Residential Housing Project – Weed, CA

California Polytechnic State University San Luis Obispo

Fall 2017

Project by

Spencer Shobe

In Association with

Dewi Bleher, Munenari Hirata, Purvaa Goel and Ryan O'Neill

About the Project:

In September of 2014, the Boles Fire swept through the small city of Weed in northern California. Over 150 structures were destroyed in the fire and many families were displaced. One of the buildings destroyed included a commercial building that once sat on what is now divided into seven lots in the eastern part Weed. Great Northern Services (GNS), a non-profit organization committed to the growth and redevelopment of the city, bought the empty seven lots to develop residential housing for work-force families who were displaced by the fire. Within the seven lots, GNS plans to develop five single family residences and two duplexes.

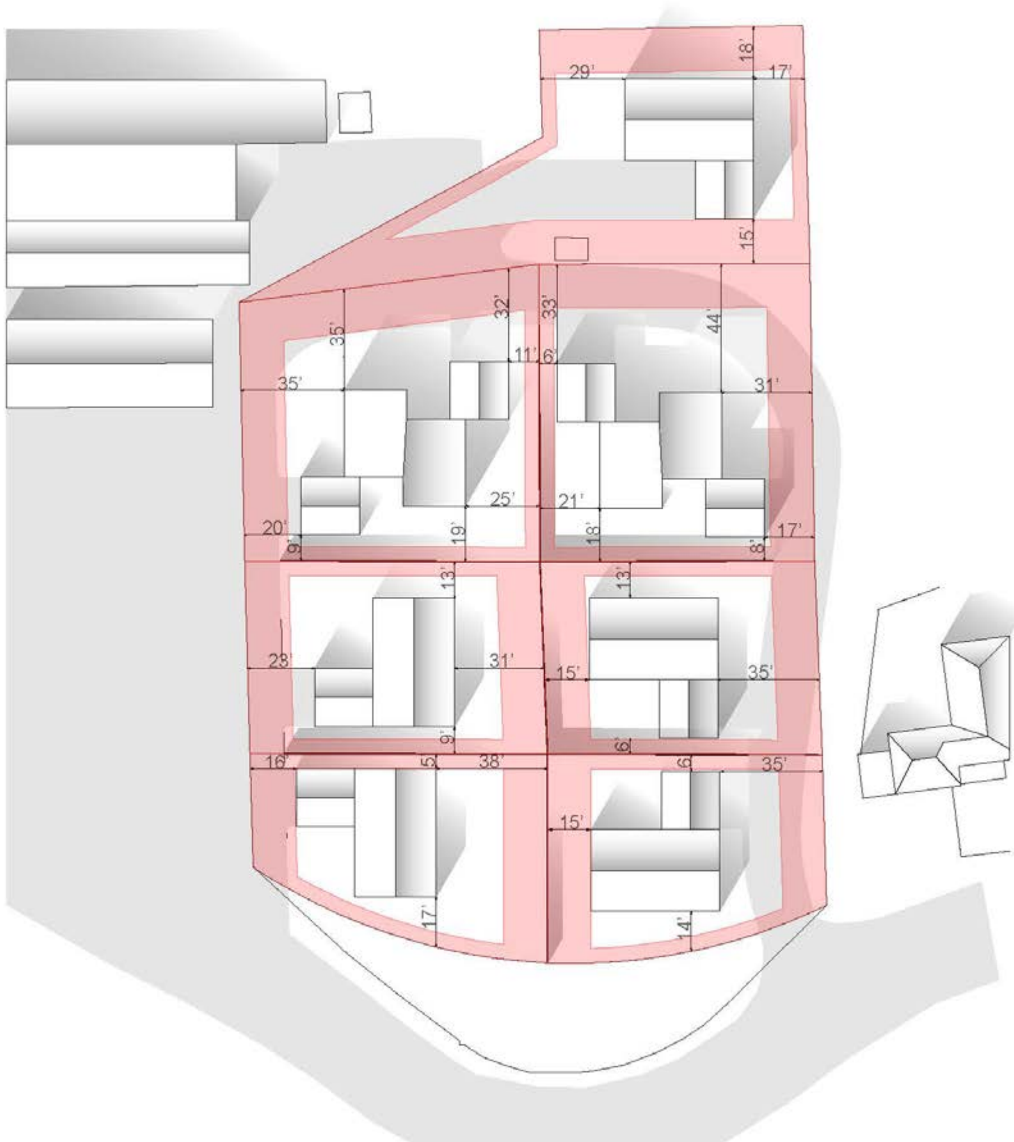
California Polytechnic University's Contribution:

GNS had several goals for the project including; resiliency, passive energy design, prefabrication, constructability and low budget. In order to keep budget low and recruit creative and innovative minds, GNS turned to California Polytechnic University and the College of the Siskiyous to help with the architectural design, structural design and construction. In addition, GNS wanted these buildings to be able to be built at California Polytechnic University and transported to Weed, CA. By approaching the project with an Integrated Project Delivery (IPD) approach, California Polytechnic University combined groups of Architecture, Architectural Engineering and Construction Management students into eight teams of four to six students to take on the project. The idea of IPD is that each group is tasked with designing the architectural, structural and construction design with an integrated approach.

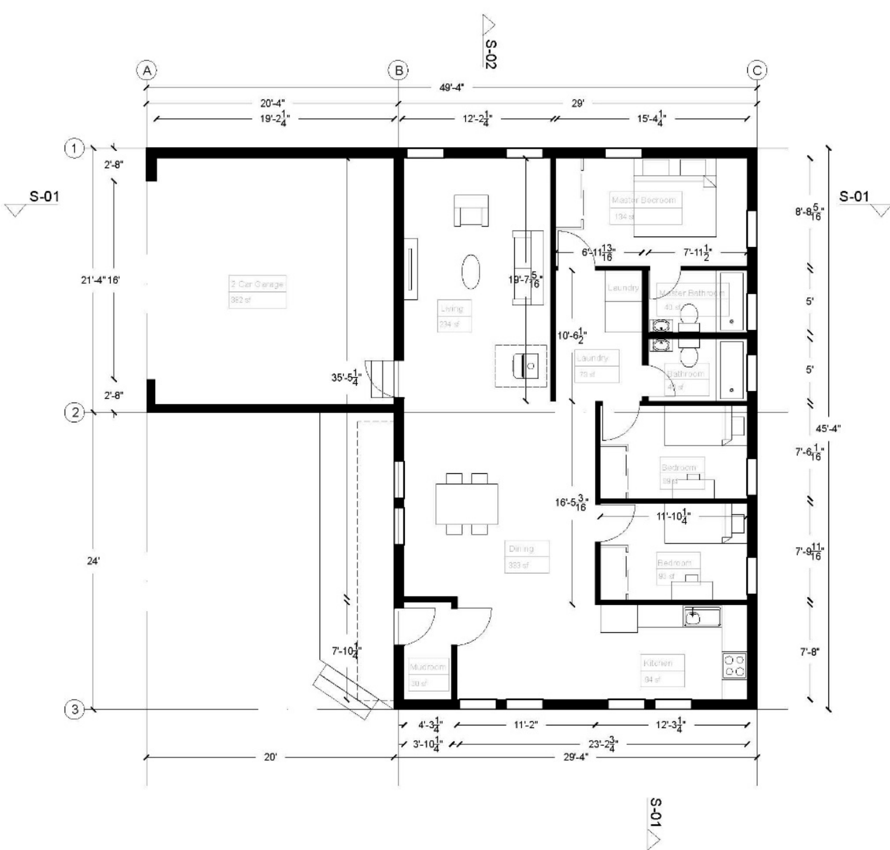
The Design Process and My Involvement:

Being the only Architectural Engineer of the group and the architectural design being the first step in the process, I was challenged to apply my specific knowledge of structural engineering to help inform my team what I thought the best approach was. My main goals when deciding what direction to take were keeping cost low and creating a project that could be easily prefabricated and transported. In order to achieve these goals, I created two objectives for design. First, I thought it would be best to build in four foot panels because that is the most common size plywood is manufactured in. Second, I tried to direct the design to stay fairly regular in shape so that structural member sizes wouldn't have to vary throughout the project and roof trusses could be utilized throughout the entire length of the roof in order to reduce the need for extra roof beams, posts and foundations. This would make the project more transportable and potentially more affordable. In the end the first objective was somewhat a failure because as a team we learned that designing the house with such tight restrictions made the design feel unnatural and made the floor plan unreasonable. The second objective however, did work out. In the end the entire roof was constructed of roof trusses and there were less than six unique structural members throughout the entire structure. The next step, the structural design, included the structural calculation and planning of the building. Because I was the only member of my group with the necessary knowledge to complete this task, this part of the project was done solely by me.

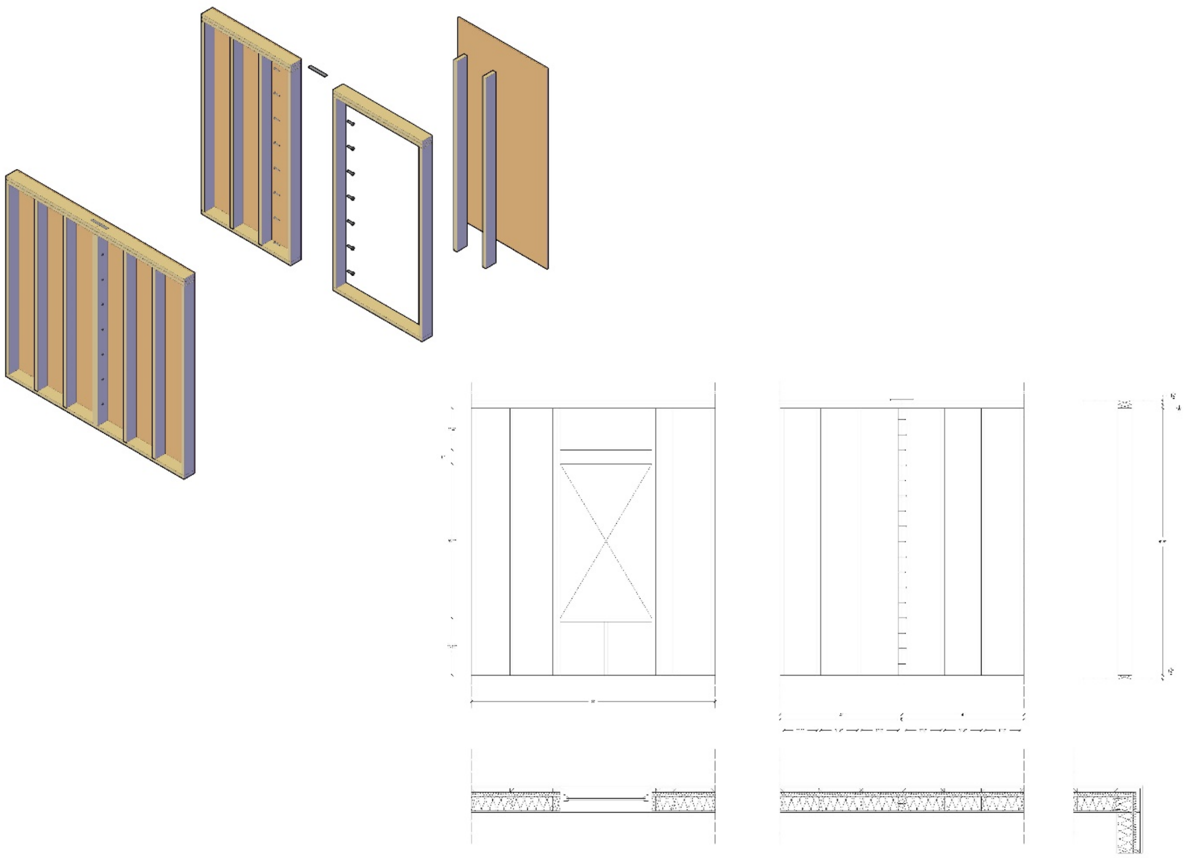
Parcel Layout Overview



Building Property Clearences



Site Overview and Floor Plan



Penalization Details

General

1. *Applicable Code:* 2016 California Building Code (cBC).
   A. Design Wind Speed (ASCE-7 Fig. 26.5-1A): 110 mph, Exposure C (Weed Municipal Building Code).
   B. Design Seismic Criteria (ASCE Section 12.8 using Equivalent Lateral Force procedure)

Seismic Importance Factor I:	1.0
Short Period MCE Acceleration SS:	0.736
Long Period MCE Acceleration S1:	0.328
Site Coefficients Fa & Fv:	1.0 & 1.0, respectively
Response Modification Coefficient R:	6.5
Soil Profile Type:	D

2. *Governing Code Authority:* City of Weed, CA
3. *Design Intent:* Contract documents indicate information sufficient to convey design intent. Review contract documents and verify field and existing conditions. Promptly notify Structural Engineer, prior to proceeding with work, if design intent requires further clarification.
4. *Submittals:* Review for completeness and compliance with contract documents prior to submission to Structural Engineer. Submit prior to fabrication. Submittal review is for general conformance with design intent and does not constitute an authorization to deviate from terms and conditions of contract. When indicated, provide a professional engineer's signature and seal applicable to state where project is located. Maintain at site a copy of reviewed and accepted submittals
5. *Modifications and Substitutions:* Must be accepted in writing by Structural Engineer. No modification or substitution will be accepted via shop drawing review.
6. *Contract Documents Use:* Perform structural related work and develop shop drawings considering contract documents in their entirety. See architectural drawings for top of floor and roof elevations, depressions, slopes, openings, curbs, drains, trenches, slab edge locations, wall overall dimensions and locations of openings not indicated on structural drawings. Any discrepancies between architectural and structural dimensions should be confirmed with the Structural Engineer before starting work.
7. *Construction Means and Methods:* Not a part of contract documents. Perform construction means, methods, techniques, sequences and procedures complying with national, state and local safety ordinances. Site visits (including structural observation) by Structural Engineer do not constitute supervision of construction means and methods.
8. *Typical Details:* Details titled as "Typical" are applicable throughout project and may not be specifically referenced herein. Contractor is responsible for identifying these details and understanding extent of their application prior to performing work.

Masonry

1. *Specified Compressive Strength of Masonry (f'_m):* 1500 psi.
2. *Concrete Block:* ASTM C90, medium weight, Grade N-I attaining a minimum compressive strength as required to meet specified compressive strength of masonry (f'_m).
5. *Mortar:* ASTM C270, Type S conforming with IBC Section 2103.1 and attaining a minimum compressive strength at 28 days of 1800 psi. Do not use masonry cement or plastic cement.
3. *Grout:* ASTM C476 or IBC Table 2103.3 attaining a minimum compressive strength as required to meet specified compressive strength of masonry (f'_m). However, in no case shall grout compressive strength be less than 2000 psi at 28 days.
4. *Portland Cement:* Cast-in-place concrete section of general notes.
5. *Aggregates for Mortar and Grout:* ASTM C144 and C404 of natural sand and rock.
6. *Reinforcing Steel:* Reinforcing steel section of general notes unless indicated otherwise.
7. *Reinforcing Steel Splices:* Lap reinforcing steel at splices a minimum of 72 bar diameters, unless noted otherwise. Where clear distance between bars at adjacent splices is 3 inches or less, increase lap length 30 percent unless splices are staggered at least 24 bar diameters.
8. *Placement:* Set cells in vertical alignment.
9. *Grouting:* Grout solid all cells. Mechanically vibrate grout in cells.
   A. Horizontal Construction Joints: Hold grout 1 1/2 inches below top of masonry unit if work is stopped one hour or longer.
   B. Grout Cover Around Reinforcing Steel, Anchor Bolts and Inserts Penetrating Masonry Shell: 1 inch minimum

Earthwork and Foundations

1. *Design Assumption:* In lieu of more detailed soils information, existing subgrade is assumed to be class "5" in compliance with CBC Table 1806.2 with allowable bearing pressure of 1,500 psf.
   *These values may be increased 33 percent for seismic or wind loading
2. *Excavations, Backfill and Compaction of Backfill:* Comply with requirements of IBC Section 1804. Contractor is responsible for all excavation, lagging, shoring, underpinning and related procedures.
3. *Minimum Footing Depths:* 12 inches below adjacent grade (excluding landscaping soil) or finish floor, whichever is lower.
4. *Water Exposure at Building Perimeter Footings:* At areas where sidewalks or paving do not immediately adjoin structure, provide positive drainage away from structure at building perimeter. Landscape irrigation is not permitted within five feet of building perimeter footings except when enclosed in protected planters with direct drainage away from structure or which complies with applicable code. Discharge from downspouts, roof drains and scuppers is not permitted onto unprotected soils within five feet of building perimeter. Refer to geotechnical report for complete requirements.

Reinforcing Steel

1. *Reinforcing Steel:*
   All bars unless indicated otherwise ASTM A615, Grade 60
   Bars to be welded ASTM A706, Grade 60
2. *Wire Reinforcing:*
   Smooth welded wire fabric ASTM A185
   Deformed wire stirrups (D4 and larger only) ASTM A497
3. *Lap Lengths:* As shown on drawings. If lap lengths cannot be determined, verify with Structural Engineer. Lap wire fabric 1-1/2 spaces (1 foot minimum).
4. *Minimum Cast-in-Place Concrete Cover:* Min. cover, in.
   Slabs on Grade center of slab
   (a) Concrete Exposed to Earth or Weather (Unformed) 3
5. *Chairs or Spacers:* Plastic or plastic coated when resting on exposed surfaces.
6. *Bending:* Bend cold unless otherwise accepted by Architect (Structural Engineer). Do not field-bend reinforcing steel bars embedded in concrete unless otherwise shown on contract documents or pre-approved by Structural Engineer.

Rough Carpentry

1. *Structural Lumber:* Grade marked Douglas Fir-Larch structural lumber complying with Standard Grading Rules No. 17 of the West Coast Lumber Inspection Bureau. Provide air-dry lumber with 19 percent maximum moisture content.
2. *Classifications and Grades:*

Member	*Size Classification*	*Grade*
Rafters and Joists Larger Than 2x4	2" to 4" thick, 2" and wider	No.2
2x4 Joists and Rafters	2" to 4" thick, 2" and wider	No.2
4x Beams, Headers and Stringers	2" to 4" thick, 2" and wider	No.1
Beams, Headers and Stringers Larger Than 4x	Beams and Stringers	No.1
4x Posts	4" thick, 4" and wider	No.1
Posts Larger Than 4x	Posts and Timbers	No.1
Studs, Plates and Blocking		Stud Grade No.2

3. *Plywood:* U.S. Product Standard PS 1-95 and classified as Exposure 1. Each sheet of plywood shall be identified with appropriate trademark of the American Plywood Association.
4. *Pressure Treat Structural Lumber Bearing on Concrete or Masonry:* See specifications. Provide hot dipped galvanized or stainless steel fasteners and hardware connectors at pressure treated structural lumber.
5. *Nails:* Common nails with dimensional properties complying with IBC 2303.6. Install nails in compliance with CBC Chapter 23, including Table 2304.10.1
6. *Bolts:* ASTM A307 bolts with standard cut washer under bolt head and nut. Provide holes for bolts 1/32 to 1/16 inch larger than nominal bolt diameter. Re-tighten bolts prior to application of sheathing or finish.
7. *Lag Screws:* ANSI/ASME Standard B18.2.1 for lag screw dimensions. Pre-drill all holes. Hole at shank portion to match diameter of shank. Holes at threaded portion to be 60 to 75 percent of shank diameter and equal to length of threaded portion. Use soap and lubricants to facilitate installation. Driving with hammer is not permitted.
8. *Plate Washers:* Provide under heads or nuts of bolts (including anchor bolts at sill plates) and lag screws of the following sizes when anchoring wood:
   1/2" diameter 1/8"x2" sq. 5/8" diameter 1/8"x2-1/2" sq.
   3/4" diameter 3/16"x2-3/4" sq. 7/8" diameter 1/4"x3" sq.
   1" diameter 5/16"x3-1/2" sq.
9. *Wood Hardware Connectors:* Manufactured by Simpson Strong-Tie Company, Inc.
10. *Notching or Cutting Structural Lumber:* Not permitted unless specifically detailed or indicated.
11. *Lateral Support for Beams, Rafters and Joists:* IBC Section 2308.7.
12. *Wood Studs:*
    A. Top Plate: construct with 2 pieces same width as studs. Splice as indicated.
    B. Stud Wall Bracing in Stud Walls not Plywood Sheathed: Compliance with IBC Section 2308.6.
    C. Fire Blocks: IBC Section 718.
    D. Notching or Boring Holes in Wood Studs: IBC Section 2308.5.9.
    E. Partition Support at Floor Framing: Double joists under partitions which are parallel to joists and provide solid full depth blocking under partitions which are perpendicular to joists.

Nailing Schedule (Portion of IBC Table 2304.10.1)

All nails are common nails unless written acceptance by Architect (Structural Engineer) is attained.

1. Joist to sill or girder, toenail	3-8d
2. Bridging to joist, toe nail each end	2-8d
3. 1"x6" subfloor or less to each joist, face nail	2-8d
4. Wider than 1"x6" subfloor to each joist, face nail	3-8d
5. 2" subfloor to joist or girder, blind and face nail	2-16d
6. Sole plate to joist or blocking, typical face nail	16d @ 16" o/c
7. Sole plate to joist or blocking, at braced wall panels	3-16d per 16"
8. Top plate to stud, end nail	2-16d
9. Stud to sole plate	4-8d, toe nail or 2-16d, end nail
10. Double studs, face nail	16d @ 24" o/c
11. Doubled top plates, typical face nail	16d @ 16" o/c
12. Doubled top plates, lap splice	8-16d
13. Blocking between joists or rafters to top plate, toe nail	3-8d
14. Rim joist to top plate, toe nail	8d @ 6" o/c
15. Top plates, laps and intersections, face nail	2-16d
16. Continuous header, two pieces	16d @ 16" o/c along each edge
17. Ceiling joist to plate, toe nail	3-8d
18. Continuous header to stud, toe nail	4-8d
19. Ceiling joists, laps over partitions, face nail	3-16d
20. Ceiling joists to parallel rafters, face nail	3-16d
21. Rafter to plate, toe nail	3-8d
22. 1" brace to each stud and plate, face nail	2-8d
23. 1"x8" sheathing or less to each bearing, face nail	2-8d
24. Wider than 1"x8" sheathing to each bearing, face nail	3-8d
25. 2" planks	2-16d at each bearing
26. Built-up corner studs	16d @ 24" o/c
27. Built-up girder and beams	20d @ 32" o/c at top and bottom and staggered 2-20d at ends and at each splice

Class Information:
ARCH 451-02 Lab
Architectural Design 4.1
Fall 2017
California Polytechnic
State University
San Luis Obispo

Team member:
Dewi Bleher
Purvaa Goel
Munenari Hirata
Ryan O'Neill
Spencer Shobe

Residential Housing Project - Weed,CA
Great Northern Services

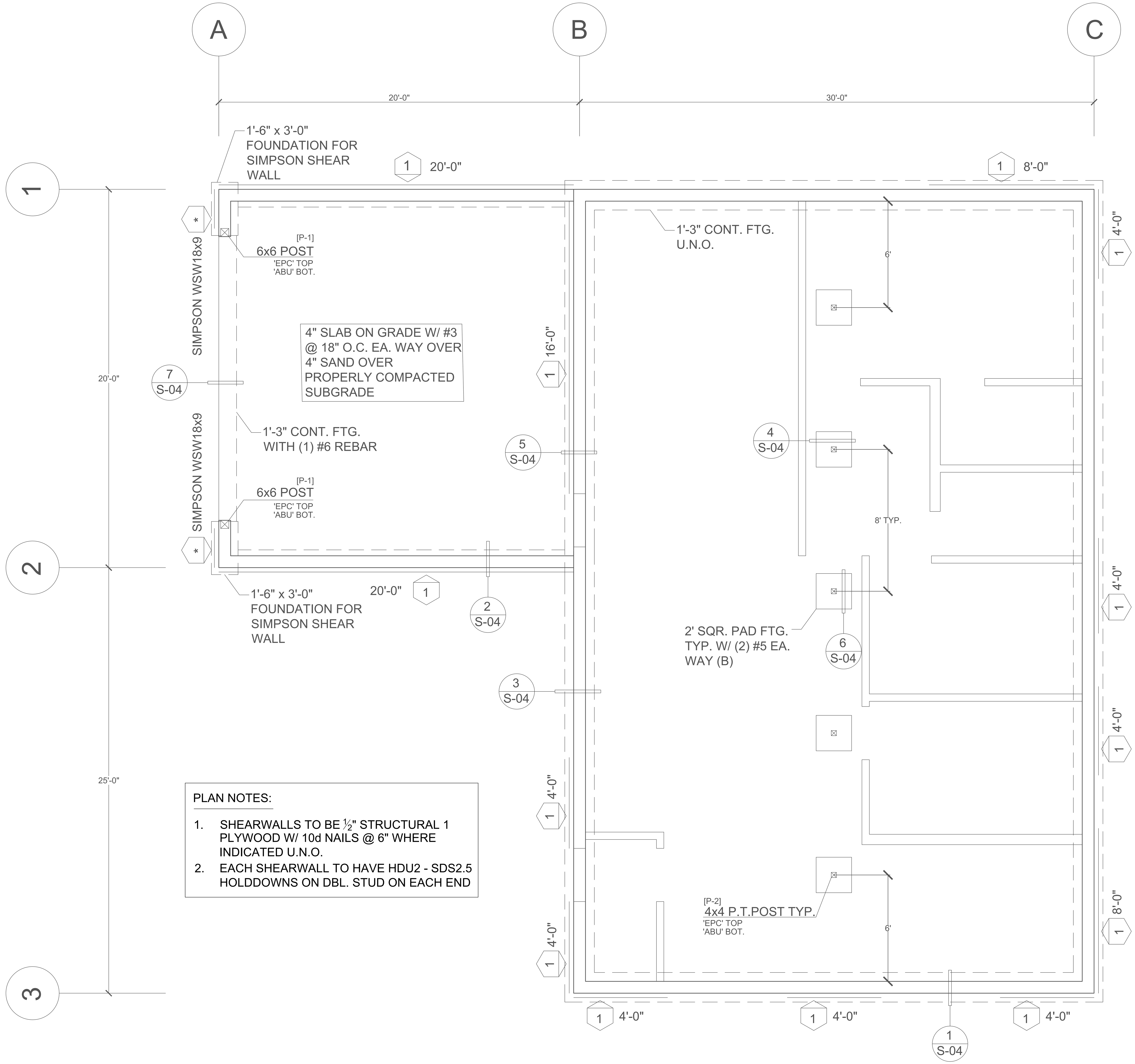
General Notes

Revisions

No.	Desc.	Date

Site: 780 South Davis Ave. Weed, CA
Date: 11/17/17

Sheet Number: S-00
Scale: NA



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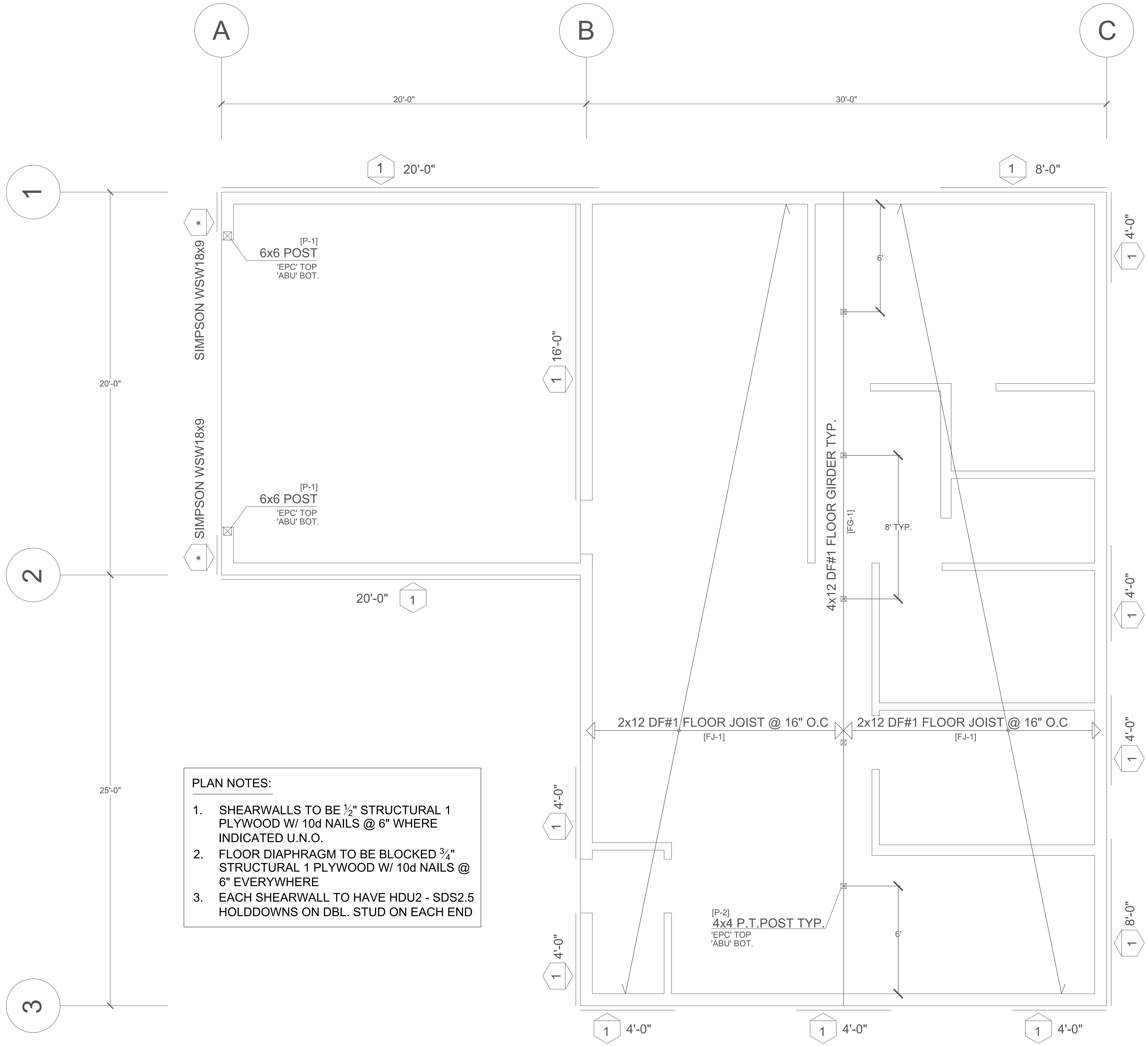
Foundation Plan

Revisions

No.	Desc.	Date

Site: 780 South Davis Ave. Weed, CA
Date: 11/17/17
Sheet Number: S-01
Scale: 3/8" = 1'-0"



PLAN NOTES:

1. SHEARWALLS TO BE ½" STRUCTURAL 1 PLYWOOD W/ 10d NAILS @ 6" WHERE INDICATED U.N.O.
2. FLOOR DIAPHRAGM TO BE BLOCKED ¾" STRUCTURAL 1 PLYWOOD W/ 10d NAILS @ 6" EVERYWHERE
3. EACH SHEARWALL TO HAVE HDU2 - SDS2.5 HOLDDOWNS ON DBL. STUD ON EACH END

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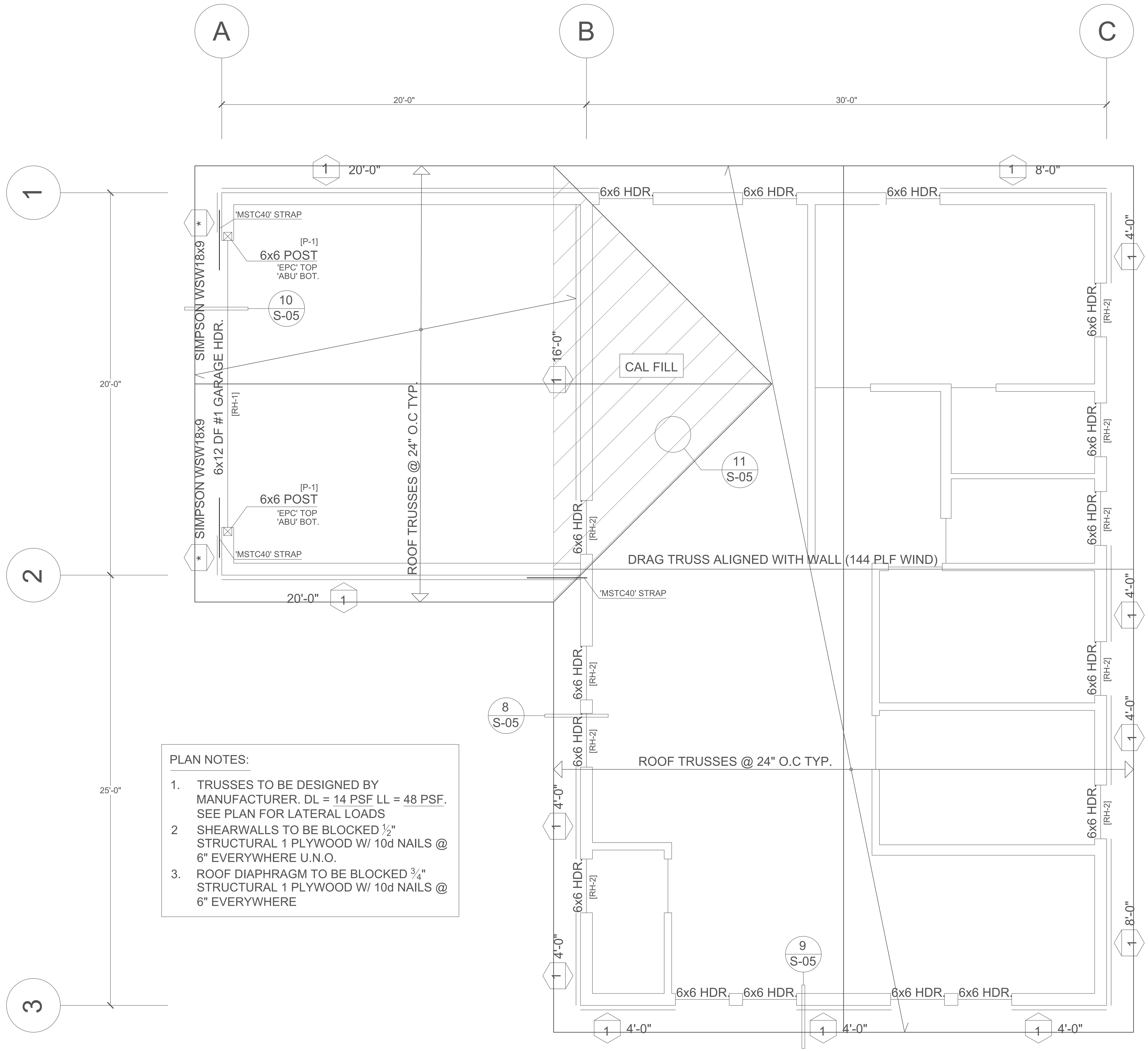
Residential Housing Project - Weed,CA
Great Northern Services

First Floor Framing Plan

Revisions		
No.	Desc.	Date

Site:	Date:
780 South Davis Ave. Weed, CA	11/17/17
Sheet Number:	**Scale:**
S-02	3/8" = 1'-0"



PLAN NOTES:

1. TRUSSES TO BE DESIGNED BY MANUFACTURER. DL = 14 PSF LL = 48 PSF. SEE PLAN FOR LATERAL LOADS
2. SHEARWALLS TO BE BLOCKED ½" STRUCTURAL 1 PLYWOOD W/ 10d NAILS @ 6" EVERYWHERE U.N.O.
3. ROOF DIAPHRAGM TO BE BLOCKED ¾" STRUCTURAL 1 PLYWOOD W/ 10d NAILS @ 6" EVERYWHERE

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Residential Housing Project - Weed,CA
Great Northern Services

Roof Framing Plan

Revisions

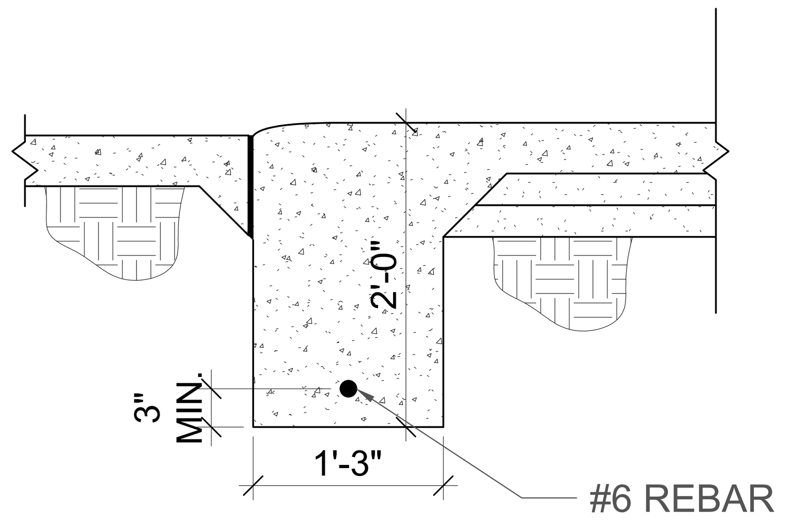
No.	Desc.	Date

Site: 780 South Davis Ave. Weed, CA

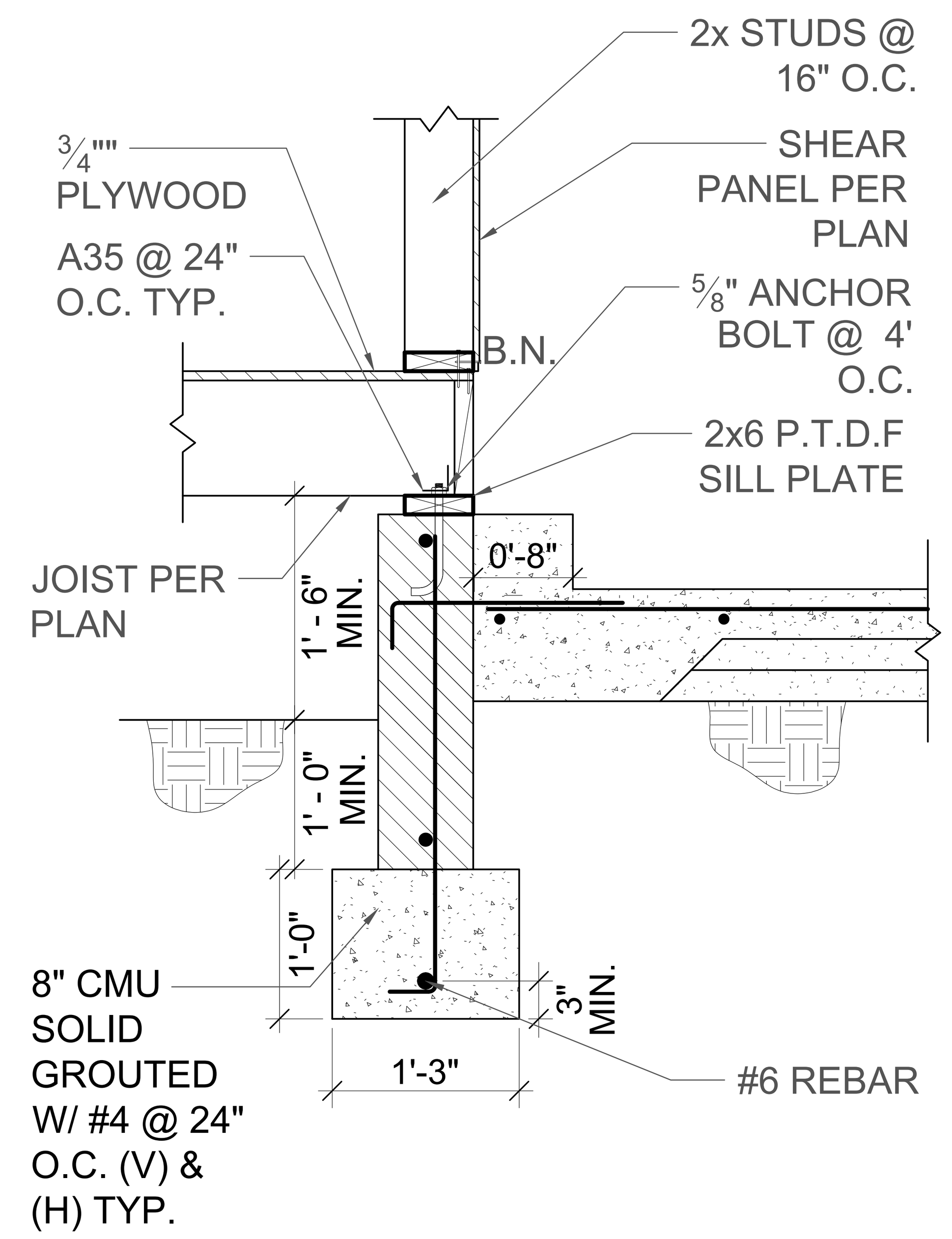
Date: 11/17/17

Sheet Number: S-03

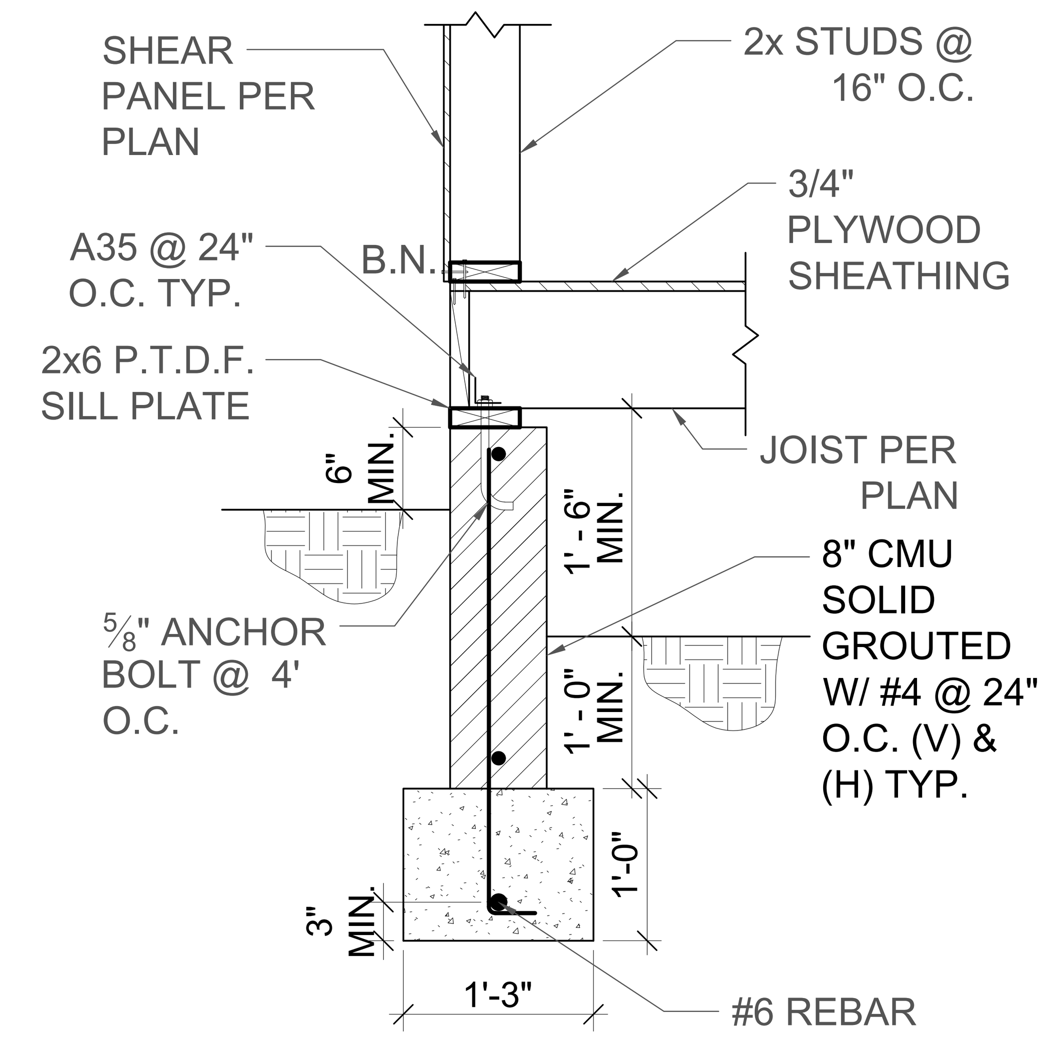
Scale: 3/8" = 1'-0"



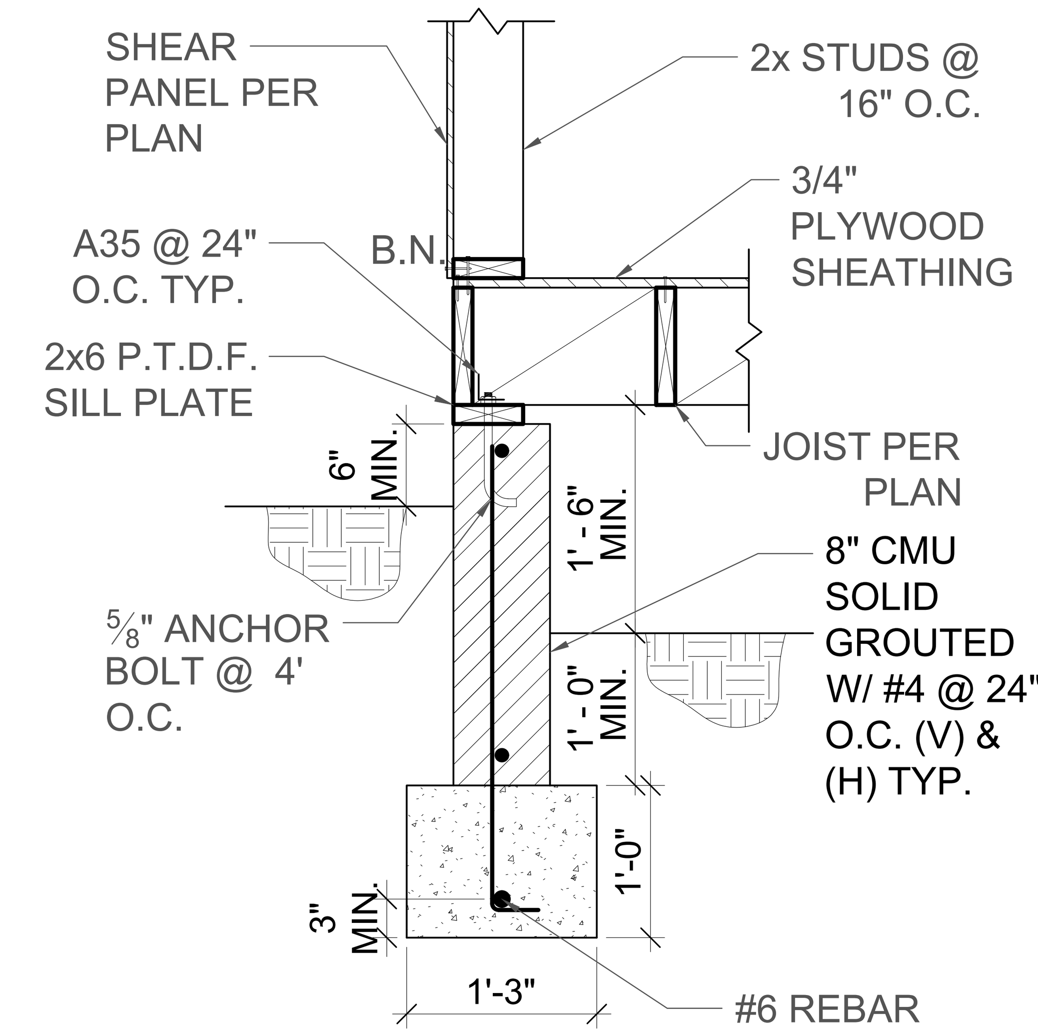
GARAGE FOOTING @ OPENING DETAIL 7



INTERIOR GARAGE FOOTING DETAIL 5



EXTERIOR FOOTING DETAIL 3



EXTERIOR FOOTING DETAIL 1

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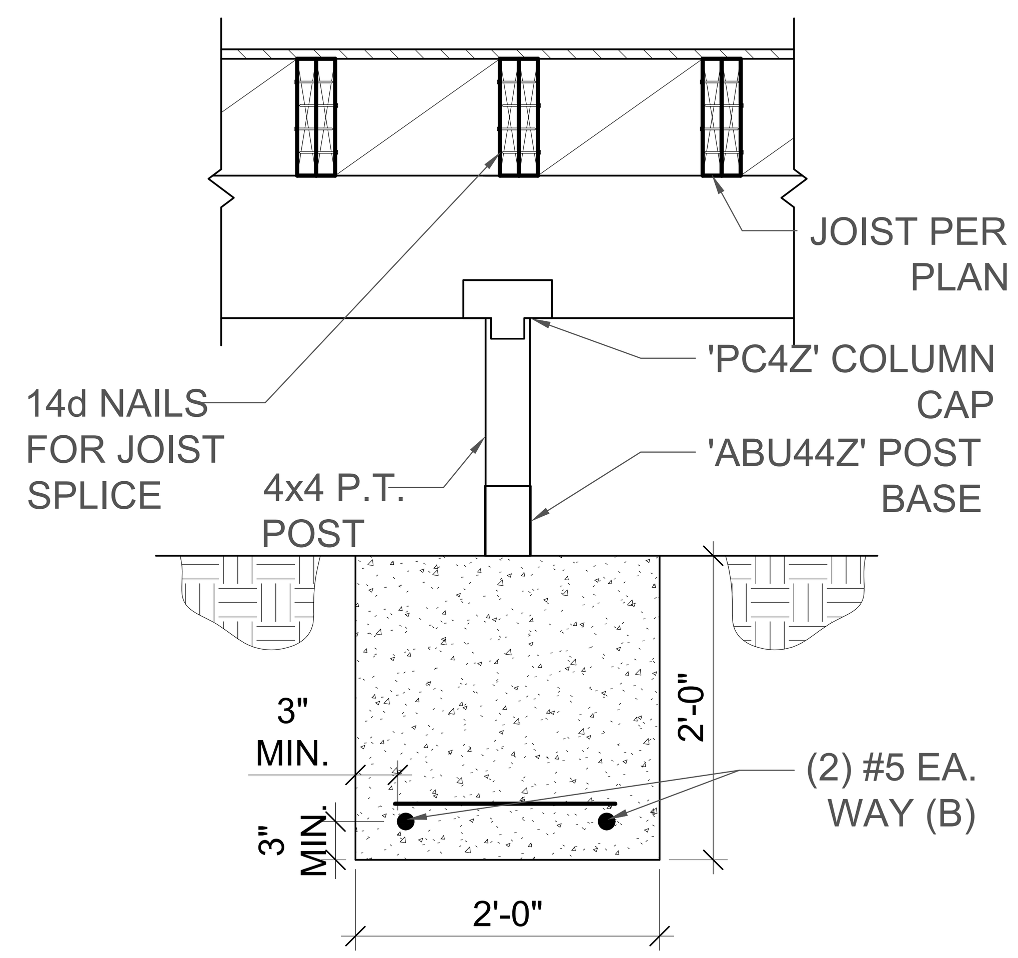
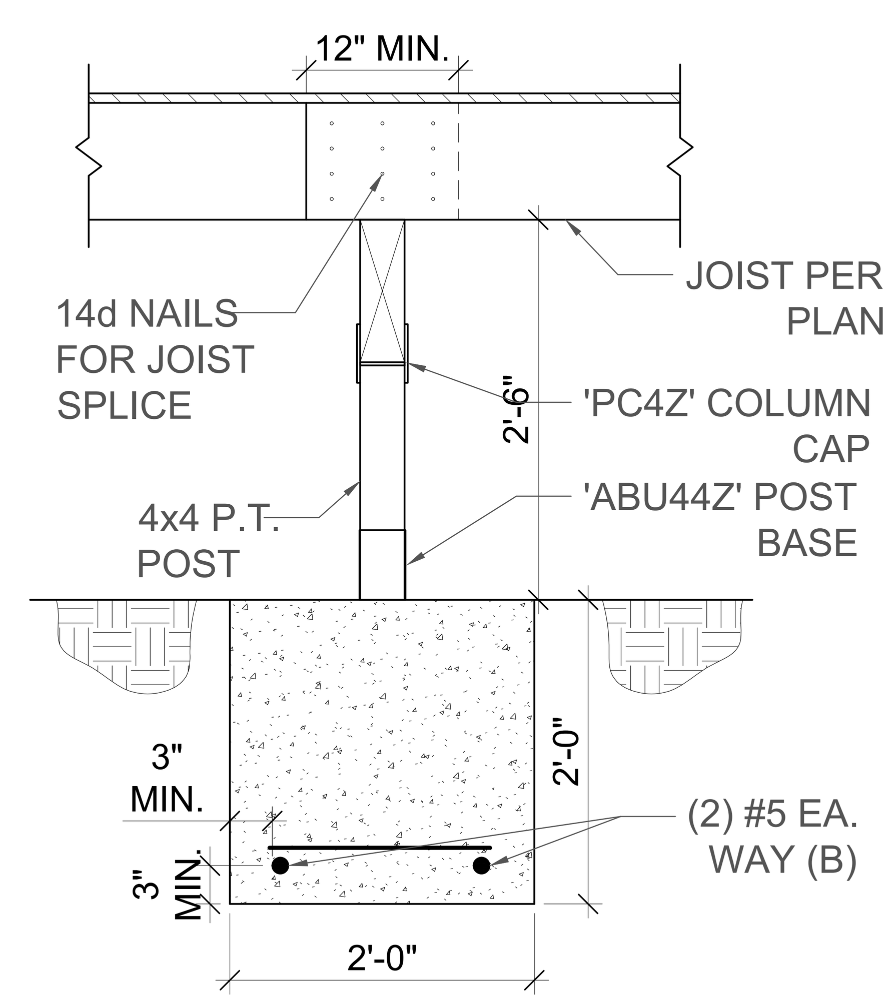
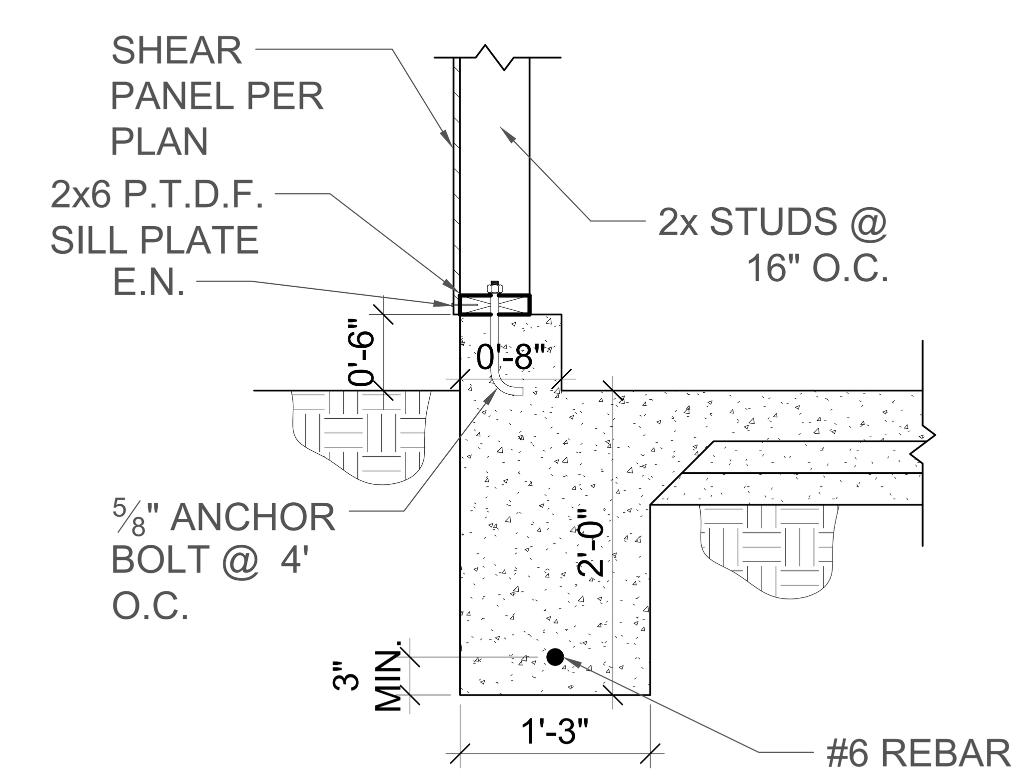


INTERIOR FOOTING/FLOOR DETAIL 6



INTERIOR FOOTING/FLOOR DETAIL 4



EXTERIOR GARAGE FOOTING DETAIL 2

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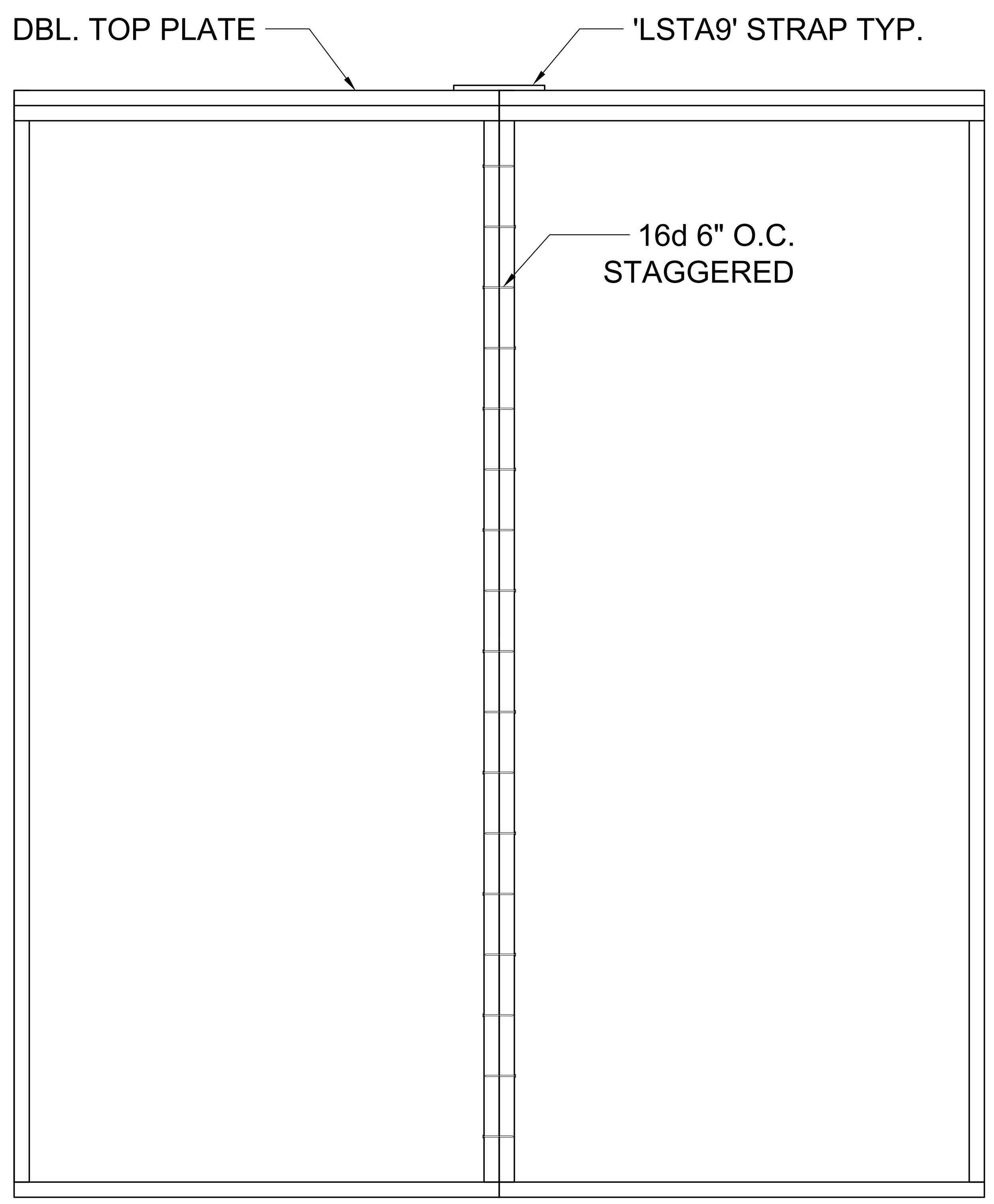
Great Northern Services

Detials

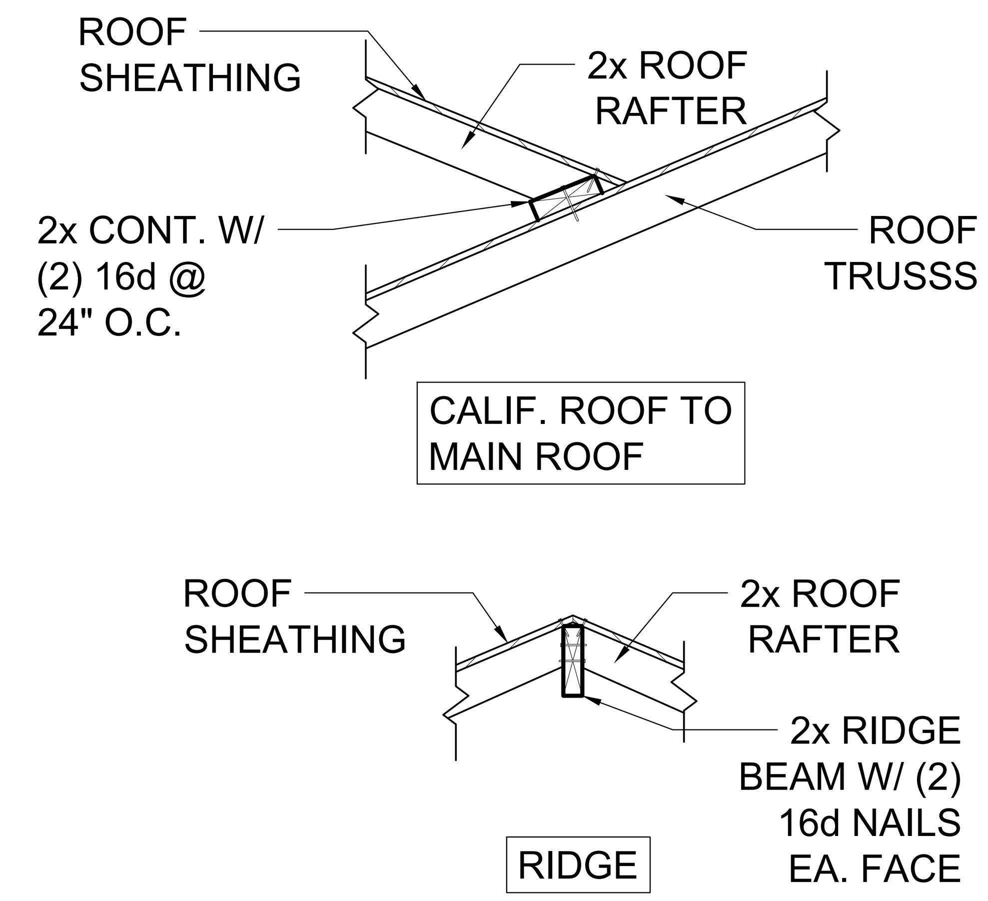
Revisions

No.	Desc.	Date

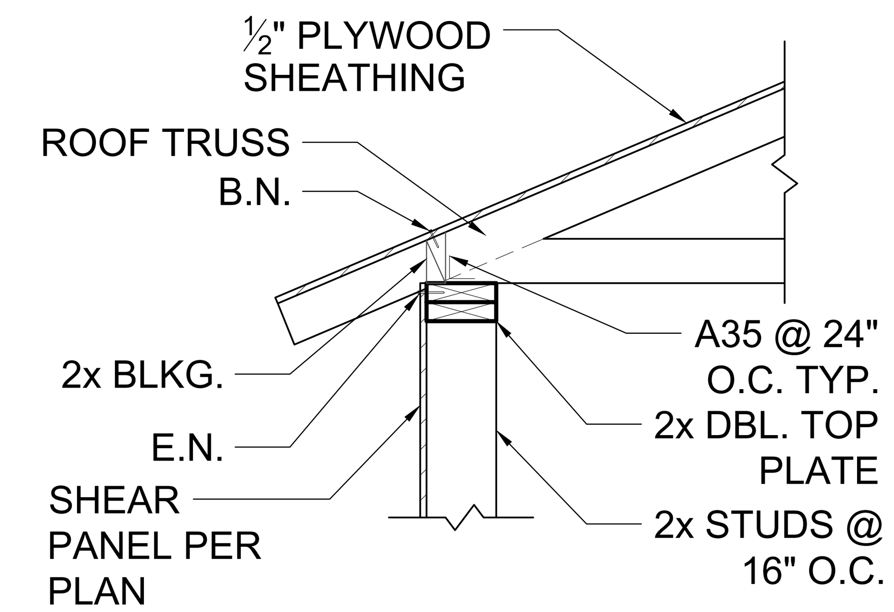
Site: 780 South Davis Ave. Weed, CA
Date: 11/17/17
Sheet Number: S-04
Scale: 1" = 1'-0"



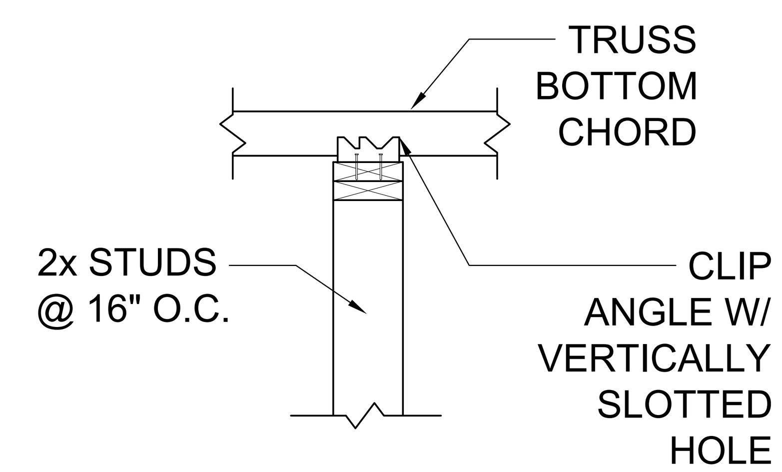
STANDARD PANEL CONNECTION DETAIL 13



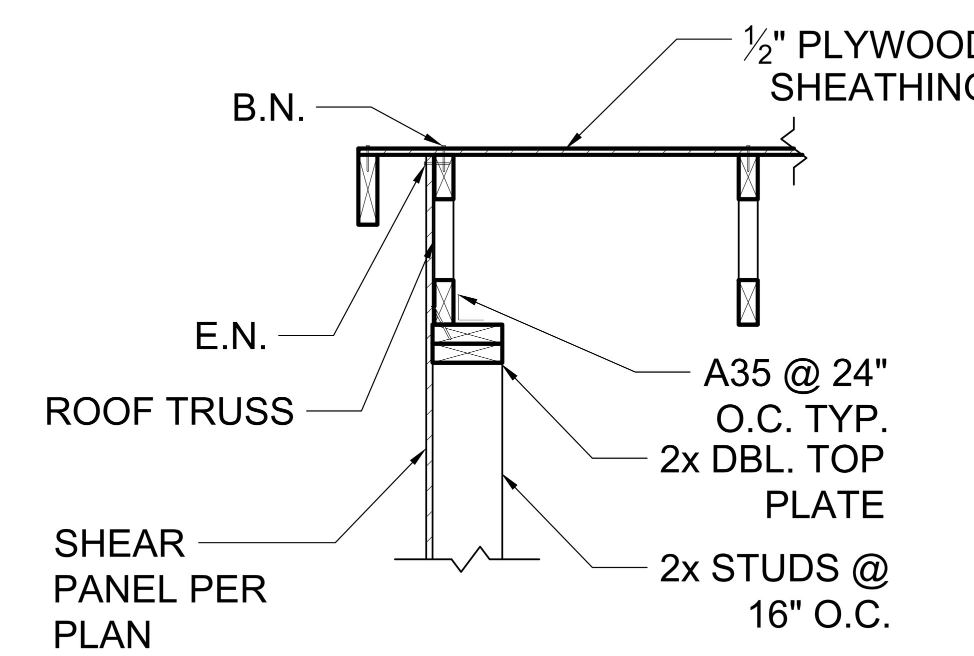
CALIF. DETAIL 11



ROOF TRUSS CONNECTION DETAIL 8



INTERIOR WALL CONNECTION 12



ROOF TRUSS CONNECTION DETAIL 9

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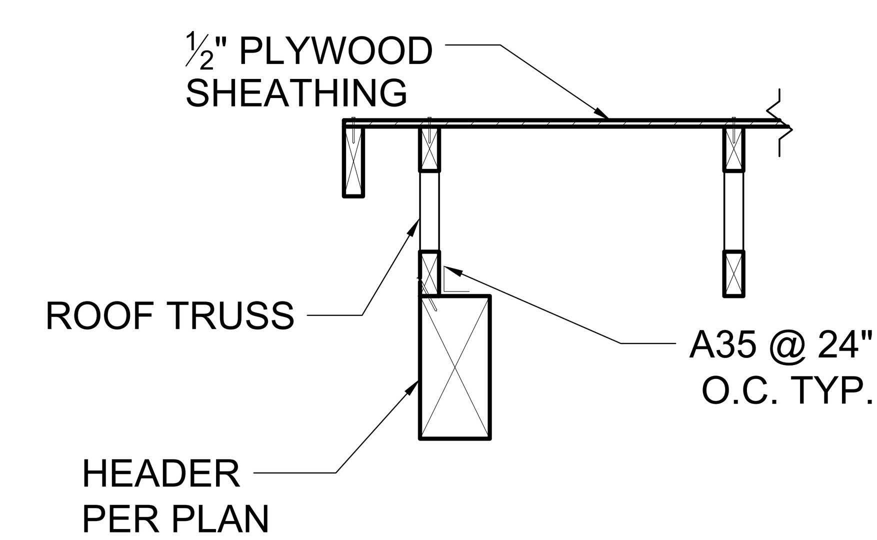

GARAGE HEADER DETAIL 10

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Revisions

No.	Desc.	Date

Site: 780 South Davis Ave. Weed, CA
Date: 11/17/17
Sheet Number: S-05
Scale: 1" = 1'-0"

CALCULATION PACKAGE

STUDIO
GREEN.

PROJECT ENGINEER: SPENCER SHOBE

DATE: 11/17/17

STUDIO GREEN.

PROJECT: WEED HOUSING DEVELOPMENT PAGE: TOC
BY: SPENCER SHOBE
TITLE: TABLE OF CONTENTS DATE: 11/17/2017

STUDIO GREEN.

PROJECT: WEED HOUSING DEVELOPMENT PAGE: BC-1
BY: SPENCER SHOBE
TITLE: BUILDING CRITERIA DATE: 11/17/2017

LOACTION: 780 S. DAVIS STREET WEED, CA PARCEL 1

ARCHITECT: STUDIO GREEN

OWNER: GREAT NORTHERN SERVICES

JURISDICTION: CITY OF WEED

BUILDING CODE:

GENERAL:	2015 IBC ASCE 7-10
TIMBER DESIGN:	NDS 2015

STRUCTURAL SYTEMS:

VERTICAL:	WOOD ROOF, WOOD FLOOR, WOOD WALLS CONCRETE FOOTINGS, MASONRY STEM WALL
LATERAL:	WOOD SHEAR PANELS

STUDIO GREEN.

PROJECT: WEED HOUSING DEVELOPMENT PAGE: LT-1
BY: SPENCER SHOBE
TITLE: LOAD TAKEOFF DATE: 11/17/2017

ROOF

	(PSF)
METAL ROOF	1.0
INSULATION	3.0
PLYWOOD SHEATHING	2.5
TRUSS SELF WIEGHT	2.0
MEP	1.0
CEILING	3.0
MISC.	1.5

DEAD	14.0
ROOF LIVE (SNOW)	48.0

TOTAL	62.0

FLOOR

VINYL FLOORING	1.5
PLYWOOD SHEATHING	2.5
FLOOR JOIST SELF WEIGHT	2.0
INSULATION	2.0
MISC.	2.0

DEAD	10.0
FLOOR LIVE	40.0

TOTAL	50.0

EXTERIOR WALLS

WOOD SIDING	2.0
PLYWOOD SHEATHING	1.5
INSULATION	3.0
2x6 STUDS	2.5
GYPSUM WALL BOARD	3.0

TOTAL	12.0

INTERIOR WALLS

2x4 STUDS	2.0
1/2" GYPSUM WALL BOARD (BOTH SIDES)	6.0

TOTAL	8.0

SNOW LOAD

$p_f = 60$ PSF (WEED BUILDING CODE)

$p_s = C_s p_f$ (ASCE 7.4-1)

$C_s = 0.8$ (ASCE FIG. 7-2)

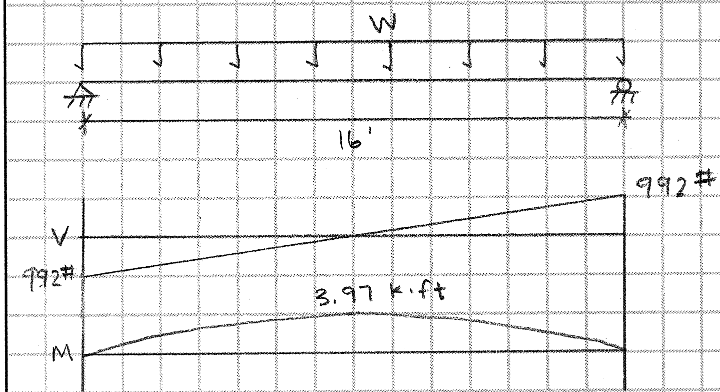
$p_f = (60 \text{ PSF})(0.8)$

$\boxed{p_f = 48 \text{ PSF}}$

STUDIO
GREEN.

PROJECT: WEED HOUSING DEVELOPMENT PAGE: V-2
BY: SPENCER SHOBE
TITLE: [RH-1] - GARAGE HEADER DATE: 11/17/2017

[RH-1] GARAGE HEADER



$W = D + S = 124$ PLF

$D = (14 \text{ PSF})(2') = 28$ PLF

$S = (48 \text{ PSF})(2') = 96$ PLF

BENDING

$$F_B^* = \overset{1000}{\cancel{F_B}} \cdot \overset{1.15}{\cancel{C_D}} \cdot \overset{1}{\cancel{C_M}} \cdot \overset{1}{\cancel{C_t}} \cdot \overset{1.1}{\cancel{C_F}} \cdot \overset{1}{\cancel{C_i}} \cdot \overset{1}{\cancel{C_r}}$$

$F_B^* = 1265$ psi

$R_B^2 = \dfrac{l_e d}{b^2}$ ASSUME 6x12

$l_u/d = 16 \cdot 12/12 = 16 > 7$

$\therefore l_e = 1.63 l_u + 3d$
$= 1.63(16 \cdot 12) + 3 \cdot 12$
$= 348.96$ in

$R_B^2 = \dfrac{(348.96 \text{ in})(11.5)}{(5.5^2)} = 132$

$F_{BE} = \dfrac{1.2 E'_{min}}{R_B^2} = \dfrac{(1.2)(620,000)}{132} = 5635$ psi

$$C_L = \frac{1 + (F_{BE}/F_B^*)}{1.9} - \sqrt{\left(\frac{1 + F_{BE}/F_B^*}{1.9}\right)^2 - \frac{(F_{BE}/F_B^*)}{.95}}$$

$$C_L = \frac{1 + (5365/1265)}{1.9} - \sqrt{\left(\frac{1 + 5365/1265}{1.9}\right)^2 - \frac{(5365/1265)}{.95}} = 0.99$$

$$F_B' = \overset{1000}{\cancel{F_B}} \cdot \overset{1.15}{\cancel{C_D}} \cdot \overset{1}{\cancel{C_M}} \cdot \overset{1}{\cancel{C_t}} \cdot \overset{0.99}{\cancel{C_L}} \cdot \overset{1.1}{\cancel{C_F}} \cdot \overset{1}{\cancel{C_{fu}}} \cdot \overset{1}{\cancel{C_i}} \cdot \overset{1}{\cancel{C_R}}$$

$F_B' = 1265$ psi

$$S_{xx} \geq \frac{M}{F'_B}$$

$$S_{xx} \geq \frac{47{,}640 \ \# \cdot in}{1265 \ psi}$$

$$S_{xx} \geq 37.66 \ in^3$$

USE 6×12 DF #1 $S_{xx} = 121.2 \ in^3 \geq 37.66 \ in^3$ ✓

SHEAR

$$F'_V = \overset{180}{F_V} \cdot \overset{1.15}{C_D} \cdot \overset{1}{C_M} \cdot \overset{1}{C_t} \cdot \overset{1}{C_i} = 207 \ psi$$

$$F'_V \geq \frac{V}{A} = \frac{922^{\#}}{63.25 \ in^2} = 14.6 \ psi < 207 \ psi$$ ✓

DEFLECTION

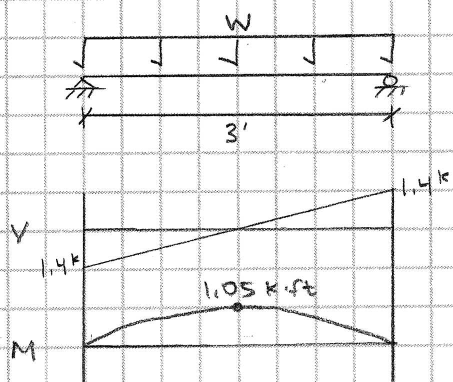
$$L/360, \ L/240 = \overset{\Delta_L}{12 \cdot 16/360}, \ \overset{\Delta_{D+L}}{12 \cdot 16/240} = 0.53, \ 0.8$$

$$\Delta_L = \frac{5wL^4}{384EI} = \frac{5(96/12)(16 \cdot 12)^4}{(384)(1{,}700{,}000)(697.1)} = 0.12'' < 0.53''$$ ✓

$$\Delta_{D+L} = \frac{5wL^4}{384EI} = \frac{5(124/12)(16 \cdot 12)^4}{384(1{,}700{,}000)(697.1)} = 0.15'' < 0.8''$$ ✓

$$\boxed{\text{USE } 6\times12 \text{ DF \#1}}$$

[RH-2] - TYP. HEADER (WORST CASE)



$W = D + S = 930$ PLF

$D = (14 \text{ PSF})(15') = 210$ PLF

$S = (48 \text{ PSF})(15') = 720$ PLF

BENDING

$$F_b' = \overset{1000}{F_b} \cdot \overset{1.15}{C_D} \cdot \overset{1}{C_M} \cdot \overset{1}{C_t} \cdot \overset{1}{C_L} \cdot \overset{1.5}{C_F} \cdot \overset{1}{C_{fu}} \cdot \overset{1}{C_i} \cdot \overset{1}{C_r}$$

$F_b' = 1725$ psi

$$S_x > \frac{M}{F'_b} = \frac{12600 \text{ \# in}}{1725} = 7.30 \text{ in}^3$$

USE 6x6 DF #1 $S_x = 27.73 > 7.30$ ✓

SHEAR

$$F'_v = \overset{180}{F_v} \cdot \overset{1.15}{C_D} \cdot \overset{1}{C_M} \cdot \overset{1}{C_t} \cdot \overset{1}{C_i}$$

$F'_v = 207$ psi

$$f_v = \frac{V}{A} = \frac{1400 \text{ \#}}{30.25 \text{ in}^2} = 46.3 \text{ psi} < 207 \text{ psi}$$ ✓

DEFLECTION

$L/360 , L/240 = 0.133 , 0.2$

$$\Delta_L = \frac{5wL^4}{384EI} = \frac{(5)(720/12)(3.12)^4}{(384)(1700000)(76.26)} = 0.010'' < 0.133'' \checkmark$$

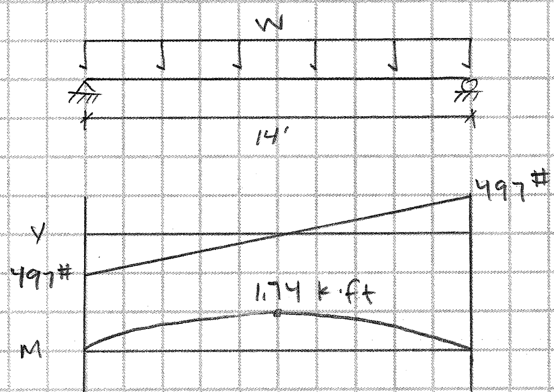
$$\Delta_{L+D} = \frac{(5)(930/12)(3.12)^4}{(384)(1700000)(76.26)} = 0.013'' < 0.2'' \checkmark$$

$\boxed{\text{USE 6x6 DF \#1}}$

STUDIO GREEN.

PROJECT: WEED HOUSING DEVELOPMENT PAGE: V-6
BY: SPENCER SHOBE
TITLE: [FJ-1] TYP. FLOOR JOIST DATE: 11/17/2017

[FJ-1] TYP. FLOOR JOIST



$W = D + L = 71$ PLF

$D = \left(\left(\overset{\text{INT. WALLS}}{8000\#/2000\ SF}\right) + (10\ PSF)\right)(1.33') = 17$ PLF

$L = (40\ PSF)(1.33') = 54$ PLF

BENDING

$$F'_B = \overset{900}{F_B} \cdot \overset{1}{\cancel{C_D}} \cdot \overset{1}{\cancel{C_M}} \cdot \overset{1}{\cancel{C_t}} \cdot \overset{1}{\cancel{C_L}} \cdot \overset{1}{\cancel{C_F}} \cdot \overset{1}{\cancel{C_{fu}}} \cdot \overset{1}{\cancel{C_i}} \cdot \overset{1.15}{\cancel{C_r}}$$

$F'_B = 1035$ psi

$$S_{xx} \geq \frac{M}{F'_B} = \frac{20\,880\ \#\cdot in}{1035\ psi} = 20.17\ in^3$$

USE 2 x 10 @ 16" O.C. $S_{xx} = 21.39\ in^3 > 20.17\ in^3$ ✓

SHEAR

$$F'_V = \overset{180}{F_V} \cdot \overset{1}{\cancel{C_D}} \cdot \overset{1}{\cancel{C_M}} \cdot \overset{1}{\cancel{C_t}} \cdot \overset{1}{\cancel{C_i}}$$

$F'_V = 180$ psi

$$F'_V \geq \frac{V}{A} = \frac{497\#}{13.88\ in^2} = 35.81\ psi \leq 180\ psi$$ ✓

DEFLECTION

$L/360,\ L/240 = 0.47'',\ 0.7''$

$$\Delta_{D+L} = \frac{5wL^4}{384EI} = \frac{(5)(71/12)(14.12)^4}{(384)(1,600,000)(98.93)} = 0.39'' < 0.7'' \checkmark$$

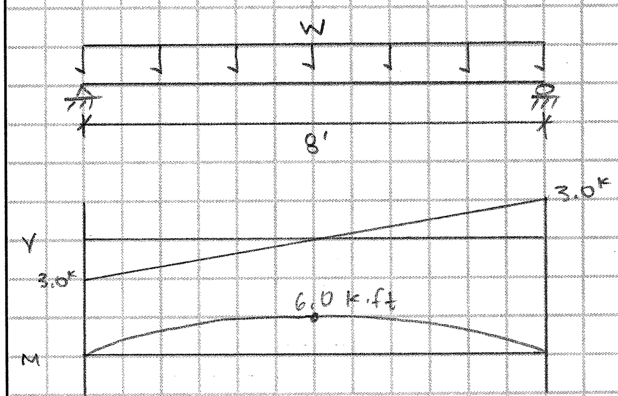
$$\Delta_L = \frac{5(54/12)(14.12)^4}{384(1,600,000)(98.93)} = 0.29'' < 0.47'' \checkmark$$

$\boxed{\text{USE } 2\times10 \text{ DF \#2 @ 16'' O.C.}}$

STUDIO GREEN.

PROJECT: WEED HOUSING DEVELOPMENT PAGE: V-8
BY: SPENCER SHOBE
TITLE: [FG-1] - TYP FLOOR GIRDER DATE: 11/17/2017

[FG-1] - TYP. FLOOR GIRDER



$W = D + L = 756\ PLF$

$D = \left(\left(8000\#/2000SF\right) + (10\ PSF)\right)(14') = 196$

$L = (40\ PSF)(14') = 560\ PLF$

BENDINGS

$F'_B = \cancelto{1000}{F_B} \cdot \cancelto{1}{C_D} \cdot \cancelto{1}{C_M} \cdot \cancelto{1}{C_t} \cdot \cancelto{1}{C_F} \cdot \cancelto{1.1}{C_i} \cdot \cancelto{1}{C_r}$

$F'_B = 1100\ psi$

$S_{xx} \geq \frac{M}{F'_B} = \frac{72000\ \#\cdot in}{1100\ psi} = 65.45\ in^3$

USE 4×12 $S_{xx} = 73.8\ in^3 > 65.45\ in^3$ ✓

SHEAR

$F'_V = \cancelto{180}{F_V} \cdot \cancelto{1}{C_D} \cdot \cancelto{1}{C_M} \cdot \cancelto{1}{C_t} \cdot \cancelto{1}{C_i}$

$F'_V = 180\ psi$

$F'_V \geq \frac{V}{A} = \frac{3000\#}{39.38\ in^2} = 76.18\ psi < 180\ psi$ ✓

DEFLECTION

$L/360,\ L/240 = 0.27'',\ 0.4''$

$$\Delta = \frac{(5)(750/12)(12 \cdot 8)^4}{(384)(1{,}700{,}000)(415.3)} = 0.10'' < 0.40'' \checkmark$$

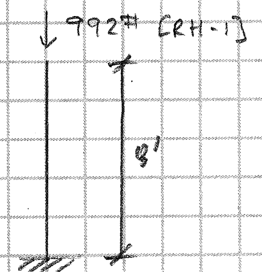
$$\Delta = \frac{(5)(560/12)(12 \cdot 8)^4}{(384)(1700000)(415.3)} = 0.07'' < 0.27'' \checkmark$$

$\boxed{\text{USE } 4\times12 \text{ DF \#1}}$

STUDIO
GREEN.

PROJECT: WEED HOUSING DEVELOPMENT PAGE: V-10
BY: SPENCER SHOBE
TITLE: [P-1] - GARAGE POST DATE: 11/17/2017

[P-1] - GARAGE POST



$$F'_c = \overset{1500}{F_c} \cdot \overset{1.15}{\cancel{C_D}} \cdot \overset{1}{\cancel{C_M}} \cdot \overset{1}{\cancel{C_t}} \cdot \overset{1.5}{\cancel{C_F}} \cdot \overset{1}{\cancel{C_i}} \cdot \overset{1}{\cancel{C_P}}$$

$$F'_c = 2587.5 \text{ psi}$$

$$A \geq \frac{P}{F'_c} = \frac{992\#}{2587.5 \text{ psi}}$$

$$A \geq .38 \text{ in}^2 \quad \text{WILL NOT GOVERN}$$

$$F'_{c\perp} = \overset{625}{F_{c\perp}} \cdot \overset{1}{\cancel{C_M}} \cdot \overset{1}{\cancel{C_t}} \cdot \overset{1}{\cancel{C_i}} \cdot \overset{1.07}{\cancel{C_b}}$$

$$C_b = \frac{l_b + 0.375}{l_b} = \frac{5.5 + 0.375}{5.5} = 1.07$$

$$F'_{c\perp} = 668 \text{ psi}$$

$$F'_{c\perp} \geq \frac{P}{A}$$

$$A \geq \frac{P}{F'_c} = \frac{992\#}{668\#} = 1.49 \text{ in}^2$$

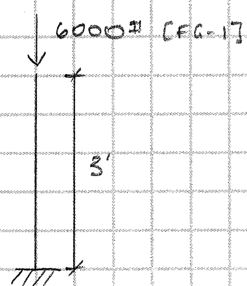
$$(5.5" \cdot 5.5") = 30.25 \text{ in}^2 > 1.49 \text{ in}^2 \quad ✓$$

$\boxed{\text{USE } 6\times6 \text{ DF \# 1}}$

STUDIO GREEN.

PROJECT: WEED HOUSING DEVELOPMENT PAGE: V-11
BY: SPENCER SHOBE
TITLE: [P-2] - FLOOR POST DATE: 11/17/2017

[P-2] - FLOOR POST



$$F'_c = F_c \cdot C_D \cdot C_M \cdot C_t \cdot C_i \cdot C_P$$

$$C_P = \frac{1 + F_{cE}/F_c^*}{2c} - \sqrt{\left(\frac{1 + F_{cE}/F_c^*}{2c}\right) - \frac{F_{cE}/F_c^*}{c}}$$

$$F_c^* = \overset{1500}{\cancel{F_c}} \cdot \overset{1}{\cancel{C_D}} \cdot \overset{1}{\cancel{C_M}} \cdot \overset{1}{\cancel{C_t}} \cdot \overset{1}{\cancel{C_i}}$$

$$F_c^* = 1500 \text{ psi}$$

$$F_{cE} = \frac{0.822\, E_{min}'}{(\ell e/d^2)} = \frac{(0.822)(620{,}000)}{(3 \cdot 12/5.5)^2} = 11{,}896 \text{ psi}$$

$$C_P = \frac{1 + 11896/1500}{2(.8)} - \sqrt{\left(\frac{1 + 11896/1500}{2(.8)}\right)^2 - \frac{11896/1500}{.8}}$$

$$C_P = 0.97$$

$$F'_c = \overset{1500}{\cancel{F_c}} \cdot \overset{1}{\cancel{C_D}} \cdot \overset{1}{\cancel{C_M}} \cdot \overset{1}{\cancel{C_i}} \cdot \overset{.97}{\cancel{C_P}}$$

$$F'_c = 1459 \text{ psi}$$

$$A > \frac{P}{F'_c} = \frac{6000\#}{1459 \text{ psi}}$$

$$A > 4.11 \text{ in}^2$$

$\boxed{\text{USE } 4\times4 \text{ P.T DF\#1}}$ $A = 12.25 \text{ in}^2 > 4.11 \text{ in}^2$ ✓

STUDIO GREEN.

PROJECT:	WEED HOUSING DEVELOPMENT	PAGE:	L-1
BY:	SPENCER SHOBE		
TITLE:	BUILDING WEIGHT	DATE:	11/17/2017

ROOF

DIAPHRAGM		LOAD (PSF)	AREA (SF)	TOTAL (LBS)
ROOF		14.0	2050	28700

TOTAL	28700

WALLS

TYPE	HEIGHT (FT)	LOAD (PSF)	LENGTH (FT)	TOTAL (LBS)
EXTERIOR	8.5	12.0	210	21420
INTERIOR	8.5	8.0	114	7752

TOTAL	29172

BUILDING WEIGHT	43286

KNOWNS:

$W = 43{,}286\#$
$R = 6.5$ (WOOD SHEAR WALLS) (ASCE TBL. 12.2-1)
$I_e = 1.0$ (ASCE TBL. 1.5-2)
$S_{DS} = 0.595$ (USGS VALUES)
SOIL: SITE CLASS D (DEFAULT)
RISK CATEGORY: II (ASCE TBL. 1.5-1)

$$V = C_s W$$

$$C_s = \frac{S_{DS}}{\left(\frac{R}{I}\right)} = \frac{0.595}{\left(\frac{6.5}{1}\right)} = 0.092$$

$$V = (0.092)(43{,}286\#)$$

$$\boxed{V = 3.98^k}$$

$$\boxed{F_R = 3.98^k}$$

L-3

USGS Design Maps Summary Report

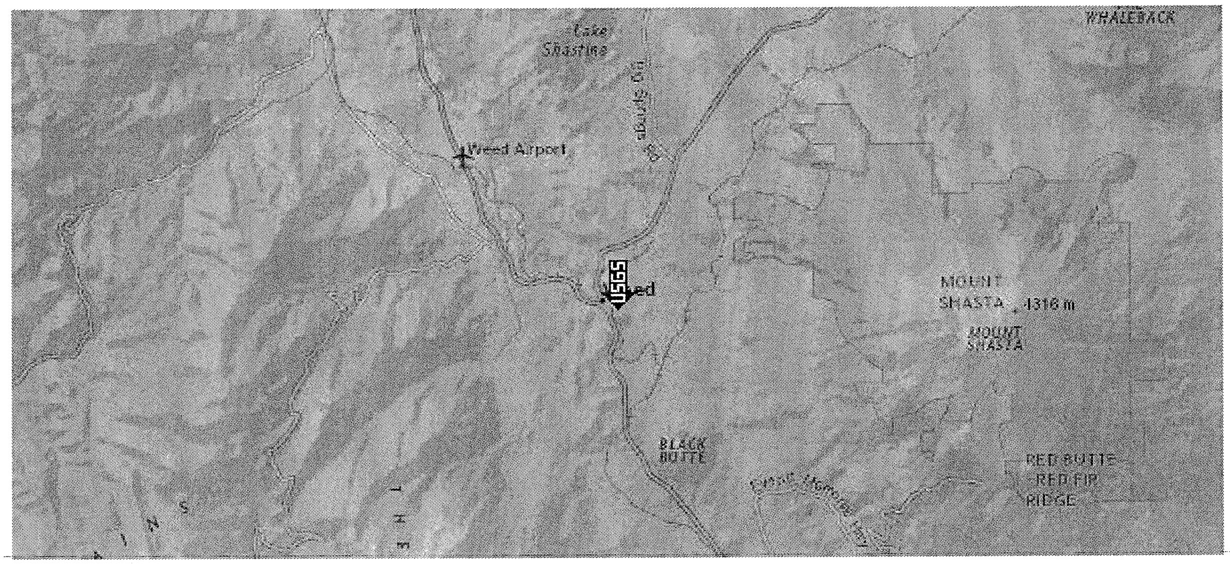
User–Specified Input

Building Code Reference Document ASCE 7-10 Standard
(which utilizes USGS hazard data available in 2008)

Site Coordinates 41.42891°N, 122.37939°W

Site Soil Classification Site Class D – "Stiff Soil"

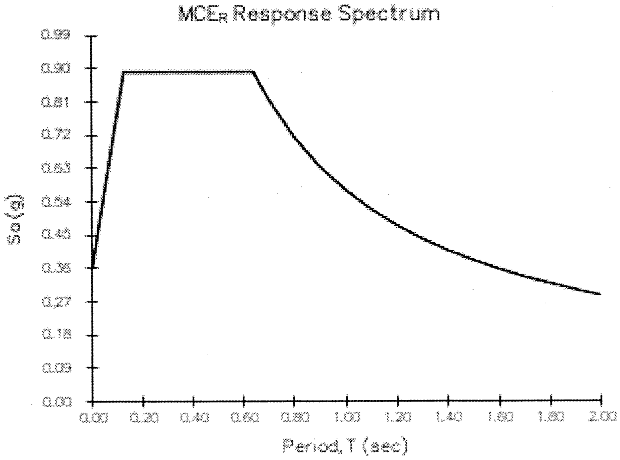
Risk Category I/II/III

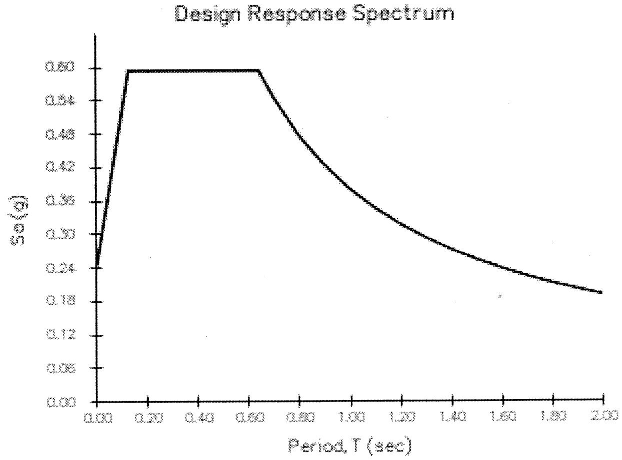


USGS–Provided Output

S_S =	0.736 g	S_{MS} =	0.891 g	S_{DS} =	0.594 g
S_1 =	0.328 g	S_{M1} =	0.572 g	S_{D1} =	0.381 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.





For PGA_M, T_L, C_{RS}, and C_{R1} values, please view the detailed report.

KNOWNS:

RISK CATEGORY: II
V = 110 MPH (ASCE FIG. 26.5-1A)
EPOSURE CATEGORY: C (WEED MUNICIPLE CODE)
TOPOGRAPHIC FACTOR (K_{ZT}): 1 (ASCE 26.8.2)
C_{NET} = 0.73 (IBC Tbl 1609.6.2)

$P_{NET} = 0.00256\, V^2 K_Z C_{NET} K_{ZT}$

$P_{NET} = (0.00256)(110)^2(1)(0.73)(1)$
$P_{NET} = 22.6$ PSF

N-S

$V = (P)(A)$
$V = (22.6\text{ PSF})(981.4\text{ SF})$
$V = 22.18^k$

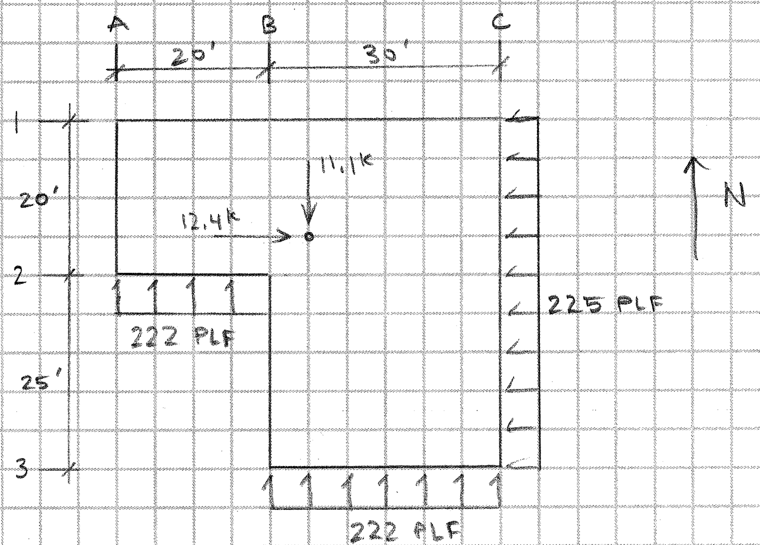
E-W

$V = (P)(A)$
$V = (22.6\text{ PSF})(1100.8\text{ SF})$
$V = 24.88^k$

WIND GOVERNS

STUDIO GREEN.

PROJECT: WEED HOUSING DEVELOPMENT PAGE: L-5
BY: SPENCER SHOBE
TITLE: SHEAR DISTRIBUTION DATE: 11/17/2017



N-S

LINE A: (222 PLF)(10') = 2220#
LINE B: (222 PLF)(25') = 5550#
LINE C: (222 PLF)(15') = 3330#

E-W

LINE 1: (225 PLF)(10') = 2250#
LINE 2: (225 PLF)(22.5') = 5063#
LINE 3: (225 PLF)(12.5') = 2813#

LINE A: $\frac{(0.6)(2220\#)}{3'} = 444$ PLF

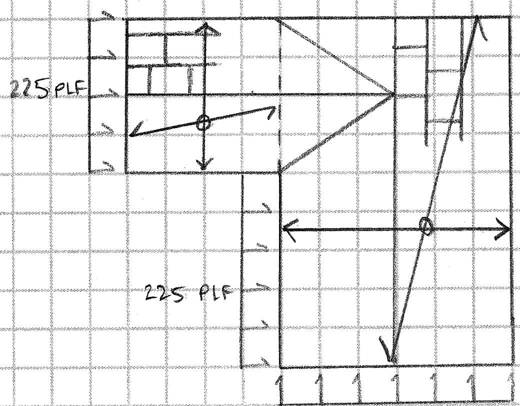
LINE B: $\frac{(0.6)(5550\#)}{24'} = 139$ PLF

LINE C: $\frac{(0.6)(3330\#)}{20'} = 100$ PLF

LINE 1: $\frac{(0.6)(2250\#)}{28'} = 48$ PLF

LINE 2: $\frac{(0.6)(5063\#)}{20'} = 152$ PLF

LINE 3: $\frac{(0.6)(2813\#)}{12'} = 141$ PLF



- ASPECT RATIO CHECK

WORST CASE - 45:30 = 1.5:1
ALLOWABLE - 4:1 > 1.5:1 ✓

USE 1/2" STRUCTURAL I PLYWOOD BLOCKED W/ 6d
NAILS @ 6" & 6" EVERYWHERE (SDPWS) (TBL. 4.2A)

CAPACITY = 260 PLF > 225 PLF ✓

STUDIO GREEN.

PROJECT: WEED HOUSING DEVELOPMENT PAGE: L-7
BY: SPENCER SHOBE
TITLE: SHEARWALL DESIGN DATE: 11/17/2017

SHEARWALL 1

USE 1/2" STRUCTURAL I PLYWOOD W/ 6d NAILS @ 6" EVERWHERE, BLOCKED

CAPACITY = 280 PLF > 152 PLF ✓

- ASPECT RATIO CHECK

WORST CASE - 8.5' : 4' = 2.125 : 1
ALLOWABLE 3.5:1 > 2.125:1 ✓

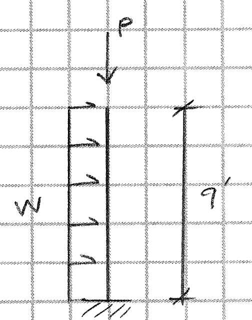
SHEARWALL *

WSW18x9 SIMPSON STRONG WALL

CAPACITY: 1920 # > (444 PLF)(1.5') = 666 # ✓

STUDIO GREEN.

PROJECT: WEED HOUSING DEVELOPMENT PAGE: L-8
BY: SPENCER SHOBE
TITLE: STANDARD STUD CHECK DATE: 11/17/2017

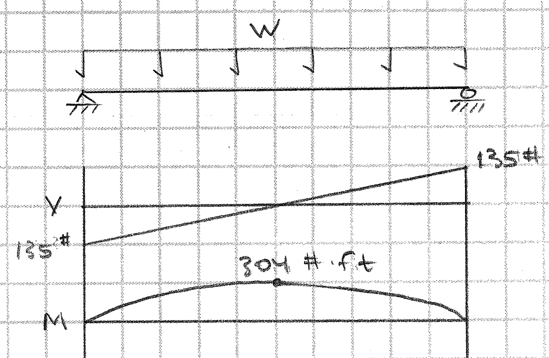


ASSUME 2×6 DF #2

W = (WIND PRESSURE)(STUD SPACING) = (22.6 PSF)(1.33') = 30.1 PLF

P = ((14 PSF)(15') + (48 PSF)(15'))(1.33') = 1237#

BENDING



$F'_B = \overset{900}{F_B} \cdot \overset{1.6}{C_B} \cdot \overset{1}{C_M} \cdot \overset{1}{C_L} \cdot \overset{1.3}{C_F} \cdot \overset{1}{C_{fu}} \cdot \overset{1}{C_i} \cdot \overset{1.15}{C_r}$

$F'_B = 2153$ psi

$S_x \geq \frac{M}{F'_B} = \frac{3654 \text{ \#·in}}{2153 \text{ psi}} = 1.70 \text{ in}^3 < 7.56 \text{ in}^3$ ✓

$f_b = \frac{M}{S_{xx}} = 483$ psi

COMPRESSION

$$F'_c = \overset{1350}{\cancel{F_c}} \cdot \overset{1.6}{\cancel{C_D}} \cdot \overset{1}{\cancel{C_M}} \cdot \overset{1}{\cancel{C_t}} \cdot \overset{1.3}{\cancel{C_F}} \cdot \overset{1}{\cancel{C_i}} \cdot \overset{1}{\cancel{C_P}}$$

$F'_c = 2808$ psi

$F'_c > \frac{P}{A} = \frac{1237\ \#}{8.25\ in^2} = 150$ psi < 2808 psi ✓

COMBINED

$$F_{cE1} = \frac{(0.822)(E_{min})}{(\ell_e/d)^2} = \frac{(0.822)(580{,}000)}{(9.12/5.5)^2} = 1236 \text{ psi}$$

$$F_{cE2} = \frac{(0.822)(E_{min})}{(\ell_e/d)^2} = \frac{(0.822)(580{,}000)}{(9.12/1.5)^2} = 92 \text{ psi}$$

$$F_{bE} = \frac{(1.2)(E_{min})}{(\ell_e/d)^2} = \frac{(1.2)(580{,}000)}{(9.12/5.5^2)} = 1805 \text{ psi}$$

$f_c = \frac{P}{A} = 150$ psi

$f_{b1} = 0$

$f_{b2} = 483$ psi

$$\left(\frac{f_c}{F_c'}\right)^2 + \frac{\cancel{f_{b1}}^{\,0}}{F_B'(1 - f_c/F_{cE1})} + \frac{f_{b2}}{F_{b2}(1 - f_c/F_{cE2}) - \cancel{(f_{b1}/F_{bE})^2}^{\,0}}$$

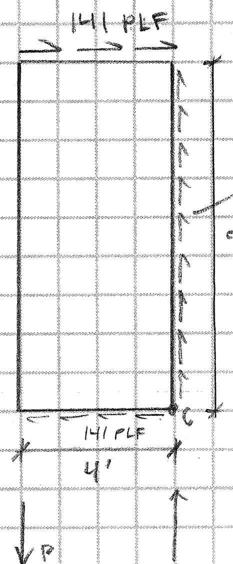
$$\left(\frac{150}{2808}\right) + \frac{483 \text{ psi}}{2153(1 - 150/1236)} = 0.31 < 1 \quad ✓$$

$\boxed{\text{2x6 DF \# 2 IS ADEQUATE}}$

STUDIO GREEN.

PROJECT: WEED HOUSING DEVELOPMENT PAGE: L-10
BY: SPENCER SHOBE
TITLE: SHEARWALL CONNECTIONS DATE: 11/17/2017

WORST CASE - 4'-0" SW @ LINE 3



$\Sigma M_C = (141\ PLF)(4')(9') - (P)(4') = 0$

$P = 1269\#$

HOLDDOWN - $\boxed{\text{USE HDU2-SDS2.5}}$
CAPACITY = 3075# > 1269# ✓

TOP PLATE STRAP - $\dfrac{V_{MAX}}{D_{DIAPHRAGM}}$
(CHORD FORCE)

N-S $\dfrac{(11.1^k)(.6)}{45'} = 148\ PLF$

E-W $\dfrac{(12.4^k)(.6)}{50'} = 149\ PLF$ ← MAX

$\boxed{\text{USE LSTA9}}$ CAPACITY 740 PLF > 149 PLF ✓

ANCHOR BOLTS

$\boxed{\text{USE 1/2" DIAMETER ANCHOR BOLTS @ 4' O.C.}}$ CAPACITY = 650#
(NDS Tbl 12E)

DEMAND = (4')(141 PLF) = 564# < 650# ✓

STUDIO GREEN.

PROJECT: WEED HOUSING DEVELOPMENT PAGE: L-11
BY: SPENCER SHOBE
TITLE: SHEARWALL CONN. CONT. DATE: 11/17/2017

STUD NAIL CONNECTION

$\boxed{\text{USE 10d COMMON NAIL @ 6" O.C. STAGGERED}}$ CAPACITY = 115#
(NDS Tbl 12L)

DEMAND = (141 PLF)(9') = 1269#

CAPACITY = (16 NAILS)(115#/NAIL) = 1840# > 1269# ✓

* TOP PLATE STRAP & STUD NAILING CONNECTION ARE *
FOR PANEL TO PANEL FORCE TRANSFER

STUDIO GREEN.

PROJECT: WEED HOUSING DEVELOPMENT PAGE: F-1
BY: SPENCER SHOBE
TITLE: CONTINUOUS FOUNDATION DATE: 11/17/2017

$$W_{MAX} = (14\ \text{PSF} + 48\ \text{PSF})(15') + (10\ \text{PSF} + 40\ \text{PSF})(15') + (12\ \text{PSF})(9') + (78\ \text{PCF})(8''/12'')(2.5')$$

$$W_{MAX} = 1888\ \text{PLF}$$

$$b_F = \frac{1888\ \text{PLF}}{1500\ \text{PSF}} = 1.25'$$ $\boxed{16'' \times 12''\ \text{CONT. FTG.}}$

REBAR

$$A_s = \rho b d$$

$$A_s = 0.0018(12'')(16'')$$

$$A_s = 0.3456\ in^2$$

$\boxed{\text{USE (1) \#6}}$ $A = 0.44\ in^2 > 0.346$ ✓

FOOTINGS UNDER FLOOR GIRDERS

$P_{MAX} = 6000\#$ (2) [FG-1]

$\sigma > \frac{P}{A}$

$A > \frac{6000\#}{1500\,psf}$

$A > 4\ ft^2$

$\boxed{\text{USE } 2' \times 2' \text{ PAD FTG.}}$

REBAR

$A_s = \rho b d$

$A_s = 0.0018\,(24'')\,(12'')$

$A_s > 0.518\ in^2$

$\boxed{\text{USE (2) \#5}}$ $A_s = 0.62\ in^2 > 0.518\ in^2$ ✓

SIMPSON STRONG WALL PAD FOOTING

PER SIMPSON (SEE ATTACHED) W = 18"

F-3

SIMPSON Strong-Tie®

Standard and Balloon Framing on Concrete Foundations

Strong-Wall® Wood Shearwall Standard Application on Concrete Foundation

Strong-Wall Wood Shearwall Model[9]	Allowable Vertical Load, P (lb.)[4]	2,500 psi Concrete						3,000 psi Concrete					
		Seismic[3]			Wind			Seismic[3]			Wind		
		Allowable ASD Shear Load, V (lb.)	Drift at Allowable Shear, Δ (in.)[10]	Anchor Tension at Allowable Shear, T (lb.)[11]	Allowable ASD Shear Load, V (lb.)	Drift at Allowable Shear, Δ (in.)[10]	Anchor Tension at Allowable Shear, T (lb.)[11]	Allowable ASD Shear Load, V (lb.)	Drift at Allowable Shear, Δ (in.)[10]	Anchor Tension at Allowable Shear, T (lb.)[11]	Allowable ASD Shear Load, V (lb.)	Drift at Allowable Shear, Δ (in.)[10]	Anchor Tension at Allowable Shear, T (lb.)[11]
WSW12x7	1,000	1,065	0.31	10,285	1,380	0.43	13,375	1,065	0.31	10,285	1,380	0.43	13,375
	4,000	1,065	0.31	10,285	1,380	0.43	13,375	1,065	0.31	10,285	1,380	0.43	13,375
	7,500	1,065	0.31	10,285	1,380	0.43	13,370	1,065	0.31	10,285	1,380	0.43	13,375
WSW18x7	1,000	2,475	0.31	13,865	2,980	0.4	16,675	2,475	0.31	13,865	3,225	0.43	18,040
	4,000	2,475	0.31	13,865	2,710	0.36	15,160	2,475	0.31	13,865	3,225	0.43	18,040
	7,500	2,475	0.31	13,865	2,395	0.32	13,395	2,475	0.31	13,865	2,910	0.39	16,280
WSW24x7[9]	1,000	5,515	0.29	22,710	5,515	0.32	22,710	5,515	0.29	22,710	5,515	0.32	22,710
	4,000	5,515	0.29	22,710	5,400	0.31	22,240	5,515	0.29	22,710	5,515	0.32	22,710
	7,500	5,515	0.29	22,710	4,950	0.29	20,390	5,515	0.29	22,710	5,515	0.32	22,710
WSW12x8	1,000	960	0.39	11,125	1,245	0.53	14,420	960	0.39	11,125	1,245	0.53	14,420
	4,000	960	0.39	11,125	1,245	0.53	14,420	960	0.39	11,125	1,245	0.53	14,420
	7,500	960	0.39	11,125	1,155	0.49	13,370	960	0.39	11,125	1,245	0.53	14,420
WSW18x8	1,000	2,430	0.39	16,245	2,490	0.42	16,675	2,430	0.39	16,245	2,925	0.50	19,560
	4,000	2,430	0.39	16,245	2,265	0.38	15,160	2,430	0.39	16,245	2,695	0.46	18,045
	7,500	2,430	0.39	16,245	2,000	0.34	13,395	2,430	0.39	16,245	2,435	0.41	16,280
WSW24x8	1,000	4,945	0.37	24,355	4,840	0.40	23,830	4,945	0.37	24,355	5,515	0.45	27,150
	4,000	4,945	0.37	24,355	4,515	0.37	22,240	4,945	0.37	24,355	5,360	0.44	26,395
	7,500	4,945	0.37	24,355	4,140	0.34	20,390	4,945	0.37	24,355	4,985	0.41	24,540
WSW12x9	1,000	790	0.43	10,310	1,020	0.60	13,335	790	0.43	10,310	1,020	0.60	13,335
	4,000	790	0.43	10,310	1,020	0.60	13,335	790	0.43	10,310	1,020	0.60	13,335
	7,500	790	0.43	10,310	1,020	0.60	13,335	790	0.43	10,310	1,020	0.60	13,335
WSW18x9	1,000	1,920	0.43	14,505	2,210	0.53	16,675	1,920	0.43	14,505	2,515	0.60	18,980
	4,000	1,920	0.43	14,505	2,010	0.48	15,160	1,920	0.43	14,505	2,390	0.57	18,045
	7,500	1,920	0.43	14,505	1,775	0.42	13,395	1,920	0.43	14,505	2,155	0.51	16,280
WSW24x9	1,000	4,190	0.43	23,275	4,290	0.46	23,830	4,190	0.43	23,275	5,035	0.54	27,985
	4,000	4,190	0.43	23,275	4,000	0.43	22,240	4,190	0.43	23,275	4,750	0.51	26,395
	7,500	4,190	0.43	23,275	3,670	0.40	20,390	4,190	0.43	23,275	4,415	0.48	24,540
WSW12x10	1,000	630	0.50	9,175	810	0.67	11,810	630	0.50	9,175	810	0.67	11,810
	4,000	630	0.50	9,175	810	0.67	11,810	630	0.50	9,175	810	0.67	11,810
	7,500	630	0.50	9,175	810	0.67	11,810	630	0.50	9,175	810	0.67	11,810
WSW18x10	1,000	1,715	0.49	14,440	1,980	0.59	16,675	1,715	0.49	14,440	2,225	0.67	18,715
	4,000	1,715	0.49	14,440	1,800	0.54	15,160	1,715	0.49	14,440	2,145	0.64	18,045
	7,500	1,715	0.49	14,440	1,590	0.48	13,395	1,715	0.49	14,440	1,935	0.58	16,280
WSW24x10	1,000	3,675	0.48	22,740	3,850	0.54	23,830	3,675	0.48	22,740	4,520	0.63	27,985
	4,000	3,675	0.48	22,740	3,590	0.50	22,240	3,675	0.48	22,740	4,265	0.60	26,395
	7,500	3,675	0.48	22,740	3,295	0.46	20,390	3,675	0.48	22,740	3,965	0.55	24,540
WSW12x11	1,000	575	0.55	9,190	735	0.73	11,810	575	0.55	9,190	735	0.73	11,810
	4,000	575	0.55	9,190	735	0.73	11,810	575	0.55	9,190	735	0.73	11,810
	7,500	575	0.55	9,190	735	0.73	11,810	575	0.55	9,190	735	0.73	11,810
WSW18x11	1,000	1,510	0.53	14,010	1,800	0.67	16,675	1,510	0.53	14,010	1,975	0.73	18,335
	4,000	1,510	0.53	14,010	1,635	0.61	15,160	1,510	0.53	14,010	1,945	0.72	18,045
	7,500	1,510	0.53	14,010	1,445	0.54	13,395	1,510	0.53	14,010	1,755	0.65	16,280
WSW24x11	1,000	3,295	0.53	22,485	3,490	0.58	23,830	3,295	0.53	22,485	4,100	0.69	27,985
	4,000	3,295	0.53	22,485	3,260	0.55	22,240	3,295	0.53	22,485	3,865	0.65	26,395
	7,500	3,295	0.53	22,485	2,985	0.50	20,390	3,295	0.53	22,485	3,595	0.60	24,540

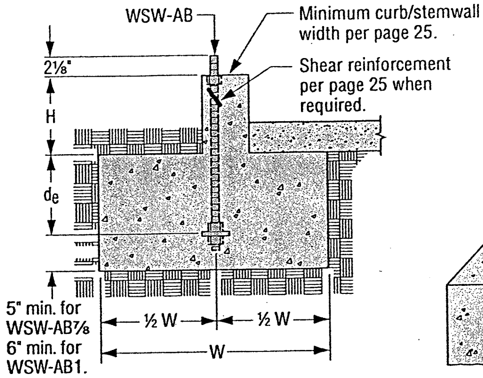
See foonotes on page 13.

F-4

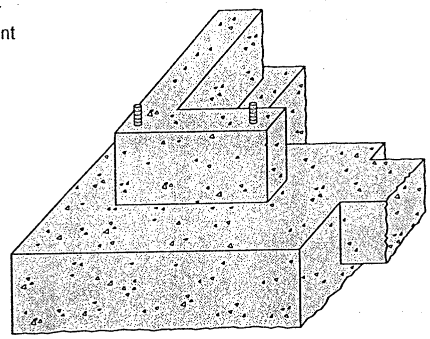
SIMPSON Strong-Tie®

Anchorage Solutions

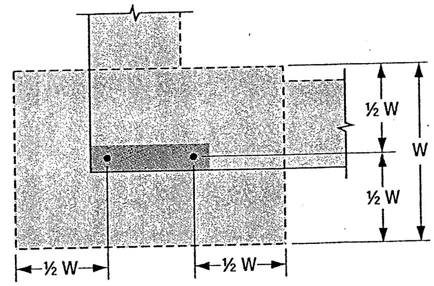
Curb or Stemwall Installation



Curb or Stemwall Section View

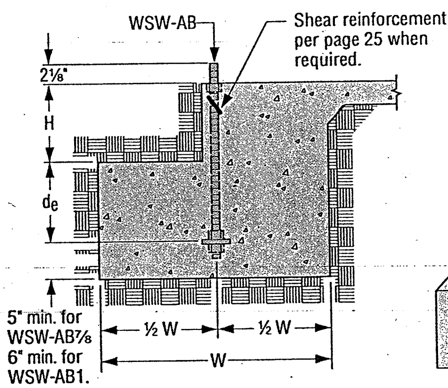


Perspective View
(Slab not shown for clarity)

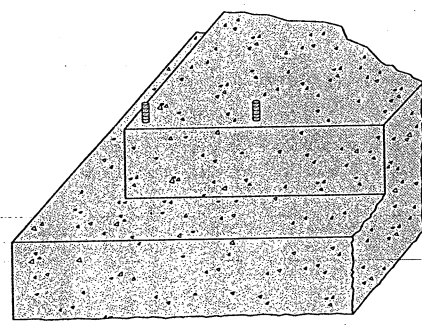


Footing Plan

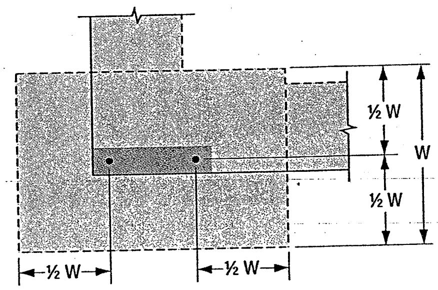
Slab-on-Grade Installation



Slab-on-Grade Section View

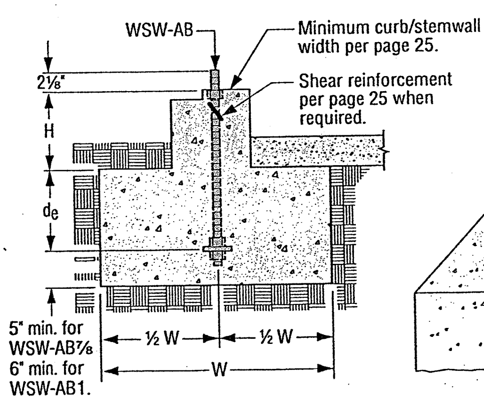


Perspective View

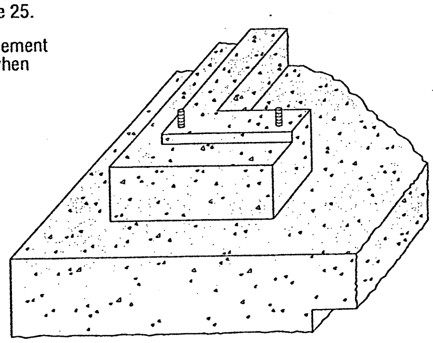


Footing Plan

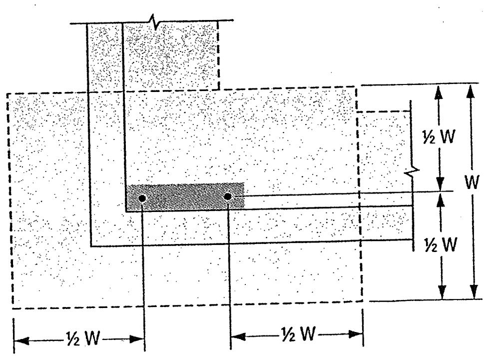
Brick Ledge Installation



Brick Ledge Section View



Perspective View



Footing Plan

Anchorage Solutions General Notes

1. The Designer may specify alternate embedment, footing size or bolt grade.
2. Footing dimensions and rebar requirements are for anchorage only.

Foundation design
(size and reinforcement) by Designer.

[P-1] CAPS & BASES

DEMAND = 992# DOWNWARD

USE ABU662 POST BASE CAPACITY 12000# > 992# ✓

USE EPC66Z COLUMN CAP

[P-2] CAPS & BASES

DEMAND = 6000# DOWNWARD

USE ABU44Z POST BASE CAPACITY = 6665# > 6000# ✓

USE PC4Z COLUMN CAP

[RH-1] DRAG STRAP

DEMAND = (444 PLF)(8') = 3552#

USE MSTC40 STRAP CAPACITY = 4745# > 3552# ✓

DRAG TRUSS STRAP

DEMAND = (152 PLF)(30') = 4560#

USE MSTC40 STRAP CAPACITY = 4745# > 4560# ✓

SIMPSON Strong-Tie®

C-2

HDU/DTT *Holdowns*

This product is preferable to similar connectors because of a) easier installation, b) higher loads, c) lower installed cost, or a combination of these features.

VALUE ENGINEERED

HDU holdowns are pre-deflected during the manufacturing process, virtually eliminating deflection under load due to material stretch. They use Simpson Strong-Tie® Strong-Drive® SDS Heavy-Duty Connector screws which install easily, reduce fastener slip and provide a greater net section when compared to bolts.

The HDU series of holdowns are designed to replace previous versions of the product such as PHDs as well as bolted holdowns. The HDU2, 4 and 5 are direct replacements for the PHD2, 5 and 6, respectively.

The DTT tension ties are designed for lighter-duty holdown applications on single or 2x posts. The new DTT1Z is installed with nails or Simpson Strong-Tie Strong-Drive SD Connector screws and the DTT2Z installs easily with the Strong-Drive SDS Heavy-Duty Connector screws *(included)*. The DTT1Z holdowns have been tested for use in designed shearwalls and prescriptive braced wall panels as well as prescriptive wood-deck applications *(see page 209 for deck applications)*.

For more information on holdown options, contact Simpson Strong-Tie.

HDU SPECIAL FEATURES:

- Holdown designs virtually eliminate deflection due to material stretch.
- Uses Strong-Drive SDS Heavy-Duty Connector screws which install easily, reduce fastener slip, and provide a greater net section area of the post compared to bolts.
- Strong-Drive SDS Heavy-Duty Connector screws are supplied with the holdowns to ensure proper fasteners are used.
- No stud bolts to countersink at openings.

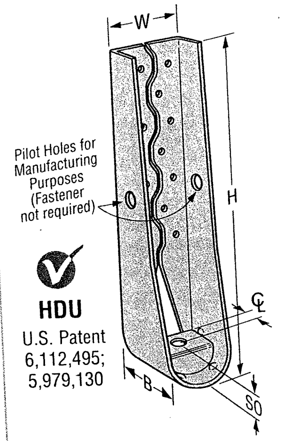
MATERIAL: See table

FINISH: HDU – Galvanized; DTT1Z and DTT2Z – ZMAX® coating; DTT2SS – stainless steel

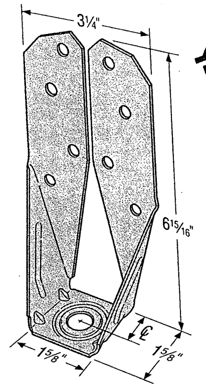
INSTALLATION: • See General Notes on page 45.

- The HDU requires no additional washer, the DTT requires a standard cut washer *(included with DTT2Z)* be installed between the nut and the seat.
- Strong-Drive SDS Heavy-Duty Connector screws install best with a low speed high torque drill with a ⅜" hex head driver.

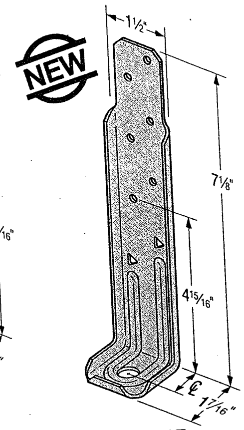
CODES: See page 12 for Code Reference Key Chart.



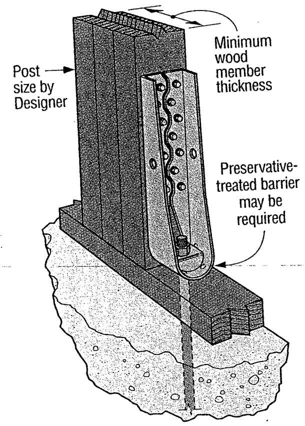
HDU
U.S. Patent 6,112,495; 5,979,130



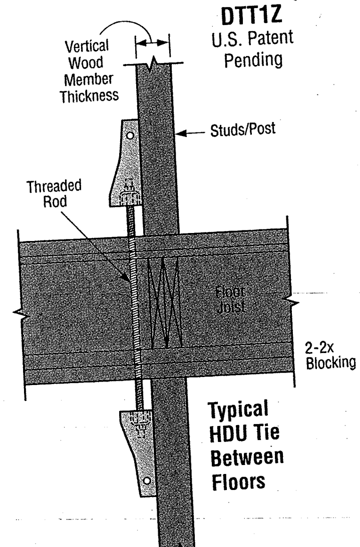
DTT2Z



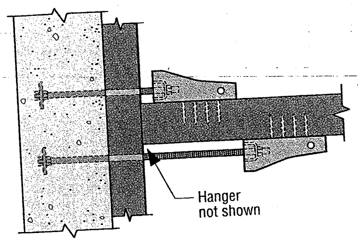
DTT1Z
U.S. Patent Pending



Vertical HDU Installation



Typical HDU Tie Between Floors



Horizontal HDU Offset Installation
(Plan View)

See Holdown and Tension Tie General Notes on page 45.

These products are available with additional corrosion protection. Additional products on this page may also be available with this option, check with Simpson Strong-Tie for details.

Model No.	Ga	Dimensions (in.)					Fasteners		Minimum Wood Member Thickness[4] (in.)	Allowable Tension Loads (160)[1]			Code Ref.
		W	H	B	℄	SO	Anchor Bolt Dia. (in.)	Post Fasteners		DF/SP	SPF/HF	Deflection at Allowable Load (in.)	
DTT1Z	14	1½	7⅛	1 7/16	¾	3/16	⅜	6-SD #9x1½	1½	840	840	0.170	160
								6-10dx1½		910	640	0.167	
								8-10dx1½		910	850	0.167	
DTT2Z	14	3¼	6 15/16	1⅝	13/16	3/16	½	8-SDS ¼"x1½"	1½	1825	1800	0.105	I6, L8, F5
								8-SDS ¼"x1½"	3	2145	1835	0.128	
DTT2Z-SDS2.5								8-SDS ¼"x2½"	3	2145	2105	0.128	
HDU2-SDS2.5	14	3	8 11/16	3¼	1 5/16	1⅜	⅝	6-SDS ¼"x2½"	3	3075	2215	0.088	
HDU4-SDS2.5	14	3	10 15/16	3¼	1 5/16	1⅜	⅝	10-SDS ¼"x2½"	3	4565	3285	0.114	
HDU5-SDS2.5	14	3	13 3/16	3¼	1 5/16	1⅜	⅝	14-SDS ¼"x2½"	3	5645	4065	0.115	
HDU8-SDS2.5	10	3	16⅝	3½	1⅜	1½	⅞	20-SDS ¼"x2½"	3	6765	4870	0.084	
									3½	6970	5020	0.116	
									4½	7870	5665	0.113	
HDU11-SDS2.5	10	3	22¼	3½	1⅜	1½	1	30-SDS ¼"x2½"	5½	9535	6865	0.137	170
									7¼	11175	8045	0.137	
HDU14-SDS2.5	7	3	25 11/16	3½	1 9/16	1 9/16	1	36-SDS ¼"x2½"	4x6[3,4]	10770	7755	0.122	I6, L8, F5
									7¼[3]	14390	10435	0.177	
									5½[2,3]	14445	10350	0.177	

1. See page 45 for Holdown and Tension Tie General Notes.
2. Noted HDU14 allowable loads are based on a 5½" wide post *(6x6 min.)*.
3. HDU14 requires heavy hex anchor nut to achieve tabulated loads *(supplied with holdown)*.
4. Loads are applicable to installation on either narrow or wide face of post.

HRS/ST/PS/HST/HTP/LSTA/LSTI/MST/MSTA/MSTC/MSTI *Strap Ties*

SIMPSON Strong-Tie®

C-3

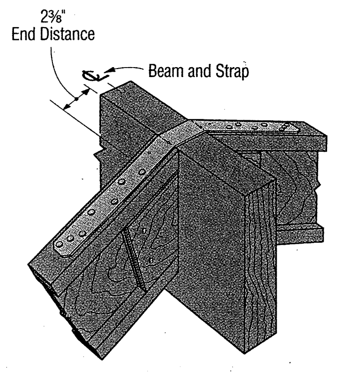
CODES: See page 12 for Code Reference Key Chart.

These products are available with additional corrosion protection. Additional products on this page may also be available with this option, check with Simpson Strong-Tie for details.

These products are approved for installation with the Strong-Drive® SD Connector screw. See page 27 for more information.

Model No.	Ga	Dimensions W	Dimensions L	Fasteners (Total)	Allowable Tension Loads (DF/SP) (160)	Allowable Tension Loads (SPF/HF) (160)	Code Ref.
LSTA9	20	1¼	9	8-10d	740	635	I4, L3, L5, F2
LSTA12		1¼	12	10-10d	925	795	
LSTA15		1¼	15	12-10d	1110	950	
LSTA18		1¼	18	14-10d	1235	1110	
LSTA21		1¼	21	16-10d	1235	1235	
LSTA24		1¼	24	18-10d	1235	1235	
ST292		2 1/16	9 5/16	12-16d	1265	1120	
ST2122		2 1/16	12 13/16	16-16d	1530	1505	
ST2115		¾	16 5/16	10-16d	660	660	
ST2215		2 1/16	16 5/16	20-16d	1875	1875	
LSTA30	18	1¼	30	22-10d	1640	1640	
LSTA36		1¼	36	24-10d	1640	1640	
LSTI49		3¾	49	32-10dx1½	2975	2555	
LSTI73		3¾	73	48-10dx1½	4205	3830	
MSTA9		1¼	9	8-10d	750	645	
MSTA12		1¼	12	10-10d	940	810	
MSTA15		1¼	15	12-10d	1130	970	
MSTA18		1¼	18	14-10d	1315	1130	
MSTA21		1¼	21	16-10d	1505	1290	
MSTA24		1¼	24	18-10d	1640	1455	
MSTA30	16	1¼	30	22-10d	2050	1820	
MSTA36		1¼	36	26-10d	2050	2050	
MSTA49		1¼	49	26-10d	2020	2020	F2, L3, L5
ST6215		2 1/16	16 5/16	20-16d	2095	1900	I4, IL14, L3, L5, F2
ST6224		2 1/16	23 5/16	28-16d	2540	2540	I4, L3, L5, F2
ST9		1¼	9	8-16d	885	760	I4, L3, L5, F2
ST12		1¼	11⅝	10-16d	1105	950	
ST18		1¼	17¾	14-16d	1420	1330	
ST22		1¼	21⅝	18-16d	1420	1420	
MSTC28		3	28¼	36-16d sinkers	3455	2980	
MSTC40		3	40¼	52-16d sinkers	4745	4305	
MSTC52		3	52¼	62-16d sinkers	4745	4745	
HTP37Z		3	7	20-10dx1½	1850	1600	L5
MSTC66	14	3	65¾	76-16d sinkers	5860	5860	I4, L3, L5, F2
MSTC78		3	77¾	76-16d sinkers	5860	5860	
ST6236		2 1/16	33 13/16	40-16d	3845	3845	
HRS6	12	1⅜	6	6-10d	605	525	L5, F26
HRS8		1⅜	8	10-10d	1010	880	
HRS12		1⅜	12	14-10d	1415	1230	
MSTI26		2 1/16	26	26-10dx1½	2745	2325	I4, L3, L5, F2
MSTI36		2 1/16	36	36-10dx1½	3800	3220	
MSTI48		2 1/16	48	48-10dx1½	5065	4290	
MSTI60		2 1/16	60	60-10dx1½	5080	5080	
MSTI72		2 1/16	72	72-10dx1½	5080	5080	
HRS416Z		3¼	16	16-SDS ¼"x1½"	2835	2305	170

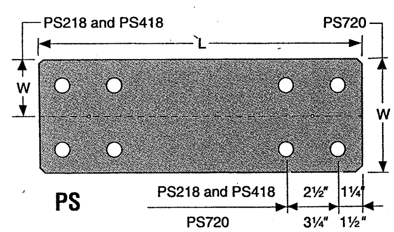
1. Loads include a 60% load duration increase on the fasteners for wind or earthquake loading.
2. 10dx1½" nails may be substituted where 16d sinkers or 10d are specified at 100% of the table loads except where straps are installed over sheathing.
3. 10d commons may be substituted where 16d sinkers are specified at 100% of table loads.
4. 16d sinkers (0.148" dia. x 3¼" long) or 10d commons may be substituted where 16d commons are specified at 0.84 of the table loads.
5. Use half of the nails in each member being connected to achieve the listed loads.
6. Tension loads apply for uplift when installed vertically.
7. **NAILS:** 16d = 0.162" dia. x 3½" long, 16d Sinker = 0.148" dia. x 3¼" long, 10d = 0.148" dia. x 3" long. 10dx1½ = 0.148" dia. x 1½" long. See page 22-23 for other nail sizes and information.

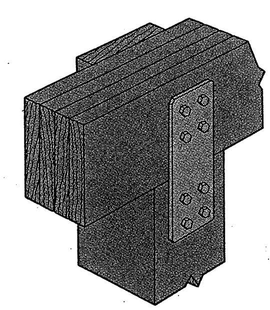


Typical LSTA Installation
(Hanger not shown)
Bend strap one time only, max 12/12 joist pitch.

Model No.	Material Thickness Gauge	Dim. W	Dim. L	Bolts Qty	Bolts Dia	Code Ref.
PS218	7 ga	2	18	4	¾	180
PS418		4	18	4	¾	
PS720		6¾	20	8	½	

1. PS strap design loads must be determined by the Designer for each installation. Bolts are installed both perpendicular and parallel-to-grain. Hole diameter in the part may be oversized to accommodate the HDG. Designer must determine if the oversize creates an unacceptable installation.
2. For allowable tension loads, see page 230.





Typical PS720 Installation

Straps & Ties

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SIMPSON Strong-Tie®

C-4

ABA/ABU/ABW *Adjustable and Standoff Post Bases*

Additional standoff bases are on page 232.

The AB series of retrofit adjustable post bases provide a 1" standoff for the post, are slotted for adjustability and can be installed with nails, Strong-Drive® SD Connector screws or bolts (ABU). Depending on the application needs, these adjustable standoff post bases are designed for versatility, cost-effectiveness and maximum uplift performance.

Features:

- The slot in the base enables flexible positioning around the anchor bolt, making precise post placement easier
- The 1" standoff helps prevent rot at the end of the post and meets code requirements for structural posts installed in basements or exposed to weather or water splash

MATERIAL: Varies (see table)

FINISH: All galvanized, most offered in ZMAX®; see Corrosion Information, pages 13-15.

INSTALLATION: • Use all specified fasteners. See General Notes.

- See our *Anchoring and Fastening Systems for Concrete and Masonry* catalog, or visit ***www.strongtie.com*** for retrofit anchor options or reference technical bulletin T-ANCHORSPEC.
- Post bases do not provide adequate resistance to prevent members from rotating about the base and therefore are not recommended for non top-supported installations *(such as fences or unbraced carports).*
- Place the base, load transfer plate and nut on the anchor bolt. Loosely tighten the nut.

ABW—Place the standoff base and then the post in the ABW and fasten on three vertical sides, using nails or Strong-Drive SD Connector screws.

- Make any necessary adjustments to post placement and tighten the nut securely on the anchor bolt.
- Bend up the fourth side of the ABW and fasten using the correct fasteners.

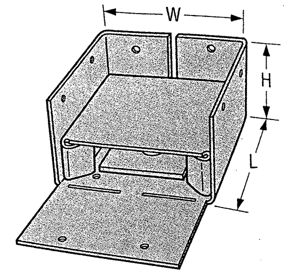
ABU—Place the standoff base and then the post in the ABU.

- Fasten using nails or Strong-Drive SD Connector screws or bolts *(ABU88Z, ABU1010Z – SDS optional).*

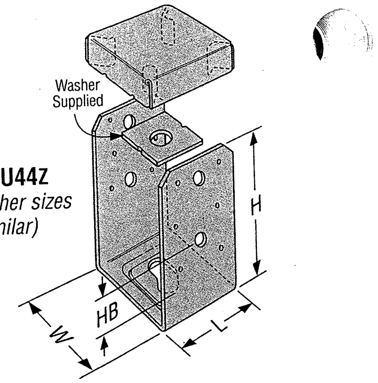
ABA—Place the post in the ABA.

- Fasten using nails or Strong-Drive SD Connector screws.

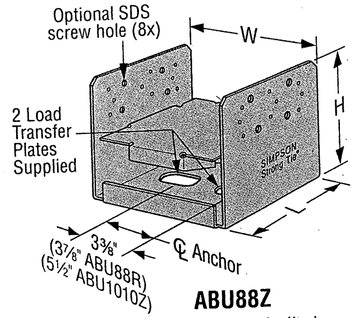
CODES: See page 12 for Code Reference Key Chart.



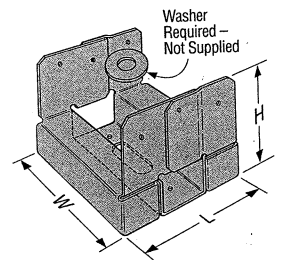
ABWZ



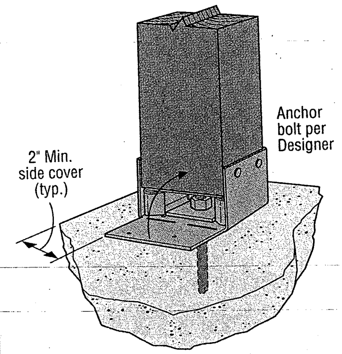
ABU44Z
(other sizes similar)



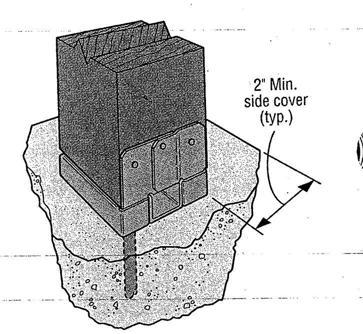
ABU88Z
(ABU1010Z similar)



ABA44Z
(other sizes similar)



Typical ABWZ Installation



Typical ABA44Z Installation

These products are available with additional corrosion protection. Additional products on this page may also be available with this option, check with Simpson Strong-Tie for details.

These products are approved for installation with the Strong-Drive® SD Connector screw. See page 27 for more information.

Model No.	Nominal Post Size	Material Base (Ga)	Material Strap (Ga)	Dimensions (in.) W	L	H	HB[6]	Fasteners Anchor Dia. (in.)	Nails	Machine Bolts Qty.	Machine Bolts Dia.	Allowable Loads Uplift Nails	Uplift Bolts	Down (100)	Code Ref.
ABA44Z	4x4	16	16	3 9/16	3⅛	3 1/16	—	½	6-10d	—	—	555	—	6000	I3, F1, L5
ABW44Z	4x4	16	16	3 9/16	3 9/16	2¼	—	½	8-10d	—	—	1005	—	7180	170
ABU44Z	4x4	16	12	3 9/16	3	5½	1¾	⅝	12-16d	2	½	2200	2160	6665	I3, F1, L2, L5
ABU44RZ	Rough 4x4	16	12	4	4	5¼	1½	⅝	12-16d	2	½	2200	2160	6665	I3, F1, L5
ABA44RZ	Rough 4x4	16	16	4 1/16	3⅛	2 13/16	—	½	6-10d	—	—	555	—	8000	I3, F1, L2, L5
ABW44RZ	Rough 4x4	16	16	4	4 1/16	1 32/33	—	½	8-10d	—	—	835	—	7180	170
ABW46Z	4x6	12	16	3 9/16	5 9/16	3	—	½	10-10d	—	—	845	—	4590	
ABA46Z	4x6	14	14	3 9/16	5 3/16	3⅛	—	⅝	8-16d	—	—	700	—	9435	I3, F1, L5
ABU46Z	4x6	12	12	3 9/16	5	7	2⅝	⅝	12-16d	2	½	2300	2300	10335	I3, F1, L2
ABU46RZ	Rough 4x6	12	12	4	6	6¾	2⅜	⅝	12-16d	2	½	2300	2300	10335	170
ABW46RZ	Rough 4x6	12	16	4	6	2 13/16	—	½	10-10d	—	—	780	—	4590	
ABA46RZ	Rough 4x6	14	14	4 1/16	5 3/16	2⅞	—	⅝	8-16d	—	—	700	—	12000	I3, F1, L5
ABU5-5	5⅛x5⅛	12	10	5¼	5	6 1/16	1¾	⅝	12-16d	2	½	2235	2235	12000	170
ABU5-6	5⅛x6	12	10	6⅛	5	6 1/16	1¾	⅝	12-16d	2	½	2235	2235	12000	
ABA66Z	6x6	14	14	5½	5¼	3⅛	—	⅝	8-16d	—	—	720	—	10665	I3, F1, L5
ABW66Z	6x6	12	14	5½	5 9/16	3	—	½	12-10d	—	—	1190	—	12935	170
ABU66Z	6x6	12	10	5½	5	6 1/16	1¾	⅝	12-16d	2	½	2300	2300	12000	I3, F1, L2
ABU66RZ	Rough 6x6	12	10	6	6	5 13/16	1½	⅝	12-16d	2	½	2300	2300	12000	170
ABA66RZ	Rough 6x6	14	14	6	5 3/16	2⅞	—	⅝	8-16d	—	—	720	—	12665	I3, F1, L5
ABW66RZ	Rough 6x6	12	14	6	6	2 13/16	—	½	12-10d	—	—	1065	—	12935	170
ABU88Z	8x8	14	12	7½	7	7	—	2-⅝	18-16d	—	—	2320	—	24335	I3, F1
ABU88R	Rough 8x8	14	12	8	7	7	—	2-⅝	18-16d	—	—	2320	—	24335	170
ABU1010Z	10x10	12	12	9½	9	7¼	—	2-⅝	22-16d	—	—	2270	—	32020	
ABU1010RZ	Rough 10x10	12	12	10	9	7	—	2-⅝	22-16d	—	—	2270	—	32020	

1. Uplift loads have been increased for wind or earthquake with no further increase allowed; reduce where other loads govern.
2. Downloads may not be increased for short-term loading.
3. Specifier to design concrete for uplift capacity.
4. ABU products may be installed with either bolts or nails *(not both)* to achieve table loads. ABU88Z, ABU88R, ABU1010Z and ABU1010RZ may be installed with 8-¼"x3" Strong-Drive® SDS Heavy-Duty Connector screws *(sold separately)* for the same table load.
5. For AB bases, higher download can be achieved by solidly packing grout under 1" standoff plate before installation. Base download on column, grout, or concrete according to the code.
6. HB dimension is the distance from the bottom of the post up to the first bolt hole.
7. Structural composite lumber columns have sides that show either the wide face or the edges of the lumber strands/veneers. For SCL columns, the fasteners for these products should always be installed in the wide face.
8. Downloads shall be reduced where limited by the capacity of the post. See pages 245-246 for common post allowable loads.
9. **NAILS:** 16d = 0.162" dia. x 3½" long, 10d = 0.148" dia. x 3" long. See page 22-23 for other nail sizes and information.

SIMPSON Strong-Tie® C-5

PCZ/EPCZ *Post Caps*

The next-generation PCZ/EPCZ post caps are designed with their post and beam flanges in-line so that one PCZ/EPCZ model can accommodate several post sizes. The PCZ/EPCZ now uses easier-to-install 10d common nails. An alternate choice of fasteners is Strong-Drive® #9x1½" SD Connector screws. ZMAX® finish is standard to meet exposure conditions in many environments. See additional corrosion information at ***www.strongtie.com/info***.

MATERIAL: 16 gauge

FINISH: ZMAX coating

INSTALLATION:

- Use all specified fasteners; see General Notes.
- Do not install bolts into pilot holes.

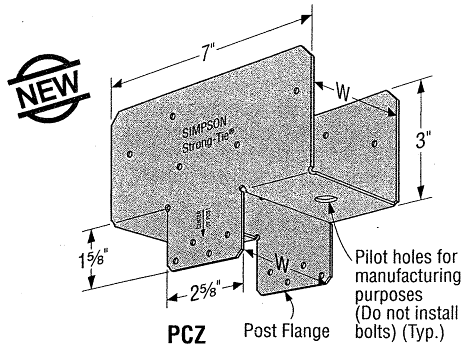
OPTIONS:

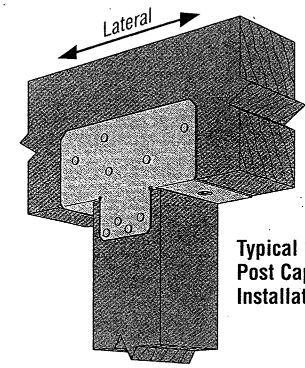
- For end conditions, specify EPCZ post caps.
- For heavy-duty applications, see CCQ and CC Series.
- For retrofit applications, see AC and LC Series.

CODES: See page 12 for Code Reference Key Chart.

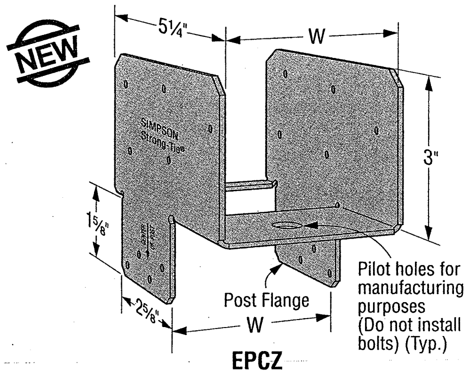
These products are available with additional corrosion protection. Additional products on this page may also be available with this option, check with Simpson Strong-Tie for details.

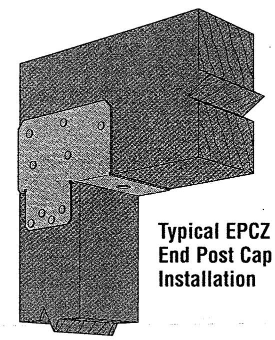
These products are approved for installation with the Strong-Drive® SD Connector screw. See page 27 for more information.





Typical PCZ Post Cap Installation

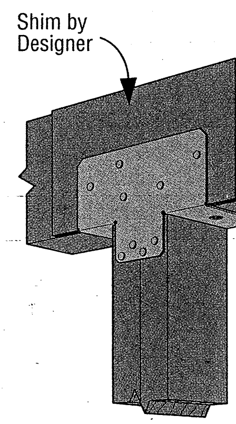




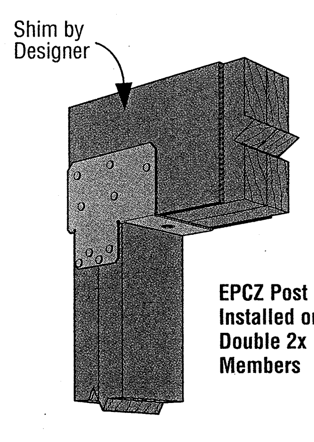
Typical EPCZ End Post Cap Installation

Model No.[7]	W (in.)	Fasteners[5,6]		Post Size	Allowable Loads (DF/SP)				Code Ref.
					PCZ		EPCZ		
		Beam	Post		Uplift (160)	Lateral (160)	Uplift (160)	Lateral (160)	
PC4Z	3$\frac{9}{16}$	10-10d	8-10d	2-2x4[4]	1480	1120	1130	895	160
				4x4	1480	1260	1130	1075	
				4x6	1480	1260	1130	1230	
				4x8	1480	1380	1130	1230	
PC6Z	5½	10-10d	8-10d	4x6	1480	1260	1435	1075	
				6x6	1480	1295	1435	1230	
				6x8	1480	1380	1435	1230	
PC8Z	7½	10-10d	8-10d	4x8	1480	1260	1435	1075	
				6x8	1480	1295	1435	1230	
				8x8	1480	1380	1435	1230	

1. Allowable loads have increased for wind or earthquake with no further increase allowed; reduce where other loads govern.
2. Uplift loads do not apply to spliced conditions. Spliced conditions must be detailed by the Designer to transfer tension loads between spliced members by means other than the post cap.
3. Structural composite lumber columns have sides that show either the wide face or the edges of the lumber strands/veneers. Values in the tables reflect installation into the wide face and do not allow for installation into the narrow face.
4. Post and beam may consist of multiple members provided they are connected independently of the post cap fasteners.
5. 10dx2½ (0.148" dia. x 2½" long) nails may be used with no load reduction for uplift and 0.85 of the table loads for lateral.
6. Strong-Drive® SD9x1½ Connector screws may be substituted for table fasteners with no load reduction.
7. Models available for rough size lumber, specify RZ suffix. Ex. PC4RZ.
8. **NAILS:** 10d = 0.148" dia. x 3" long. See page 22-23 for other nail sizes and information.
SCREWS: SD9112 = 0.131" dia. x 1½" long.



PCZ Post Cap Installed on Double 2x Members



EPCZ Post Cap Installed on Double 2x Members

Caps & Bases