill height of 3'-4” is permitted. Granular material is to be used for backfill. Backfill a distance of 1'-4” out from the wall and 2/3 the height of the total backfill height. Granular material is then to be covered with either 30 pound asphalt paper or 6 mil poly to allow for water seepage while avoiding infiltration of fine soils. The remaining of the backfill can use the same type of soil as was removed during the excavation. Finish grade is to slope a 1/2” per foot a minimum of 6'-0” from structure. Make sure that backfill is built up evenly from inside and outside of foundation. Interior backfill needs to be compacted properly to support concrete slab.



TOP VIEW



6 7/8" FROST FOOTING

NOT TO SCALE

SECTION
NOT TO SCALE

DETAIL TITLE :	BELOW GRADE 4' FROST FDN. SIP
DETAIL NO. :	FD-206
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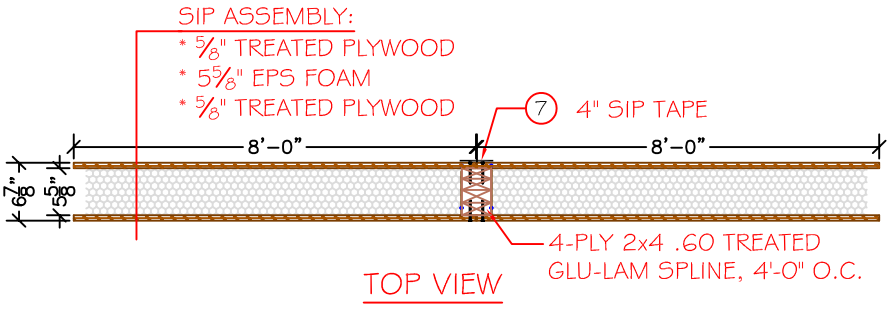
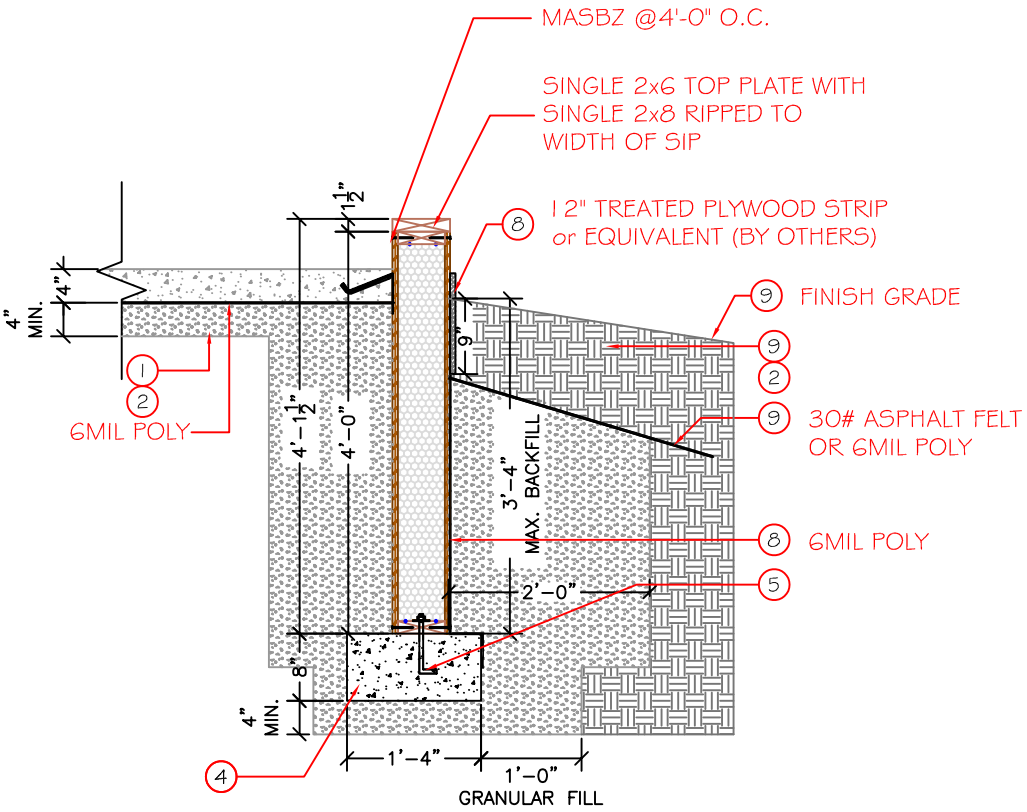


TOP VIEW



6 7/8" FROST FOOTING

NOT TO SCALE

SHOWN WITH
OPTIONAL CURB

SECTION
NOT TO SCALE

DETAIL TITLE :	BELOW GRADE 4' FROST FDN. SIP
DETAIL NO. :	FD-206-1
PAGE NO. :	4
UPDATED :	3/2024

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SOIL CONDITIONS

The type of soil and general grading conditions at the building site are factors in determining foundation construction details such as footing design, backfill and drainage provisions.

Soils are classified by their composition and how they drain. Table 1 lists common soil types and their properties. Soil classifications for most areas are listed in the standard series of soil surveys published by the U.S. Department of Agriculture's Soil Conservation Service.

PWFs may be built in Group I, II, or III soils. In poorly drained Group III soils, granular fill under the slab for basement-type foundations must be at least 6" deep, as opposed to the 4" minimum for Group I

TABLE 1 – TYPES OF SOILS AND RELATED DESIGN PROPERTIES

Soil Group	Unified Soil Classification Symbol	Soil Description	Allowable Bearing in Pounds Per Square Foot with Medium Compaction or Stiffness[1]	Drainage Characteristics[2]	Frost Heave Potential	Volume Change Potential Expansion[3]
Group I *Excellent*	GS	Well-graded gravels, gravel-sand mixtures, little or no fines.	8000	Good	Low	Low
	GP	Poorly graded gravels or gravel-sand mixtures, little or no fines.	8000	Good	Low	Low
	SW	Well-graded sands, gravelly sands, little or no fines.	6000	Good	Low	Low
	SP	Poorly graded sands or gravelly sands, little or no fines.	5000	Good	Low	Low
	GM	Silty gravels, gravel-sand-silt mixtures.	4000	Medium	Medium	Low
	SM	Silty sand, sand-silt mixtures.	4000	Medium	Medium	Low
Group II *Fair to Good*	GC	Clayey gravels, gravel-sand-clay mixtures.	4000	Medium	Medium	Low
	SC	Clayey sands, sand-clay mixture.	4000	Medium	Medium	Low
	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.	2000	Medium	High	Low
	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.	2000	Medium	Medium	Medium[4]
Group III *Poor*	CH	Inorganic clays of high plasticity, fat clays.	2000	Poor	Medium	High[4]
	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.	2000	Poor	High	High
Group IV *Unsatisfactory*	OL	Organic silts and organic silty clays of low plasticity.	400	Poor	Medium	Medium
	OH	Organic clays of medium to high plasticity, organic silts.	–0–	Unsatisfactory	Medium	High
	Pt	Peat and other highly organic soils.	–0–	Unsatisfactory	Medium	High

1 Allowable bearing value may be increased 25 percent for very compact, coarse grained gravelly or sandy soils or very stiff fine-grained clayey or silty soils. Allowable bearing value shall be decreased 25 percent for loose, coarse-grained gravelly or sandy soils, or soft, fine-grained clayey or silty soils.

2 The percolation rate for good drainage is over 4 inches per hour, medium drainage is 2 to 4 inches per hour, and poor is less than 2 inches per hour.

3 For expansive soils, contact local soils engineer for verification of design assumptions.

4 Dangerous expansion might occur if these soil types are dry but subject to future wetting.