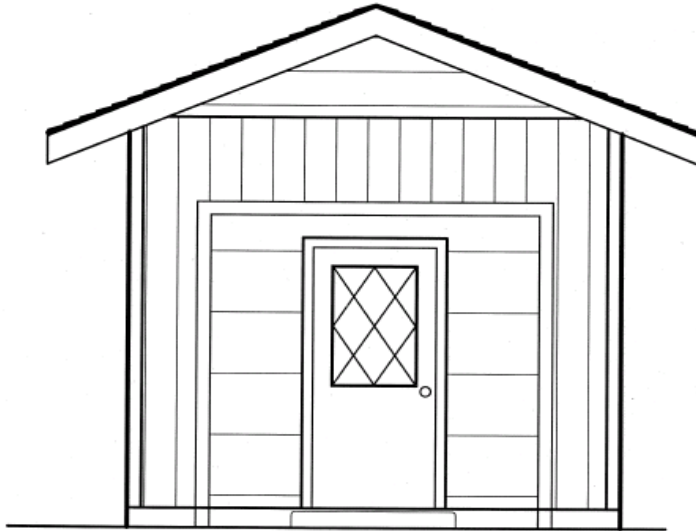


Typical Garage / Storage Shed / Shop Details

DETAILS YOU CAN USE TO BUILD YOUR GARAGE, STORAGE SHED OR SHOP BUILDING
(Valid for 2018, check for annual updates)



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Name:	Permit No:
Address:	

This guide is intended to help provide typical information needed for constructing an accessory building; however, you need at least a basic understanding of standard construction practices in order to successfully complete the project. The use of this typical detail package in lieu of submitted drawings applies to single-story garage, storage shed or shop-type buildings accessory to single-family residential uses and not attached to the residential building. The maximum size of the accessory building allowed is 24 feet wide by 35 feet long. The buildings must be constructed in strict conformance with the details contained herein. If a permit is required, a copy of this building detail package must be on the job site and available to the inspector during the inspection process.

Accessibility Information: This information can be made available in alternative formats such as large print or audio tape. To request alternative formats, please call 503-526-2493 or email cddmail@BeavertonOregon.gov.

INTRODUCTION

These plans and details are provided to the public to assist you in your garage, storage shed or shop (accessory) building construction, and for obtaining a building permit (when required), or simply to aid you in constructing an accessory building that does not require a permit. **Always check with your local jurisdiction before proceeding for land use, zoning or other regulations that may affect your project.**

When Do I Need A Permit For An Accessory Building?

A building permit is not required for accessory buildings that are less than 200 square feet in floor area and not more than 10 feet in height (measured from the finished floor to the average height of the roof). Where the structure is located on a parcel of 2.0 acres or greater, and the structure is located a minimum of 20 feet from all property lines, floor area may be increased to 400 square feet. **Regardless of the building's size, if plumbing, heating, or electrical systems are going to be installed, permits are required for that work.** (Please note, even though a permit is not required, the project must still comply with all the applicable construction and zoning codes. Always check with the Planning Division for additional setback and height restrictions)

How Do I Use The Plans To Get A Permit?

If you need a building permit for your accessory building, you will need to submit plans of sufficient detail to your local building department to indicate what you want to build. **If you are not sure how to draw plans or don't want to pay someone else to do it for you, these plans can be submitted to your local building department for the permit.** You will, however, be required to follow the plans and details as provided without deviation. One thing that will be needed is a site plan that shows an outline of your property, the house, and an outline of where you will be locating the accessory building. Be sure to indicate existing buildings or structures (pools, retaining walls, etc.) on the site. The site plans will need to be drawn to an acceptable scale (you may need to contact your local building department for this), but usually a scale of 1/8th or 1/4th of an inch equals 1 foot or similar, is acceptable). Fill out a building permit application and submit these plans (along with your site plan). After the plans are reviewed and approved, a permit to construct your accessory building will be issued (some jurisdictions may even be able to review and approve your plans at the counter, so you can leave with a permit the same day). Consult your local city/county jurisdiction for the number of sets of plans required.

For information on contacting your local building department, visit BCD.Oregon.gov and click on "Jurisdictions."

How Big Do The Footings, Walls, Beams, And Roof Rafters Need To Be?

The detail in these plans will help you determine how big the footings, wall, beams, and joists, need to be. It will also help you determine how to brace the building against wind and earthquakes. Much of it depends on the size of the accessory building. The size of beams and roof rafters depends on the length of their span and loads they will support. The wall bracing will limit where and how many door and window openings are allowed.

GENERAL NOTES

1. **Accessory buildings constructed according to this handout are not approved for commercial, business, or dwelling uses.**
2. Accessory buildings shall not be attached or supported off the house.
3. Building designs that deviate from the conditions of this handout will require a specific plan submission and may require engineering.
4. All lumber shall be grade #2 Douglas-Fir, Hem-Fir, or better, except wall framing (studs) may be stud grade. Glu-laminated beams shall be minimum 24F-V4 grade. If required to be pressure treated (to resist insect damage and dry rot), lumber shall be pressure treated in accordance with American Wood-Preservers' Association Standards (Category). The level of treatment depends on the use. For instance, foundation sill plates and any wood less than 6 inches above the ground or in contact with concrete shall have a minimum Category UC4A rating.
5. The level of preservative treatment is noted on the tags fixed to the ends of the wood members. **Remember, any time you make a cut, treat the cut end of the wood with the paint-on preservative recommended by the manufacturer. Cut ends expose the inner untreated wood to potential moisture and insect damage.**
6. **New pressure treatment methods use chemicals that will prematurely corrode standard fasteners, hardware, and flashing when in contact with pressure treated lumber, and, as a result, fastener and hardware requirements are required to meet the following:**
 - a. All screws and nails shall be hot-dipped galvanized or stainless steel.
 - b. All hardware (joist hangers, cast-in-place straps, anchors, etc.) shall be galvanized with 1.85 oz/sf of zinc (G-185 coating) or shall be stainless steel. Look for products such as "Zmax" from Simpson Strong-Tie or "Triple Zinc" from USP.
7. All nails shall be smooth-common, box, or deformed shank. For general nailing requirements, see *Table 9*.
8. Roof rafters shall be spaced either 16 inches or 24 inches apart (on-center (o.c.)). The roof design is based on a simple gable end roof with the ridge line at the center of the building width, or a sloped shed type. Ridge boards shall be not less than 1-inch in thickness and not less in depth than the cut end of the rafter (this means that if you have 2x6 rafters, use a 1x8 minimum ridge board).
9. Ceiling joists shall be installed parallel to the rafters and connected to the rafters to brace the roof. Rafter ties may be used in lieu of ceiling joists. Rafter ties (required if no ceiling joists are used) shall be minimum 2x4 connected to the rafters and spaced not more than 4 feet apart.

10. Pre-engineered manufactured roof trusses can be used in lieu of hand-cut rafters. Truss details from the manufacturer must be provided with the plans. Trusses shall be installed and braced as required by the manufacturer. Metal truss clips (anchors) such as Simpson H2.5 or equal shall connect the trusses to the top plate (See *Figure 15*).
11. Where a ceiling finish is installed (typically gypsum wallboard), the attic area must be ventilated with screened vents (bird block) at the eave and roof vents at the ridge. The minimum area of ventilation shall be 1/300th of the attic area, with one-half of the vent area at the eave and one-half near the ridge or top of the gable end. If the attic is more than 30 inches high at the ridge, a minimum 22-inch x 30-inch attic access is required.
12. If gypsum wallboard is used as an interior finish material, it shall be a minimum of ½-inch thick (5/8-inch thick recommended for ceilings where spanning more than 16 inches and supporting insulation). Wallboard shall be anchored as required by *Table 9*.
13. Wall framing shall be minimum 2x4 studs spaced a maximum of 16 inches o.c. Wall studs shall not be more than 10 feet in length. Wall studs shall be capped with minimum 2x4 double top plates to provide overlapping corners. End joints in top plates shall be offset at least 24 inches.
14. Roof sheathing shall be minimum 7/16-inch thick Oriented Strandboard (OSB) or 15/32-inch CDX plywood with a panel index of 24/0, 24/16, or 32/16 (a panel index indicates the maximum span between roof rafters and floor joists. The first number is for use with roof sheathing, and the second is for floor sheathing).
15. Wall sheathing shall be minimum 3/8-inch thick Oriented Strandboard (OSB) or CDX plywood covered with minimum 15-pound asphalt saturated felt (Apply horizontally and lap upper layer over the lower layer a minimum of 2 inches. Where vertical joints occur, lap a minimum of 6-inches.) and cover with a finish siding material or a minimum 7/16-inch thick panel siding (such as T-1-11 siding) may be used.
16. If an elevated wood floor is to be used, the floor sheathing shall be minimum 2x6 tongue and groove decking (minimum #3 grade) for post and beam type systems or minimum 7/16-inch thick OSB or plywood with a panel index of 24/16 or 32/16 covered with minimum ½-inch thick particle board or minimum ¾-inch tongue and groove plywood (floor joists shall be spaced a maximum of 16 inches o.c.).
17. There shall be a floor or landing on each side of all doors. The interior floor or landing shall not be more than 1½-inches below the top of the door threshold. Doors may open onto an exterior floor or landing (it cannot swing over the landing) as long as the floor or landing is not more than 8-inches below the top of the threshold. Landings must have a minimum dimension for 36-inches by 36-inches, but in any case, landings must be at least as wide as the door they serve (See *Figure 2a*).

18. All glazing in doors is required to be safety glass (usually tempered glass). Glazing in windows adjacent to a door where the nearest vertical edge of the glazing is within a 24-inch arc of the door in closed position (and the bottom of the window is less than 60 inches above the floor or walking surface) is required to be safety glass. Glazing that is greater than 9 square feet in area; with the bottom edge less than 18 inches off the floor; the top edge more than 36 inches above the floor; and there is a walking surface within 36 inches of the glazing shall be safety glass.
19. Inspections (not all may apply):
 - a. Footing inspections are required **PRIOR** to the placement of concrete. **Call 811 for utility locates before you dig.**
 - b. Post and beam/underfloor. Prior to placing any floor decking, the under floor area of a foundation must be inspected and approved. This includes placement of all floor beams and/or joists, ground cover, under floor ducting, plumbing, gas piping and electrical (if applicable). If applicable, call for the under floor plumbing and/or electrical prior to calling for the building and mechanical under floor inspection (the building and mechanical can be inspected at the same time).
 - c. Underfloor insulation. Prior to placing the floor decking, the under floor insulation must be inspected and approved. The under floor insulation must be kept dry, so it may be installed after the roof covering has been completed.
 - d. Concrete slab inspection. Prior to placing any concrete, an inspection shall be made after all in-slab plumbing, mechanical, and electrical building service equipment. If applicable, call for the underslab plumbing and/or electrical prior to calling for the building and mechanical underslab inspection. Note: Slab inspections are not required for slabs in non-heated/cooled space (i.e., garage floors, sidewalks, driveways, patios, etc.)
 - e. Slab edge insulation. Prior to placing any concrete, required slab edge insulation and vapor barrier must be approved.
 - f. Brace panels/alternate brace panels (wall bracing). Prior to placing any exterior wall covering, required brace panels or alternate brace panels shall be approved. This includes inspection of required nailing pattern, installations of connection devices (straps, anchors, hold-downs, etc.).
 - g. Plumbing, mechanical, gas, and electrical systems inspection. Rough inspection of plumbing, mechanical, gas and electrical systems shall be made prior to covering or concealment, before fixtures or appliances are set or installed, and prior to framing inspection.
 - h. Framing inspection shall be made after the roof, all framing, and wall bracing are in place and after the plumbing, mechanical, and electrical rough inspections are approved. If the accessory building does not have plumbing, mechanical, and electrical installations, the framing and final may be combined in a single inspection.
 - i. Insulation (if the accessory building is to be heated/cooled) prior to placement of interior wall/ceiling covering.
 - j. Final inspection after the building is finished and ready for use and after the plumbing, mechanical, and electrical final inspections are approved.

20. It is the responsibility of the permit holder or the permit holder's representative to notify the city/county who issued the permit when stages of construction are reached that requires an inspection. For information on contacting your local building department, visit BCD.Oregon.gov and click on "Jurisdictions."

GETTING STARTED

To effectively use the information contained in this document you will need to do the following (designs are based on prescriptive standards from the Oregon Residential Specialty Code):

1. Determine if your accessory building requires a permit. Note: even if a permit is not required, zoning regulations (setbacks) and public utility easements restrictions are still applicable.
2. Determine what the maximum size accessory building is allowed by the zoning regulations. Many Cities/Counties have restrictions on the maximum area and height for these type buildings. **Always check with your local Jurisdiction before proceeding for Land Use, Zoning or other regulations that may affect you project.**
3. Determine where your property lines are located and what set-backs your jurisdiction requires from the property line to the wall(s) of the accessory building. This may also limit the size of the building.
4. Determine if you have any public easements on your property and whether or not the accessory building can be constructed over the easement (in most cases, you cannot build over an easement.).
5. Determine how big and of what configuration you want your accessory building to be and enter the dimensions on the plan provided. Mark the dimensions for width and length of the building, and location, size and types of openings (door, widows, etc.) on the plans. Provide dimensions using feet and inches.
 - a. Building Width: _____ . (Add this information to Figure 1)
 - b. Building Length: _____ . (Add this information to Figure 1)
6. After determining the soil bearing capacity, frost depth, sizes for the footings, posts, beams, and joist from the table, mark the information (if applicable) in the space provided below:
 - a. Soil Bearing Value: _____ pounds per square foot (psf). (See Page 6)
 - b. Frost Depth: _____ inches. _____ N/A < 400 sq ft & < 10 ft eave height (See Table 1)
 - c. Floor Joist Size: _____ x _____ spaced _____ apart. (See Table 2)
 - d. Roof Rafter Size: _____ x _____ spaced _____ apart. (See Table 3)
 - e. Ceiling Joist Size: _____ x _____ spaced _____ apart. (See Table 4)
 - f. Foundation Option _____ Mono-slab _____ Footing/Stem-wall (See Figure 2)

Add the above information to Figures 5a, 13, and 14 as applicable.

7. If the building is to be heated/cooled, it must be insulated as follows:
 - Slab on grade: a minimum 6-mil Visqueen vapor barrier is required under the slab.
 - Floors (over crawl space): R-11
 - Walls: R-19 (this will require 2x6 wall framing)
 - Ceilings: R-19
 - Doors: Maximum U-0.20
 - Windows: maximum U-0.50 (maximum window area 25 percent of wall area)

Footing and Foundation Sizes

1. Consult your local jurisdiction for what the assumed soil bearing value is for your area. This document has footing details for soils that can support a minimum of 1000 pounds per square foot (psf) if you have soil bearing of less than 1000 psf, this document cannot be used without further design. Areas with soil bearing of at least 1000 but less than 1500 psf shall use footings that are a minimum of 18 inches in width and 6 inches thick, foundation walls shall be a minimum of 6 inches in width. Areas with soil bearing of 1500 psf or more shall use footings that are a minimum of 12 inches in width and 6 inches thick, foundation walls shall be a minimum of 6 inches in width. The foundation can either be a monolithic footing and slab (See *figure 2b*), or a footing and stem wall (See *Figure 2c*) and may also be an elevated wood floor/crawl space (See *Figure 5b*) Note: The wood floor details are not designed to support vehicle loads. If the building will be used as a garage for parking vehicles, the floor must be concrete and sloped toward the garage door. Concrete for footings, foundations, and slabs shall have a minimum compressive strength of 3000 pounds per square inch (psi). Reinforcing steel shall be minimum grade 40 (this means it has 40,000 psi tensile strength). Note: The footing details are based on native soil and not soil that has been deposited on your property (fill) in depths greater than 12 inches. The footing details require a footing/foundation wall that is a minimum of 18 inches in height so the bottom can be located a minimum of 12 inches below the finished grade and extend 6 inches above the finished grade. If you have fill material that is greater than 12 inches, your footing will need to extend through the fill to native soil. The footing may need to be deeper due to the frost depth for your county. See Table 1 to determine this depth. Note: Footings for accessory buildings of less than 400 square feet and an eave height of less than 10 feet are not required to be placed below the frost line.
2. Foundation stem walls shall not be more than 4'-6" in height. Footings and foundation require the following minimum reinforcement (See *Figure 2d*): for footings and stem walls with the concrete poured in two separate steps, a minimum of one #4 reinforcing steel horizontally 3 inches from the bottom of the footing, one #4 reinforcing steel horizontally within 12 inches of the top of the foundation wall, and vertical #4 reinforcing steel spaced not more than 4 feet on center, 3 inches from the bottom of the footing and extending a minimum of 14 inches up into the stem wall; for footings and stem walls with the concrete poured in one step (monolithic), two #4 reinforcing steel shall be placed horizontally 3 inches from the bottom of the footing; for monolithic slab/footing systems, a minimum of one #5 or two #4 reinforcing steel shall be placed horizontally within

the middle third of the footing depth. Note: Additional reinforcing steel will be required if Alternate Brace Panels are used to resist wind/earthquake loads (See Figures 8-10).

3. In addition to anchors required for brace panels outlined on page 10, sill plates are required to be attached to the foundation with minimum ½-inch diameter by 10 inch long anchor bolts (commonly called “J-bolts”) embedded 7 inches into the concrete and spaced a maximum of 6 foot on center with a minimum of two per sill plate board and within 12 inches of the board end.
4. A grounding electrode (commonly referred to as a Ufer-ground) shall be provided by installing an uncoated #4 reinforcing steel tightly attached to the foundation reinforcing steel with a minimum 12-inch splice lap and stubbed at least 12 inches above the wall plate line (See Figure 3).

**Table 1
Frost Depth**

Counties with a frost depth of 12 inches
Benton, Clackamas, Clatsop, Columbia, Coos, Curry, Lane, Lincoln, Linn, Marion, Polk, Tillamook, Washington, Yamhill
Counties with a frost depth of 18 inches
Crook, Deschutes, Douglas, Jackson, Jefferson, Josephine, Multnomah
Counties with a frost depth of 24 inches
Baker, Gilliam, Grant, Harney, Hood River, Klamath, Lake, Malheur, Morrow, Sherman, Umatilla, Union, Wallowa, Wasco, Wheeler

FLOORS

1. Floors can be concrete slab-on-grade, wood post and beam, or joist construction.
2. Concrete slabs shall be a minimum of 3500 psi concrete (2500 psi concrete for slabs within heated spaces).
3. Post and beam floors shall have minimum 4x8 beams spaced a maximum of 4 feet apart and spanning a maximum of 8 feet. The beams shall be covered with minimum 2x6 tongue and groove decking material (See Figures 4a and 4b).
4. Floor joist shall be spaced a maximum of 16 inches apart. Joist spans shall be as determined by Table 2. The joists shall be covered with minimum ½-inch particle board on minimum 7/16-inch plywood or oriented strand board (OSB), or minimum ¾-inch tongue and groove plywood (See Figures 5a and 5b).

5. Post and beam and floor joists crawl spaces shall have a ground cover of minimum 6-mil black Visqueen with joints lapped a minimum of 6 inches and lapped over the top of the footing at least 12 inches.
6. Crawl spaces shall be ventilated with (maximum 1/8-inch mesh) screened vents. The minimum ventilation shall be 1/1500 of the crawl space area, with one vent within three feet of each corner and vents placed so cross-ventilation is provided.
7. Access to the crawl space shall be provided by a minimum 18 by 24-inch opening.
8. Crawl space drainage may be required. Check with your local building department for specific requirements.

**Table 2
Floor Joists**

Building Width	Floor Joist Spacing	Floor Joist Size
0-10 feet	16 inches o.c.	2x8
10-15 feet	16 inches o.c.	2x10
15-20 feet	12 inches o.c.	2x12
Over 20 feet	*	*

* Engineer Design Required

BEAMS, HEADERS, JOISTS, AND RAFTER SIZES

Use Tables 3, 4, 5 and 6 to determine size and spacing of what spacing roof rafters, ceiling joists and opening headers (Add this information to Figures 12, 13 and 14 as applicable). Note: Tables 3, 5, and 6 are only to be used in areas (counties) that have an elevation at or below that indicated in Table 7. Areas with elevations above those indicated in Table 7 need to consult their local jurisdictions for snow loading to determine if the area is subject to snow loads in excess of 25 pounds per square foot. If the snow loads exceed 25 pounds per square foot, this document cannot be used.

**Table 3
Rafter Spans (Gable Roof)**

Building Width	Roof Rafter Spacing	Roof Rafter Size
0-10 feet	16 inches o.c. 24 inches o.c.	2x4 2x4
10-20 feet	16 inches o.c. 24 inches o.c.	2x6 2x8
20-24 feet	16 inches o.c. 24 inches o.c.	2x8 2x10

**Table 3A
Rafter Spans (Shed Roof)**

Building Width	Roof Rafter Spacing	Roof Rafter Size
0-10 feet	16 inches o.c. 24 inches o.c.	2x6 2x8
10-15 feet	16 inches o.c. 24 inches o.c.	2x8 2x12
15-20 feet	16 inches o.c.	2x12
20-24 feet	12 inches o.c.	2x12

**Table 4
Ceiling Joists***

Building Width	Ceiling Joist Spacing	Ceiling Joist Size
0-10 feet	16 inches o.c. 24 inches o.c.	2x4 2x6
10-20 feet	16 inches o.c. 24 inches o.c.	2x8 2x10
Over 20 feet	**	**

*Ceiling joists are sized to support a gypsum wallboard (sheetrock) ceiling covering but are not sized to support attic storage).

** Engineer Design Required

Table 5
Header Size for Bearing Walls
(Wall supporting the roof)

Building Width	Opening Width	Header Size*
0-20 feet	0-3 feet 3-6 feet 6-10 feet 10-12 feet 12-16 feet Over 16 feet	(2) 2x6 or 4x6 (2) 2x8 or 4x8 (3) 2x10 or 6x10 (3) 2x12 or 6x12 6x14 or 5 1/8 x 10 1/2 Glu-laminated Beam Engineer Design Required
20-24 feet	0-3 feet 3-6 feet 6-10 feet 10-12 feet 12-16 feet Over 16 feet	(2) 2x6 or 4x6 (2) 2x10 or 4x10 (3) 2x12 or 6x12 (3) 2x14 or 6x14 5 1/8 x 13 1/2 Glu-laminated Beam Engineer Design Required
Over 24 feet	*	*

* Engineer Design Required

** Headers required to be (3) 2x or a 6x in width must have 2x6 wall framing. A minimum of 2 Jack studs are required under headers spanning more than 12 feet.

Table 6
Header Size for Gable End Wall

Opening Width	Header Size
0-6 feet	(2) 2x4 or 4x4
6-8 feet	(2) 2x6 or 4x6
8-12 feet	(2) 2x8 or 4x8
12-16 feet	(2) 2x12 or 4x12
Over 16 feet	Engineer Design Required

**Table 7
Snow Load**

Maximum Elevation for Counties with a Snow Load of 25 psf or Less

Maximum elevation 400 feet
Benton, Clatsop, Columbia, Coos, Curry, Lincoln, Polk, Tillamook, Washington, Yamhill
Maximum elevation 500 feet
Multnomah, Clackamas, Marion, Lane
Maximum elevation 700 feet
Linn
Maximum elevation 1,500 feet
Douglas
Maximum elevation 2,000 feet
Sherman, Wasco, Josephine, Jackson
Maximum elevation 3,000 feet
Gilliam, Morrow, Umatilla, Union, Wallowa, Baker, Malheur
Maximum elevation 4,000 feet
Klamath, Deschutes, Jefferson, Grant, Wheeler, Crook, Lake, Harney
Cannot be used in Hood River County (minimum 50 psf snow load)

WALL BRACING

The building needs to be provided with wall (lateral) bracing at each corner and along the wall at certain points. Lateral bracing strengthens the building to resist high wind loads or earthquakes from causing it to collapse. This can be accomplished by standard brace panels (BP) or alternate brace panels (ABP). A **brace panel** is a minimum 4-foot wide plywood panel nailed to the wall at each corner and every 25 lineal feet along the wall. The BP (See *Figure 1, 6, and 7a*) is nailed to the wall studs, sole plate, and top plate with minimum 6d galvanized nails spaced not more than 6 inches apart on all edges and not more than 12 inches apart on intermediate studs, commonly referred to as "field nailing" (1-3/4 inch long, 16 gauge galvanized staples may also be used). The 4x8 or 4x10 BP panel must be attached with the long side vertically so all edges bear on a stud, sole plate, and top plate (See *Figure 7b*) for nailing at lap edge of T-1-11 panel siding). **Alternate brace panels** can be narrower than 4 feet in width (minimum 32 inches) but require additional anchorage and nailing to provide the required bracing (See *Figures 1, 6, and 8*). ABPs cannot be more than 10 feet in height. Each ABP shall be sheeted with minimum 7/16-inch panel siding, OSB, or CDX **plywood**. **The sheeting shall be nailed to the studs with 8d galvanized nails (staples are not acceptable) spaced not more than 6 inches apart on all edges and not more than 12 inches apart on intermediate studs. All edges of the sheeting must bear on the wall studs, sole plate, and top plate or be blocked. Each panel end stud shall have a tie-down device capable of providing an uplift capacity of 1,800 pounds (such as a Simpson HD2A, LSTHD8, or equivalent) installed in accordance with the manufacturer's**

recommendations. The foundation wall and footing shall be reinforced with a minimum of two #4 (1/2-inch diameter) horizontal reinforcing bars, one located at the top of the wall and one located a minimum of 3 inches from the bottom of the footing extending not less than 5 feet each way from the center of the panel with #4 vertical bars spaced not more than 24 inches on center (See *Figure 9*). A minimum 12 inch by 12 inch continuous footing/turned down slab edge is required at door openings in the braced wall line and reinforced with not less than one #4 at the top and one #4 at the bottom of the continuous footing/turned down slab (See *Figures 10 and 10b*). This reinforcement shall be lapped 15 inches with the reinforcement required in the continuous foundation located directly under the braced wall line (See *Figures 9 and 10*). Note: In no case can any doors windows or other openings be located in the area of a BP or ABP. The APB anchors must extend from the foundation to the sole plate and wall studs. If a joist floor system is used, the anchors must be similar to Simpson STHDRJ, HPAHD, or HD2A with anchor bolt extensions.

ROOF FRAMING AND COVERING

1. Roof framing shall be either hand-cut rafters of a size and spacing as determined by Table 3 or pre-engineered manufactured trusses spaced at 24 inches apart. If trusses are used, the truss diagrams provided by the manufacturer must be provided with these plans. Trusses must be anchored to the wall top plates by hurricane ties, such as Simpson H2.5 or equal (See *Figure 15*).
2. Roof sheeting shall be nailed to the roof rafters or trusses with minimum 8d nails spaced not more than 6 inches apart on all edges and not more than 12 inches apart on intermediate rafters or trusses (1-3/4 inch long, 16 gauge staples may also be used).
3. Roof covering shall be approved asphalt shingles. For other types of roof coverings, consult your local jurisdiction. All roof covering shall be installed in accordance with the applicable sections of this document and the manufacturer's installation instructions. Asphalt shingles shall: only be installed on roofs with a slope of 4 units vertical in 12 units horizontal or greater; over one-layer of 15-pound roofing felt underlayment (minimum 2-inch overlap on horizontal and 6-inch overlap on vertical joints); be anchored with a minimum 4 galvanized roofing nails for strip shingle, 2 galvanized roofing nails for single shingles. Roof slopes can be reduced to a minimum of 2 units vertical in 12 units horizontal if a minimum of two layers of 15-pound roofing felt is provided (start with a 19-inch wide strip at the eave and then apply 36-inch wide sheets of underlayment, overlapping successive sheets 19 inches. Note: In high-wind areas, attachment of shingles requires special fastening methods. Consult your local jurisdiction for more information. See Table 8 to determine if you are in a high-wind area.
4. Gutters, downspouts, and rain drains may be required for your building. Check with your local jurisdiction for requirements.

See *Figures 11, 12, 13, and 14* for roof details. See *Figure 15* for alternate shed (flat) roof option.

**Table 8
High Wind Areas**

All areas with full exposure to the ocean winds are Clatsop, Coos, Curry, Tillamook, Lincoln, and Umatilla
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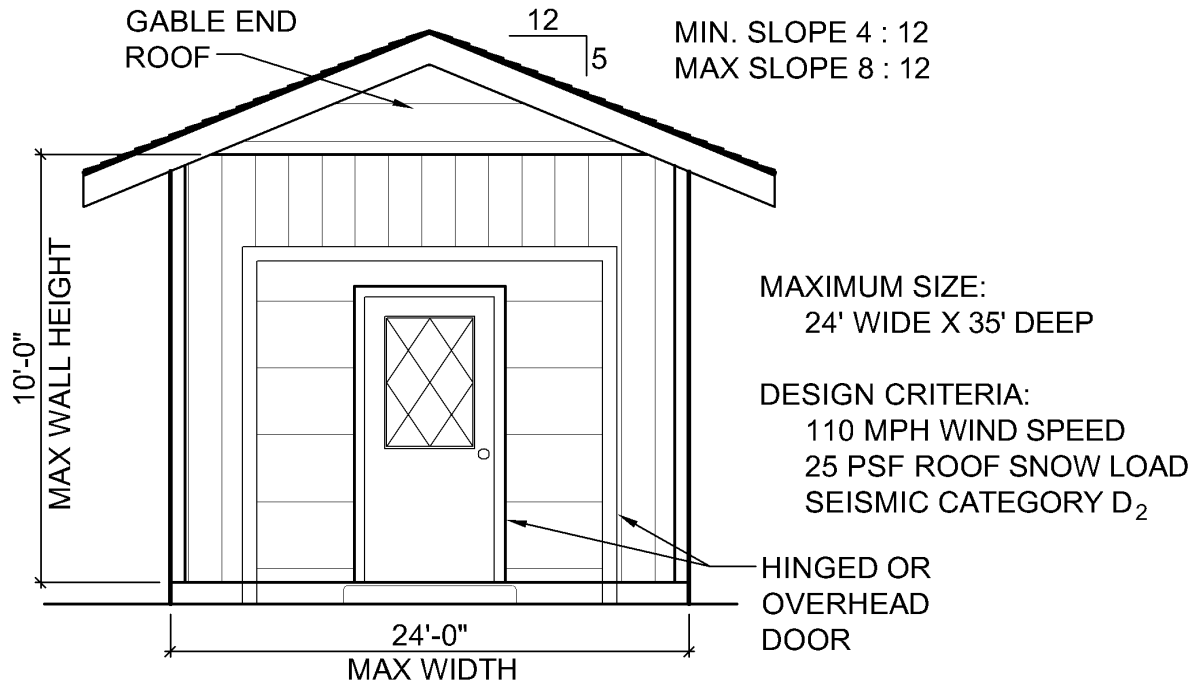
**Table 9
Nailing Requirements**

Building Element	Number & Type of Nails	Spacing
Joist to sill or girder, toe nail	3-8d	
2" subfloor (T&G decking) to joist or girder, blind or face nail	2-16d	
Sole plate to foundation plate or floor decking	16d	16" o.c.
Top or sole plate to stud end nail or toe nail	2-16d 3-8d or 2-16d	
Double studs	10d	24" o.c.
Double top plates, face nail	10d	24" o.c.
Double top plate, minimum 24-inch offset of end joints, Face nail lapped area	8-16d	
Blocking between joist or Rafters to top plate	3-8d	
Top plates, lap at corners and intersections, face nail	2-10d	
Building up headers Two pieces with 1/2" spacer	16d	16" o.c. along each edge
Ceiling joist to plate, toe nail	3-8d	

**Table 9
Nailing Requirements**

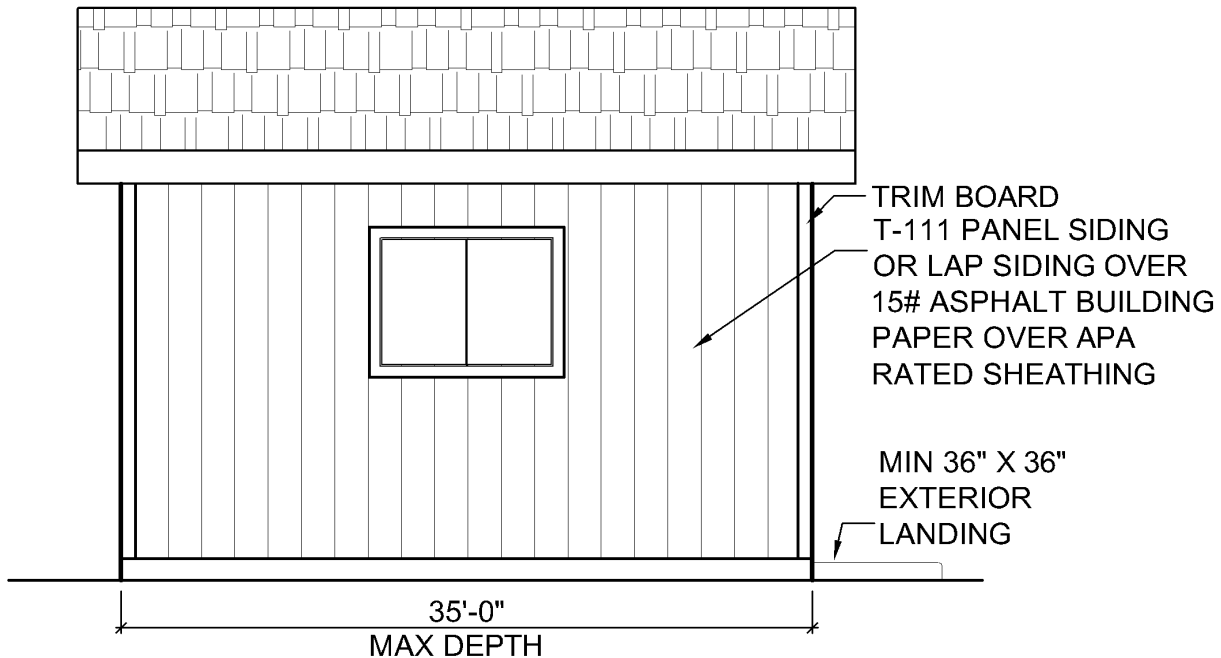
Building Element	Number & Type of Nails	Spacing
Header to stud, toe nail	4-8d	
Ceiling joist to rafter, face nail	3-10d	
Built-up corner studs	10d	24" o.c.
Roof rafter to ridge, toe nail face nail	4-16d 3-16d	
Rafter ties to rafters, face nail	3-8d	
½ " Gypsum Wallboard Nails or Screws	1-3/8" drywall nails 1-1/8" drywall screws	7" o.c. ceiling 8" o.c. walls 12" o.c. both
5/8" Gypsum Wallboard Nails or Screws	1-5/8" drywall nails 1-1/4" drywall screws	7" o.c. ceiling 8" o.c. walls 12" o.c. both

GARAGE/STORAGE SHED/ SHOP



FRONT ELEVATION

SCALE: 1/4" = 1'-0"



SIDE ELEVATION

SCALE: 1/4" = 1'-0"

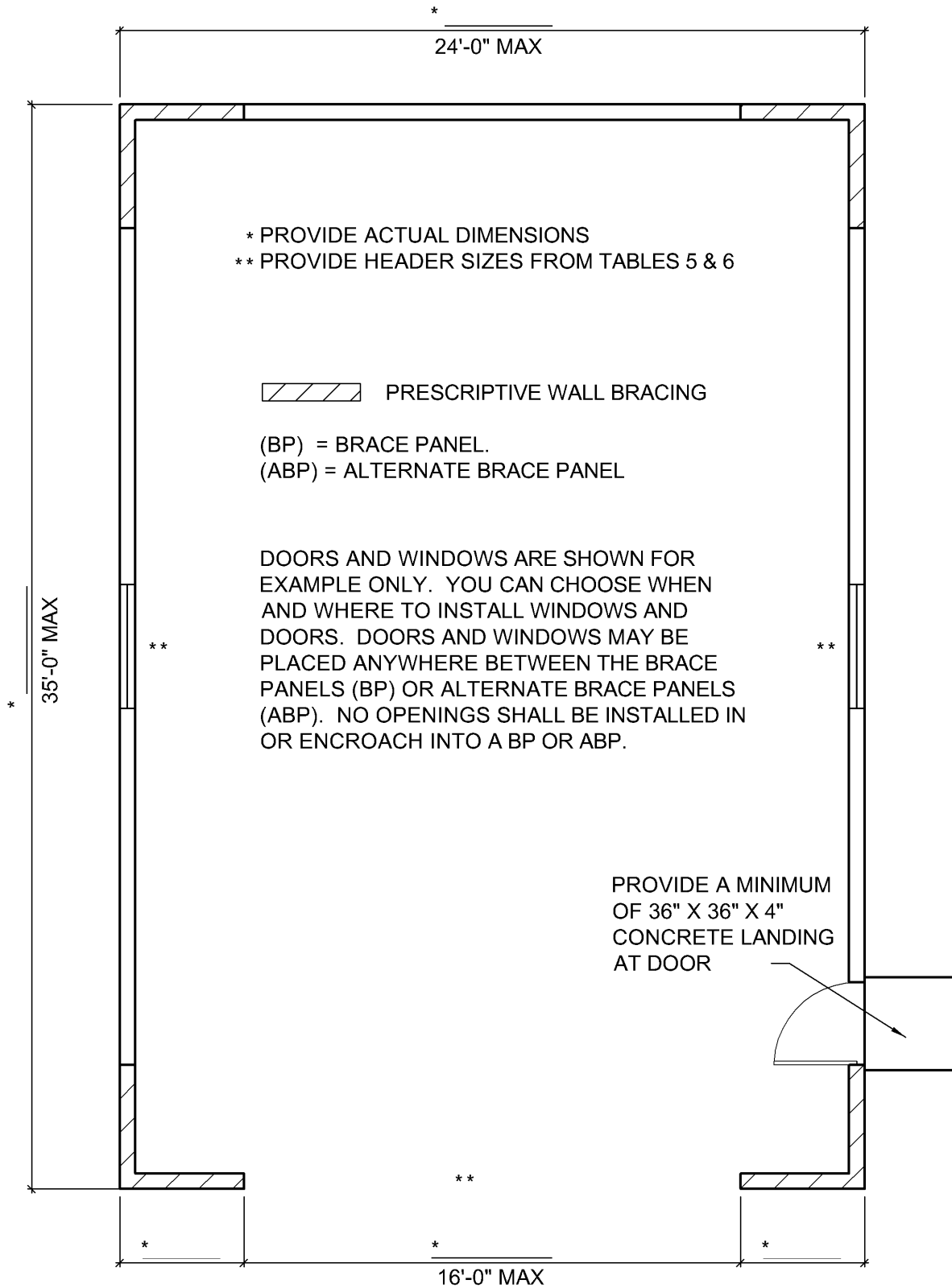


FIGURE 1

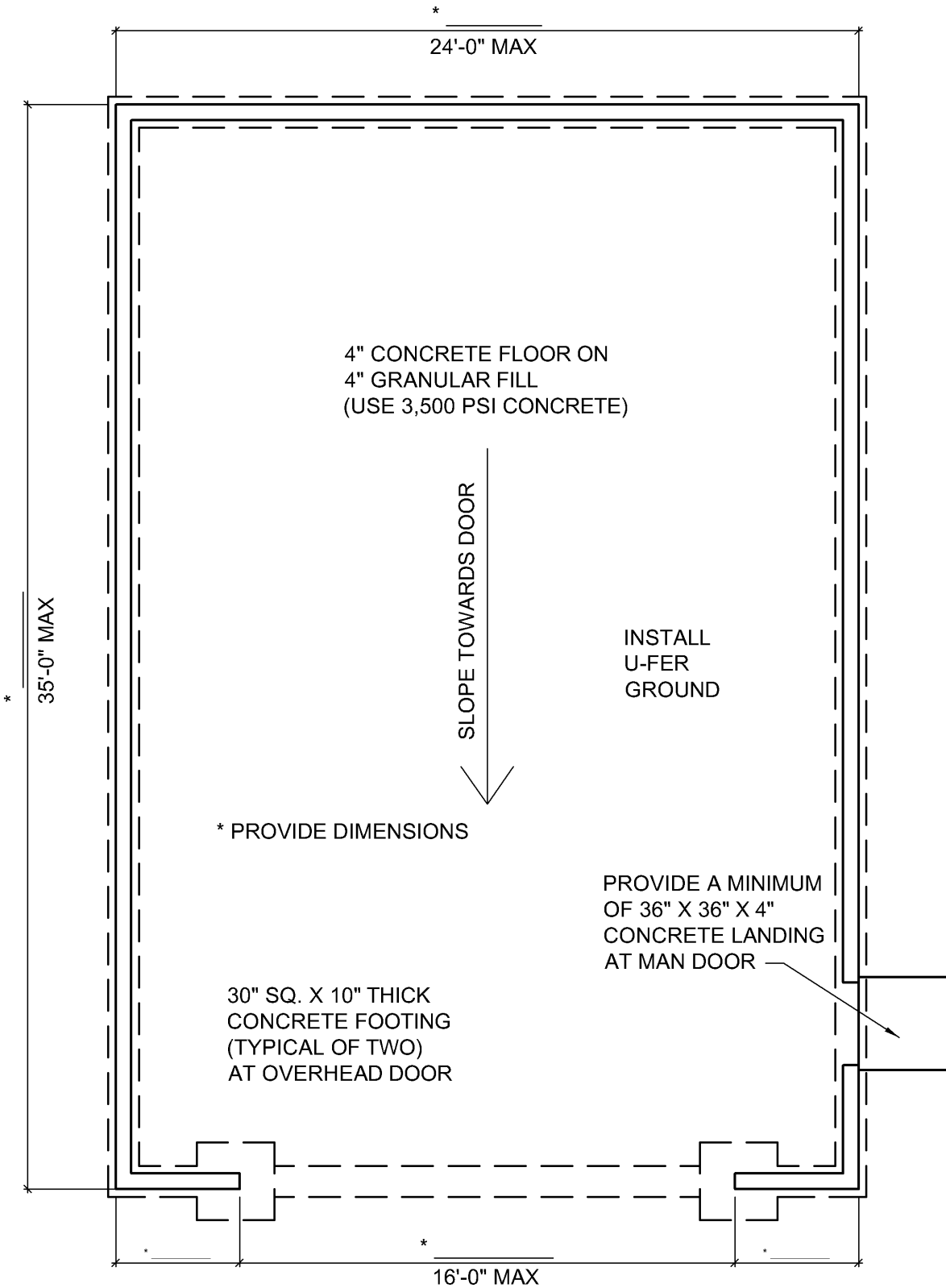


FIGURE 2a



FIGURE 2b

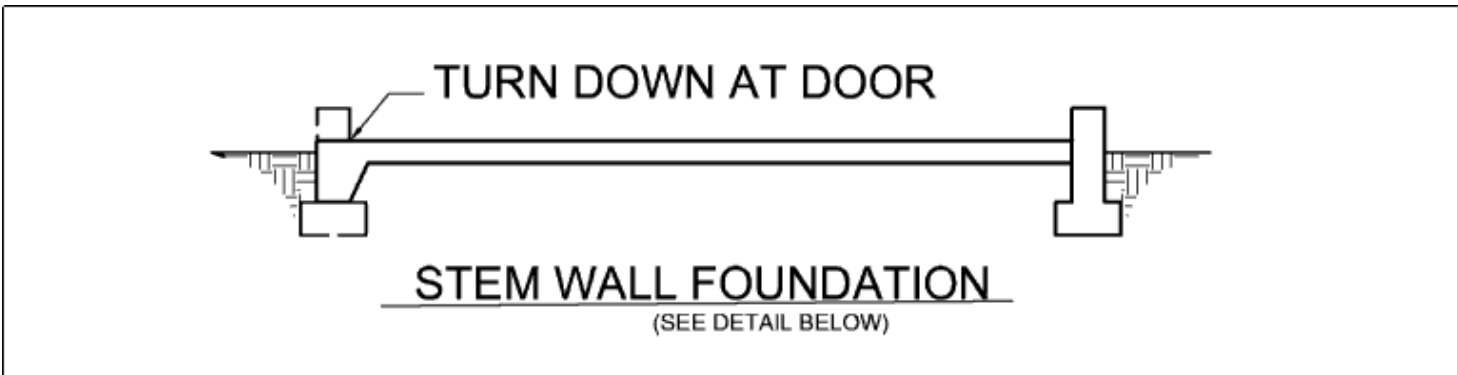


FIGURE 2c

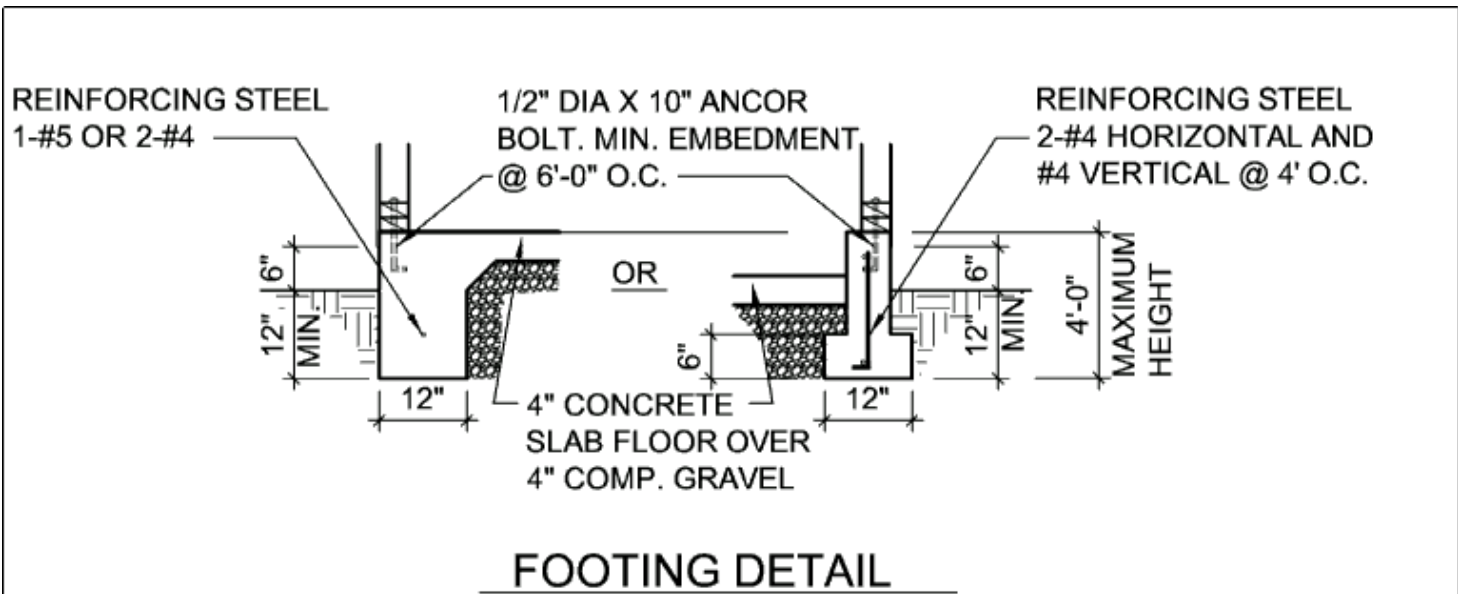
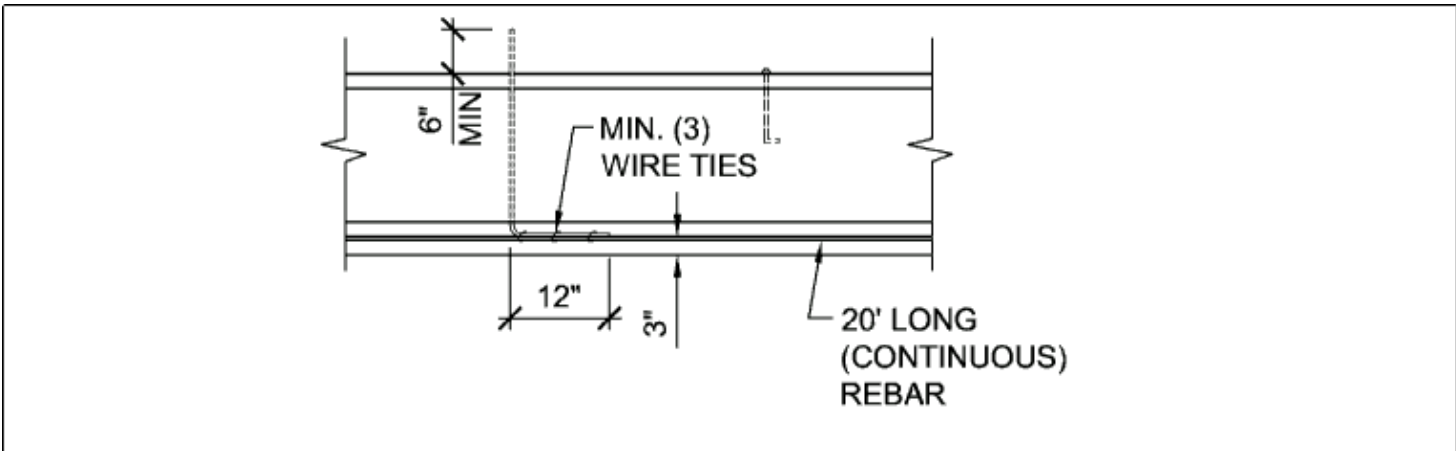


FIGURE 2d



UFER-GROUND DETAIL

FIGURE 3

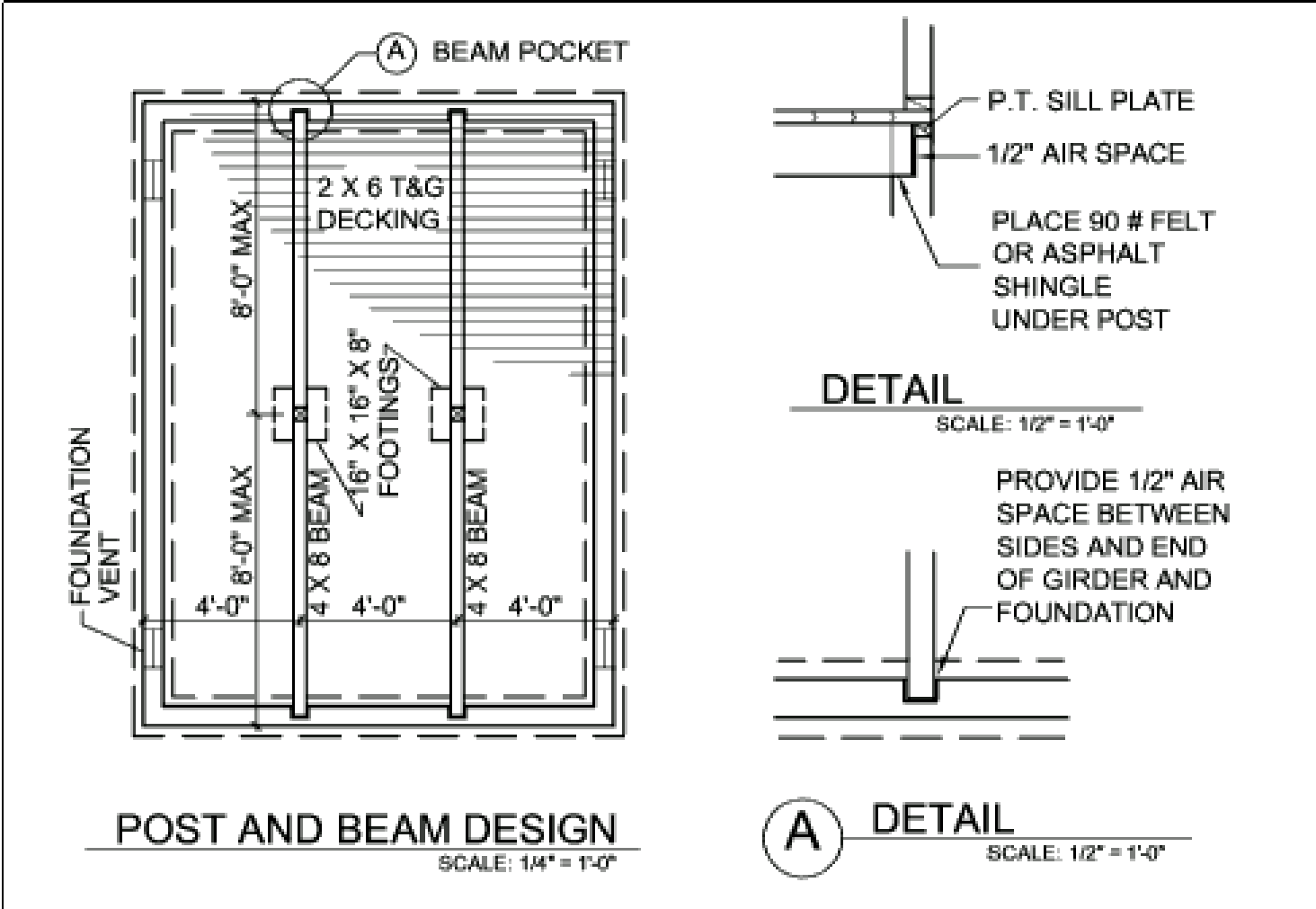


FIGURE 4a

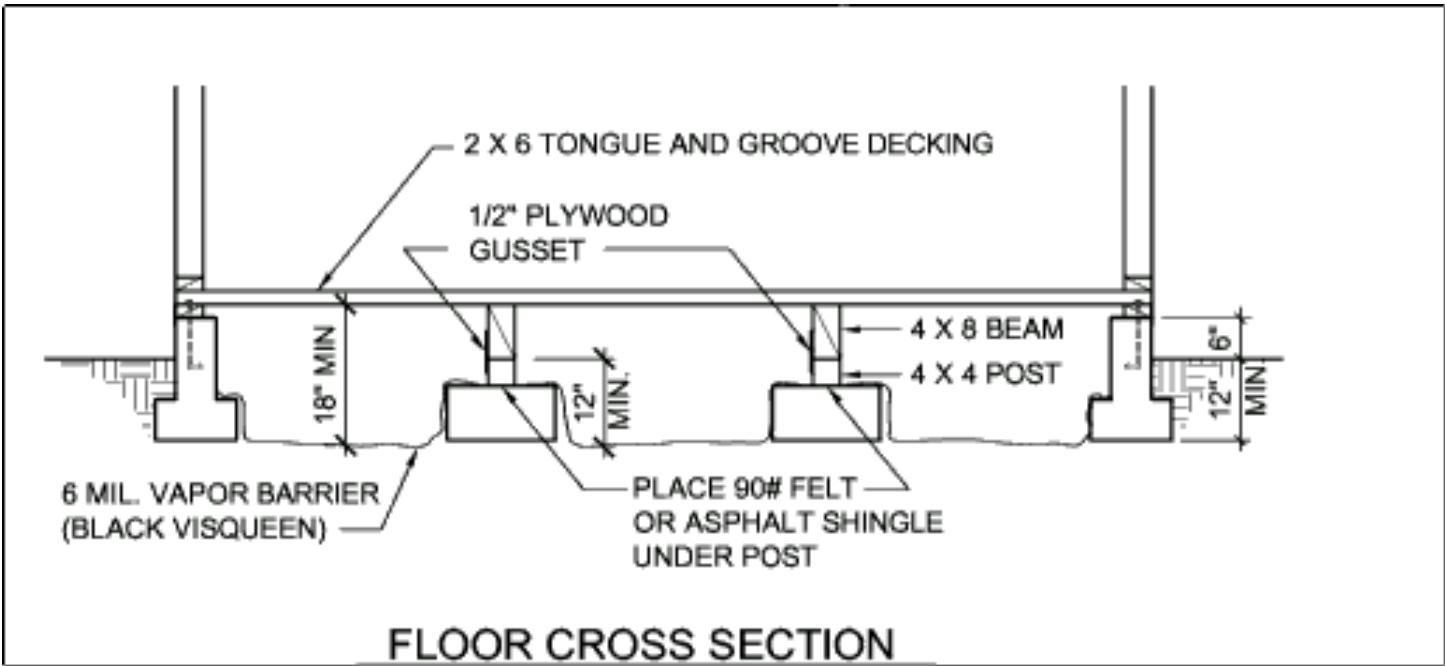


FIGURE 4b

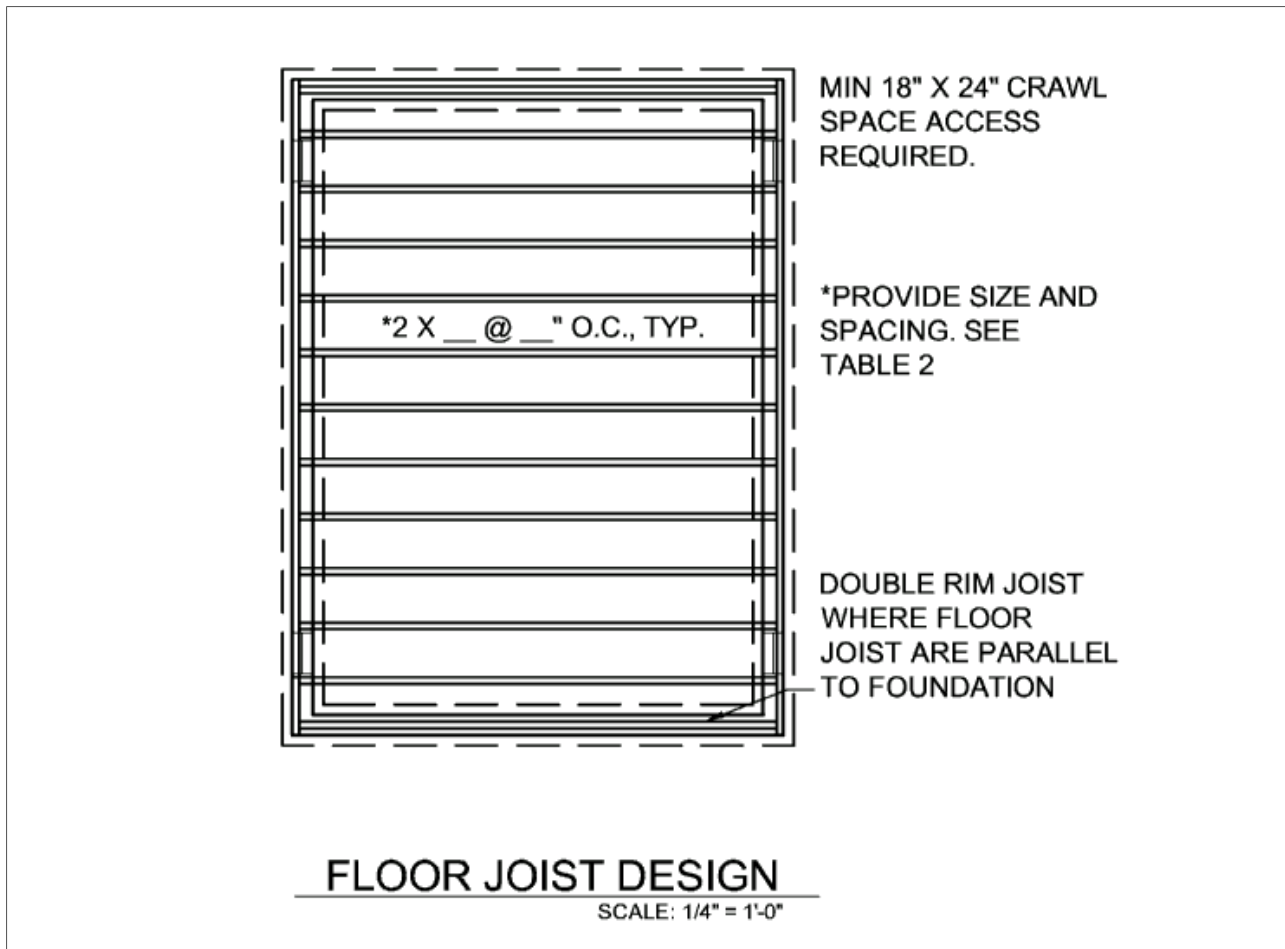


FIGURE 5a

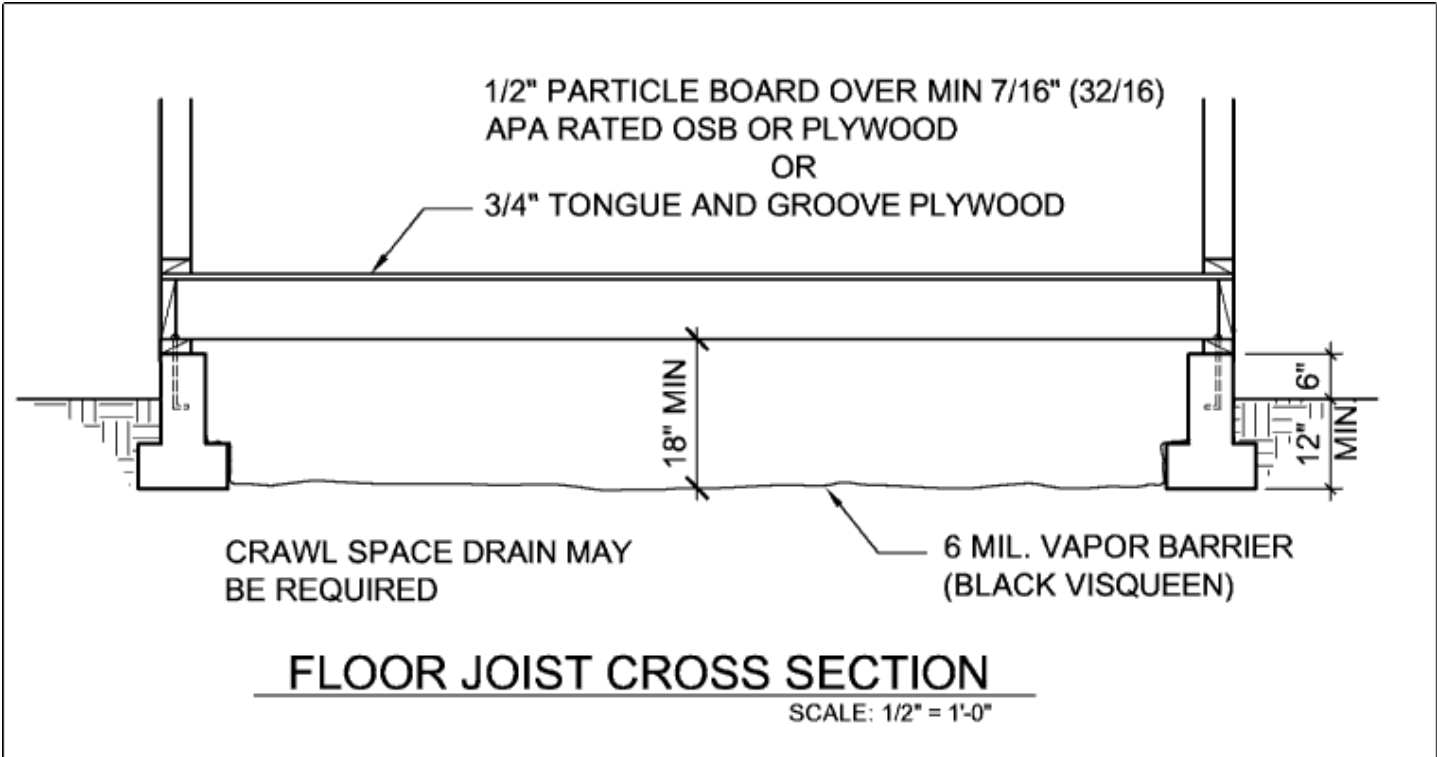


FIGURE 5b

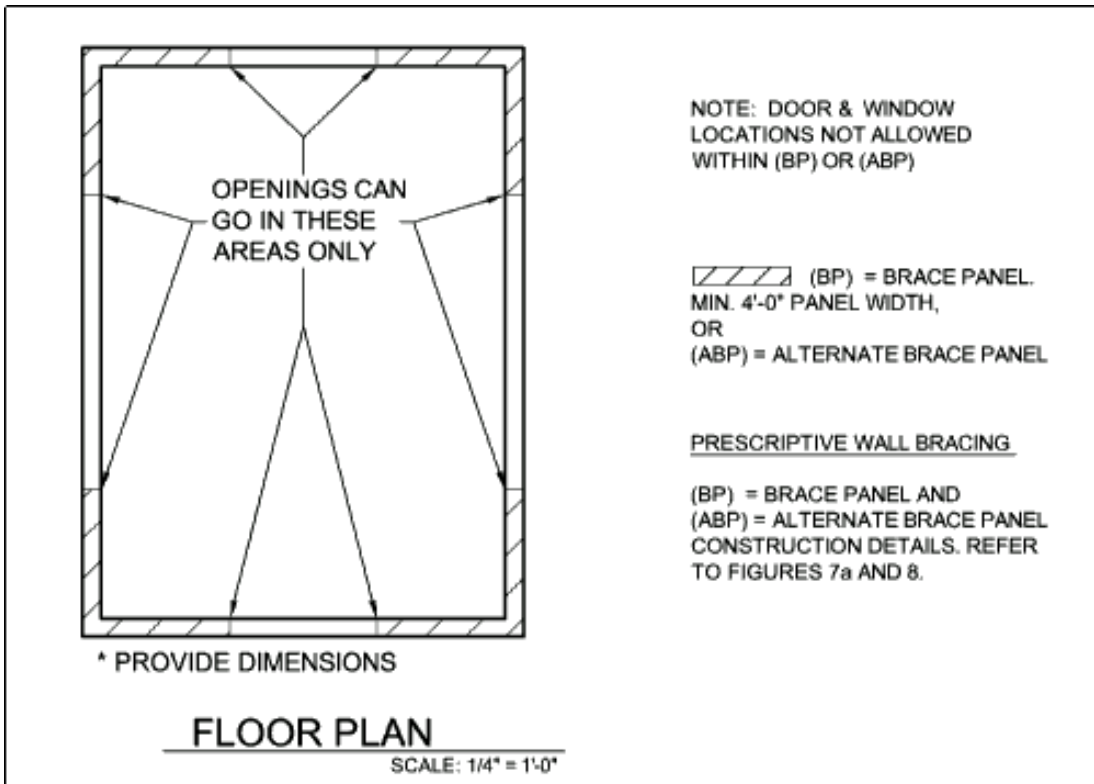
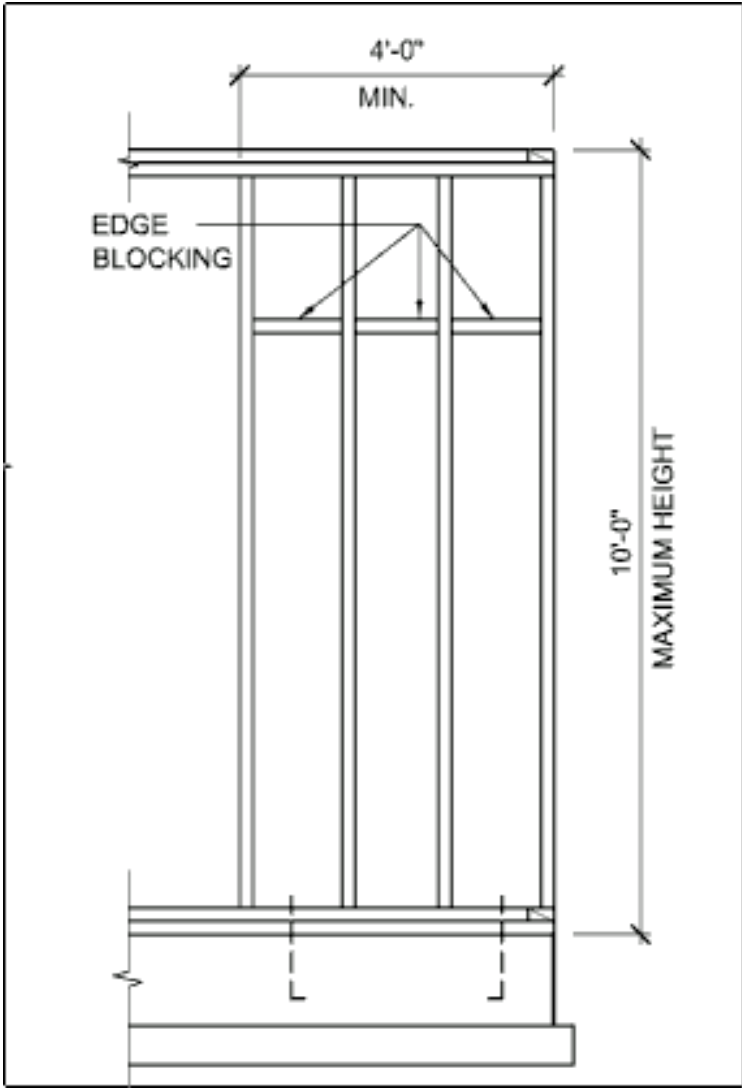
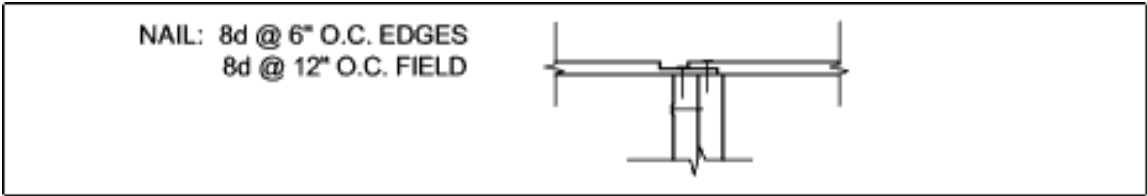


FIGURE 6



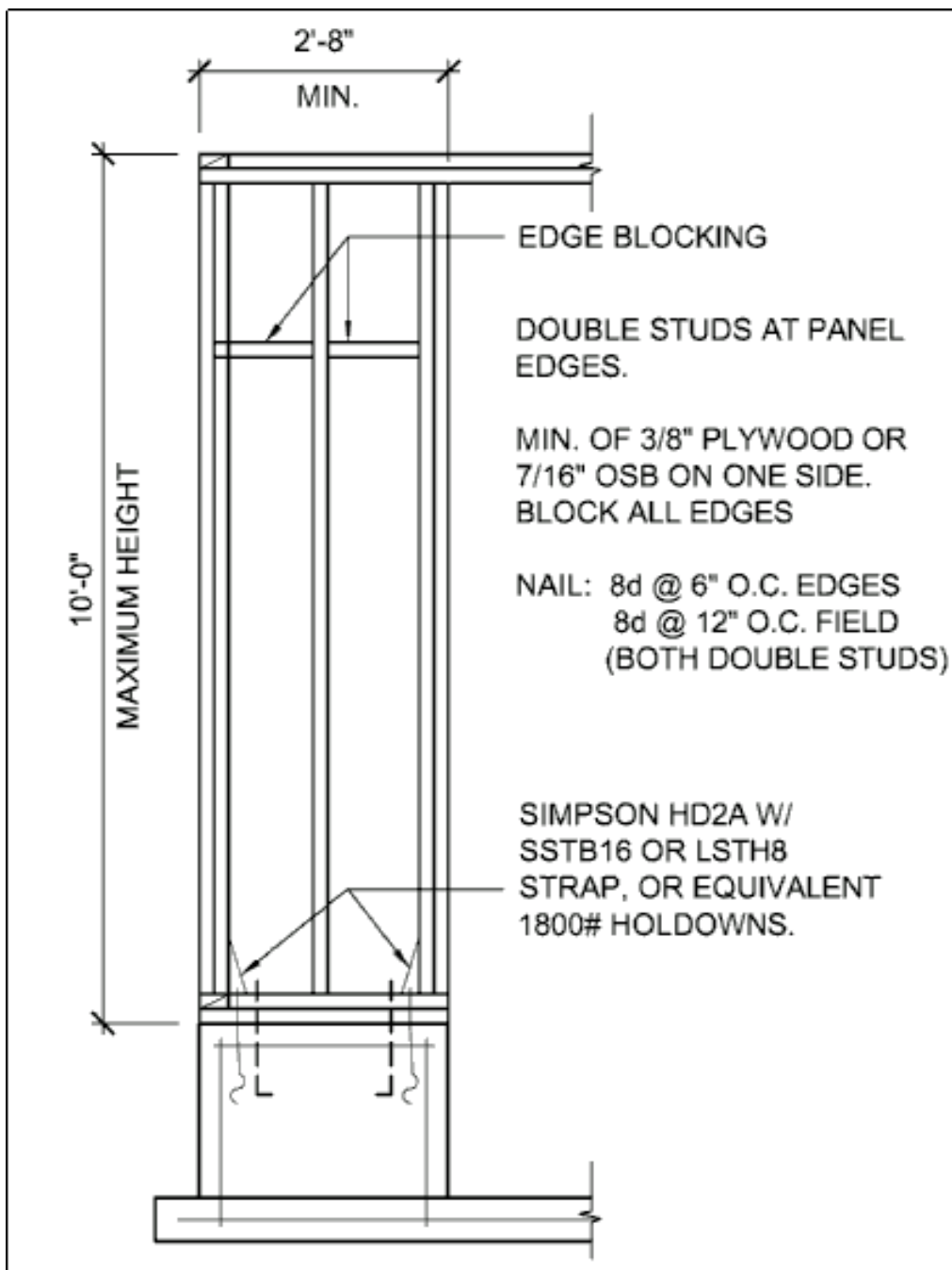
BRACE PANEL DETAIL

FIGURE 7a



LAP-EDGE NAILING DETAIL

FIGURE 7b



ALTERNATE BRACE PANEL DETAIL

FIGURE 8

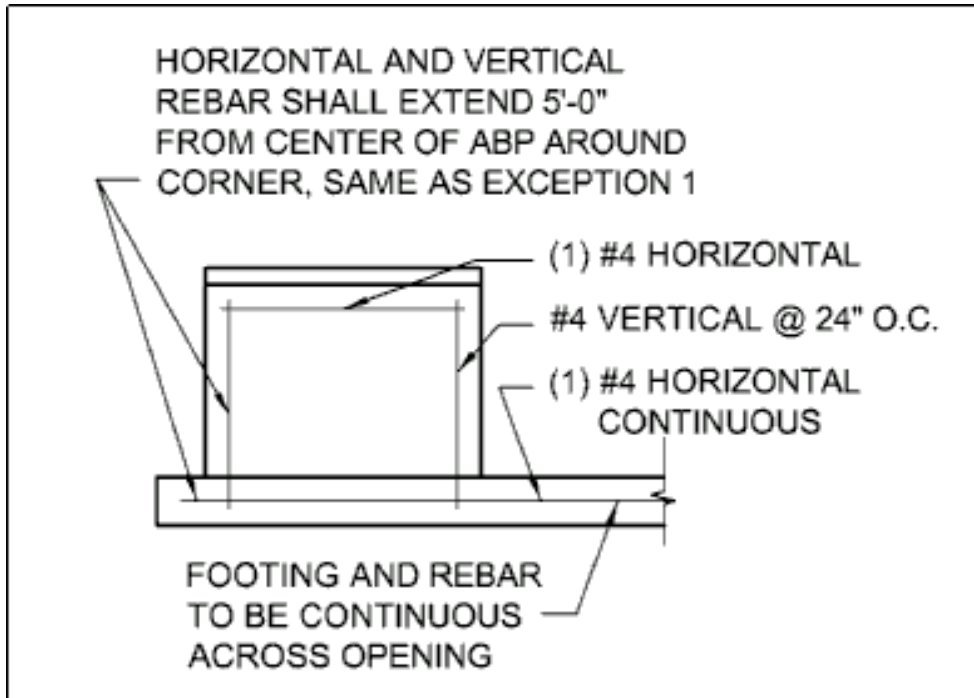


FIGURE 9

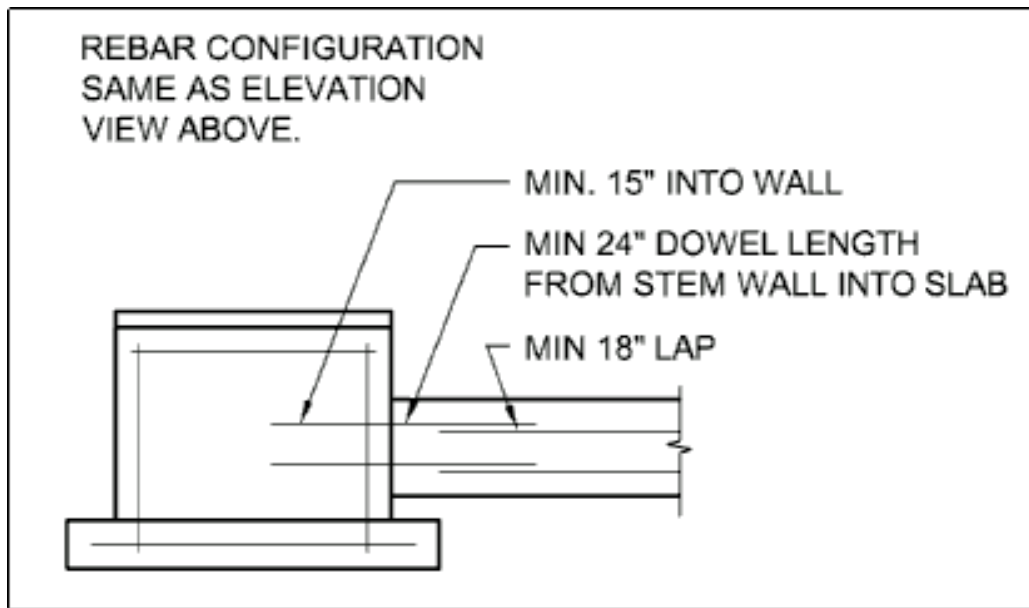
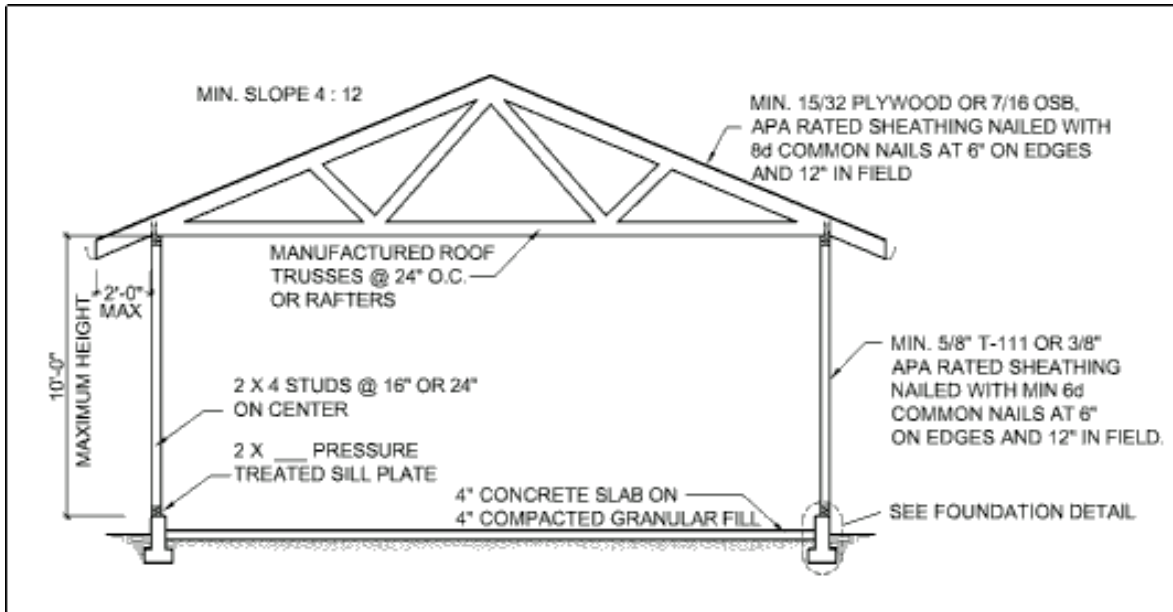
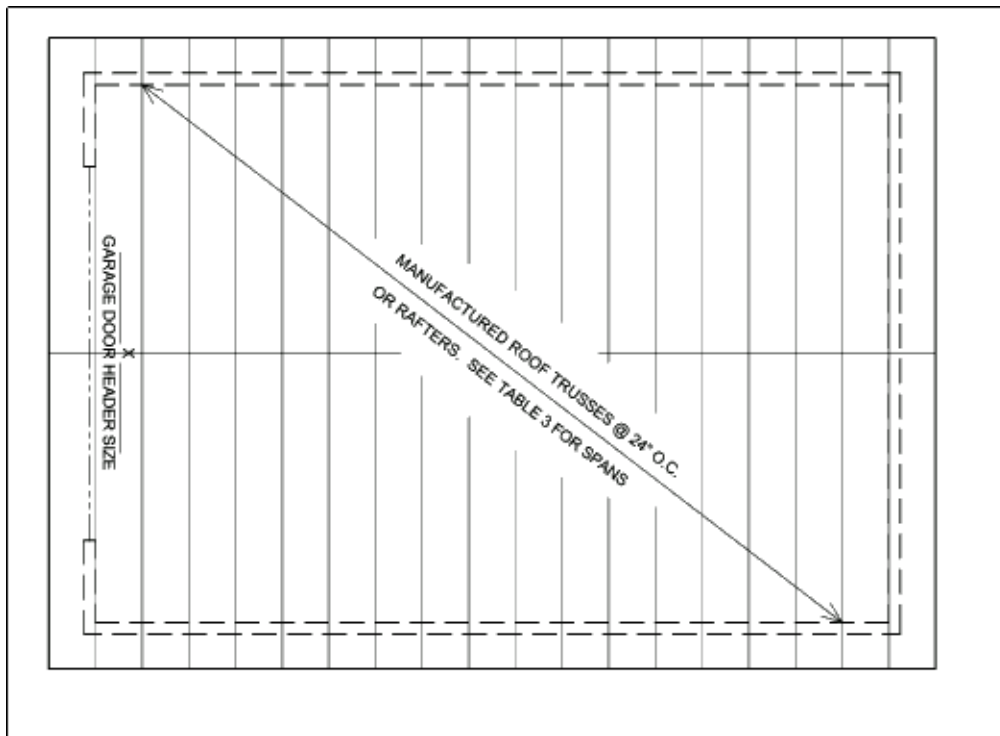


FIGURE 10



BUILDING SECTION

FIGURE 11



ROOF PLAN

FIGURE 12

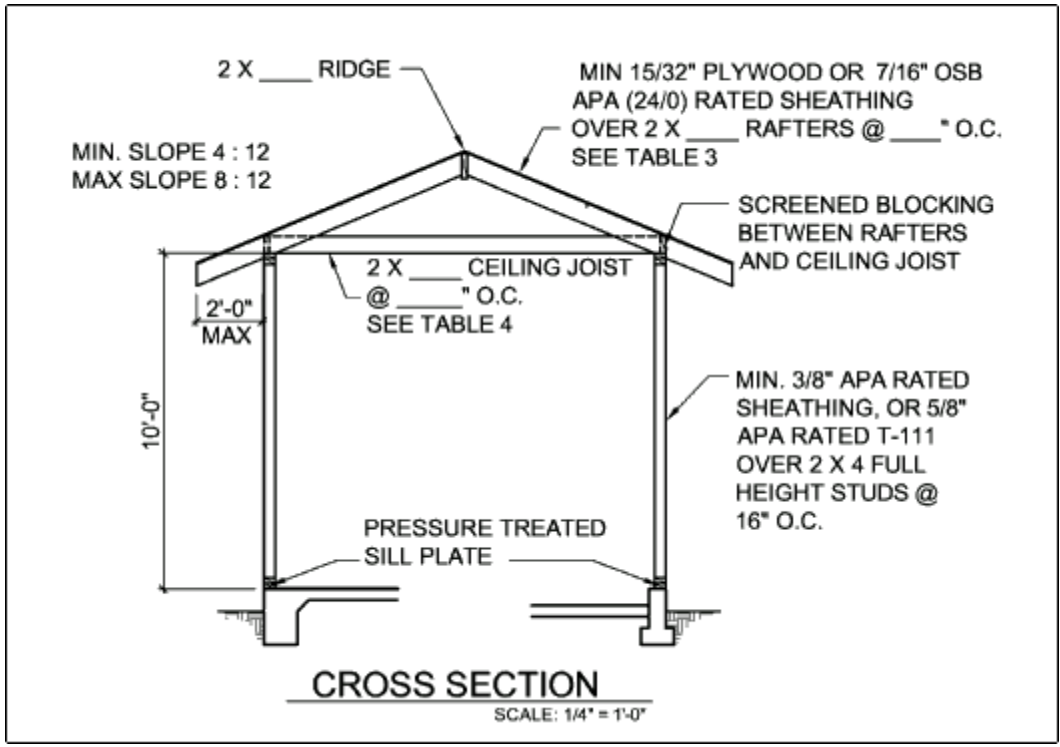


FIGURE 13

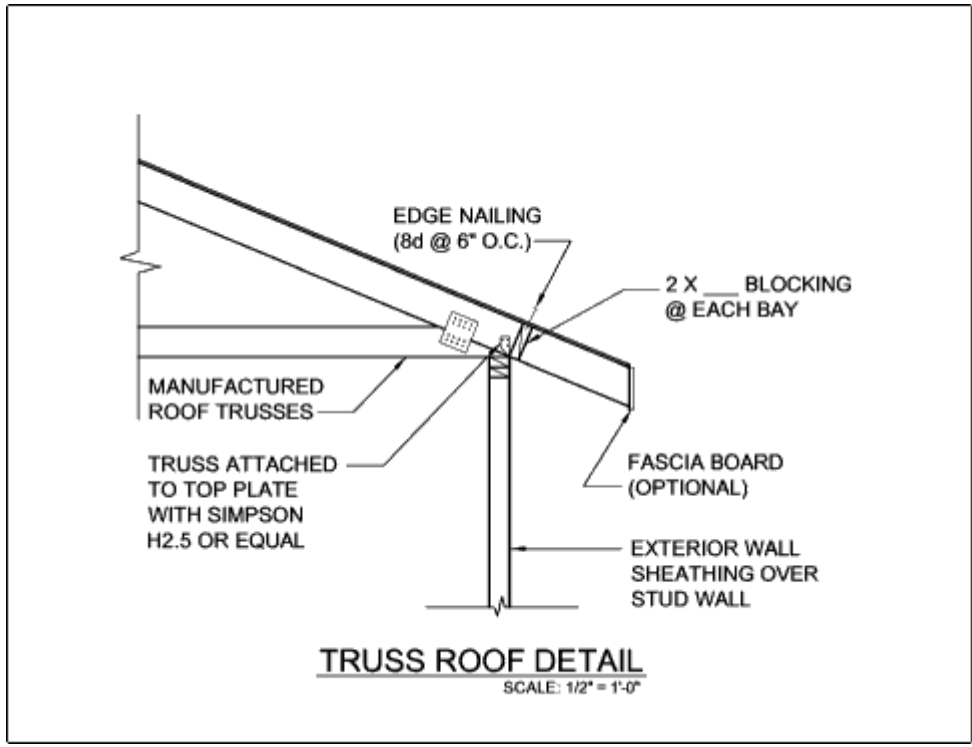


FIGURE 14

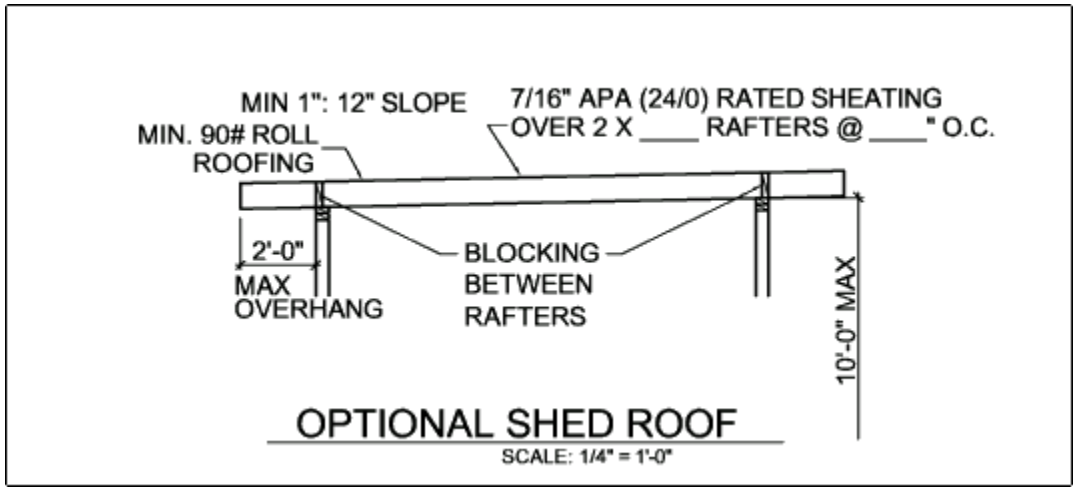


FIGURE 15