

STRUCTURAL ANALYSIS & DESIGN

of

YEAGER GARAGE
10709 LARSON RD.
ANDERSON ISLAND, WA. 98303

for

SCOTT YEAGER
10709 LARSON RD.
ANDERSON ISLAND, WA. 98303

by

THE LAND DEVELOPER'S ENGINEERED SOLUTION

A Division of THE LAND DEVELOPER, LLC

Erik B. Ainsworth, PE
PO Box 4420
Tumwater, WA 98501
(360) 250-3973



June 6, 2017

TABLE OF CONTENTS

<u>Description</u>	<u>Page Number(s)</u>
i. RESIDENCE STRUCTURAL ANALYSIS & DESIGN	1-41

THE LAND DEVELOPER'S ENGINEERED SOLUTION

a division of THE LAND DEVELOPER, LLC

• BECAUSE RESULTS MATTER •

Project: Project No.:	YEAGER GARAGE 17-036
Client:	SCOTT YEAGER 10709 LARSON RD. ANDERSON ISLAND, WA. 98303
Project Location:	10709 LARSON RD., ANDERSON WA. 98303
Date:	June 6, 2017
Problem Statement:	Provide structural analysis & design for a 1-story residential addition as shown in the attached building plans.
Existing Condition:	There are no known site constraints for this project.
Assumed Design parameters and constraints:	For the purposes of this design it is assumed that the soil bearing capacity is 1,500 psf. Per the Pierce County; the basic wind speed is 110 mph. However, since the wind load factors in the (2.4.1) Basic Load Combinations 5, 6, & 7 were adjusted (ASCE 7-05 to 7-10) from 1 to 0.6, and $140 \times \text{SQRT}(.6) = 85\text{mph}$, an analysis with 85mph with wind load factor 1 is exactly equivalent to an analysis with 110mph, wind load factor 0.6. This analysis was done with 85mph basic wind speed, wind load factor 1, and is consistent with 2015 IBC standards.
Applicable Codes:	2015 IBC and IRC and ASCE 7-10
Jurisdiction:	Pierce County
Design parameters:	WIND SPEED: 110 MPH (3-SEC GUST) $I_w=1.0$, $K_{zt}=1.0$
	SEISMIC PARAMETERS: USE SIMPLIFIED METHOD ASCE 7-10 WOOD STRUCTURAL PANEL, $R=6.5$ $S_{DS}=0.884$, $S_{D1}=0.530$
Design Loads:	ROOF: LL = 20 PSF, SL = 25 PSF, DL = 15 PSF FLOOR: LL = 40 PSF, DL = 15 PSF

USGS Design Maps Summary Report

User-Specified Input

Building Code Reference Document 2012/2015 International Building Code
(which utilizes USGS hazard data available in 2008)

Site Coordinates 47.17883°N, 122.68138°W

Site Soil Classification Site Class D – “Stiff Soil”

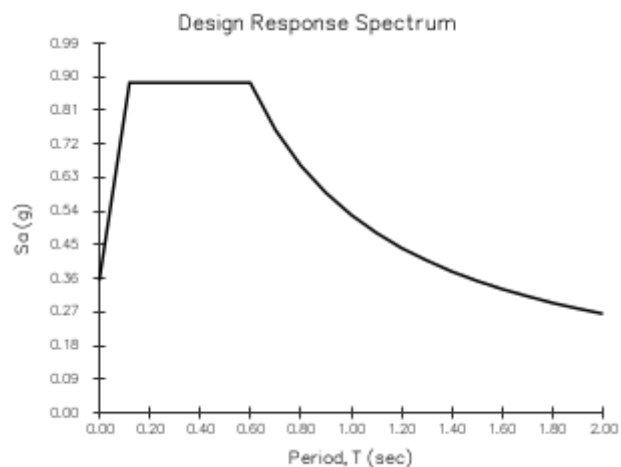
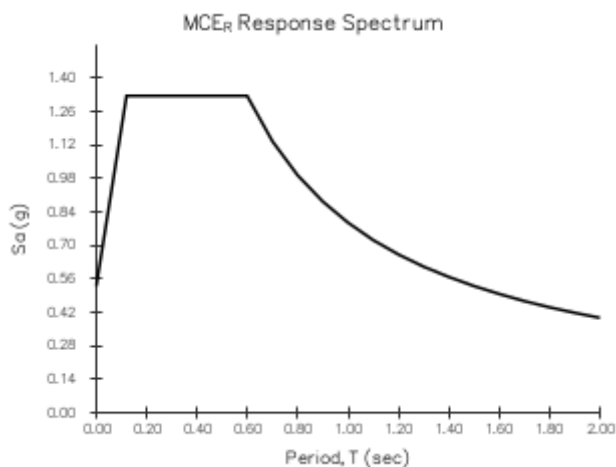
Risk Category I/II/III



USGS-Provided Output

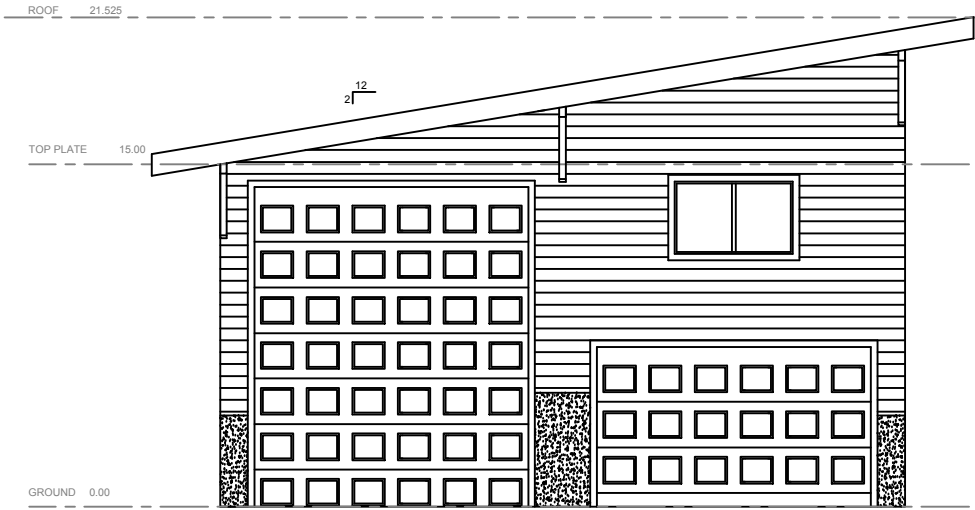
$S_s = 1.326 \text{ g}$	$S_{MS} = 1.326 \text{ g}$	$S_{DS} = 0.884 \text{ g}$
$S_1 = 0.530 \text{ g}$	$S_{M1} = 0.795 \text{ g}$	$S_{D1} = 0.530 \text{ g}$

For information on how the S_s and S_1 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.

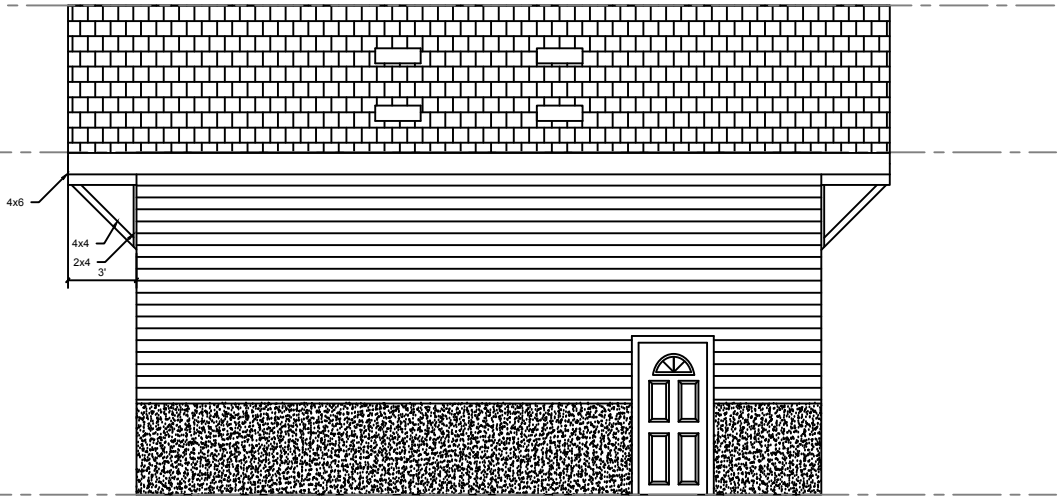


Although this information is a product of the U.S. Geological Survey, we provide no warranty, expressed or implied, as to the accuracy of the data contained therein. This tool is not a substitute for technical subject-matter knowledge.

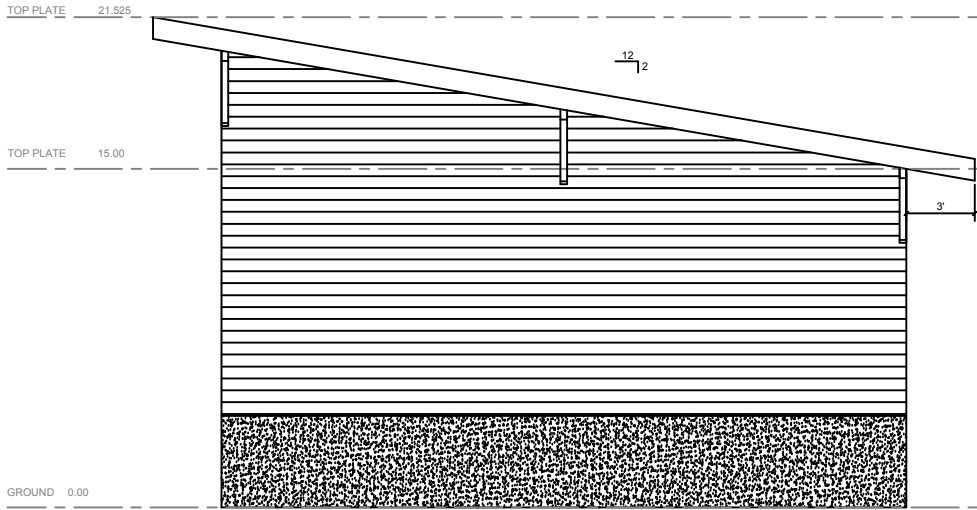
YEAGER GARAGE



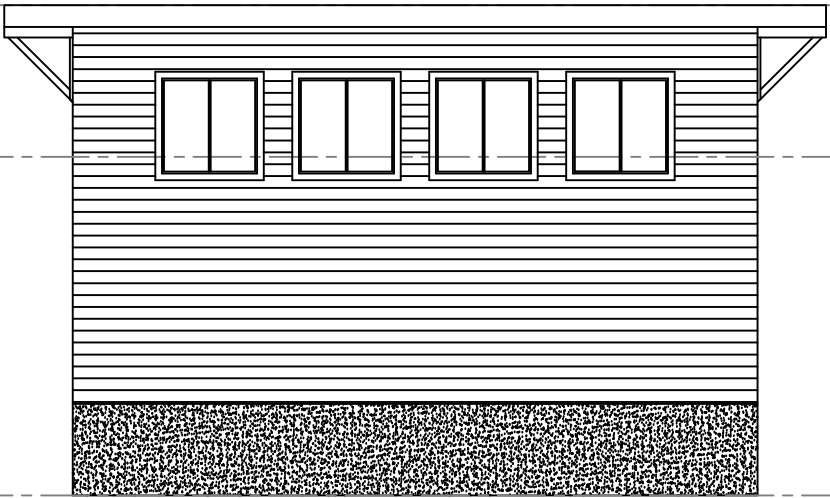
1 FRONT ELEVATION
SCALE: 1/4" = 1' - 0"



2 LEFT ELEVATION
SCALE: 1/4" = 1' - 0"



3 BACK ELEVATION
SCALE: 1/4" = 1' - 0"



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

THE LAND DEVELOPER'S ENGINEERED SOLUTION
a division of THE LAND DEVELOPER, LLC
110 RUBY ST., TUMWATER, WA. 98501
PO BOX 4420, TUMWATER, WA. 98501
(360) 250-3973
E-MAIL: erik@thelanddeveloper.com

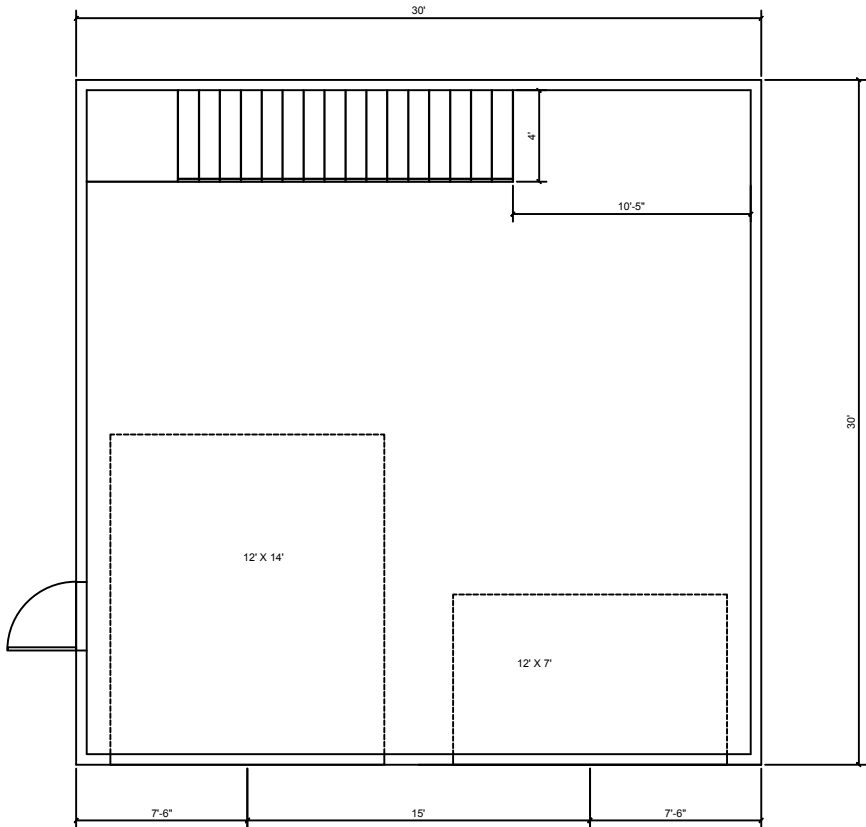


REVISIONS:	DATE:

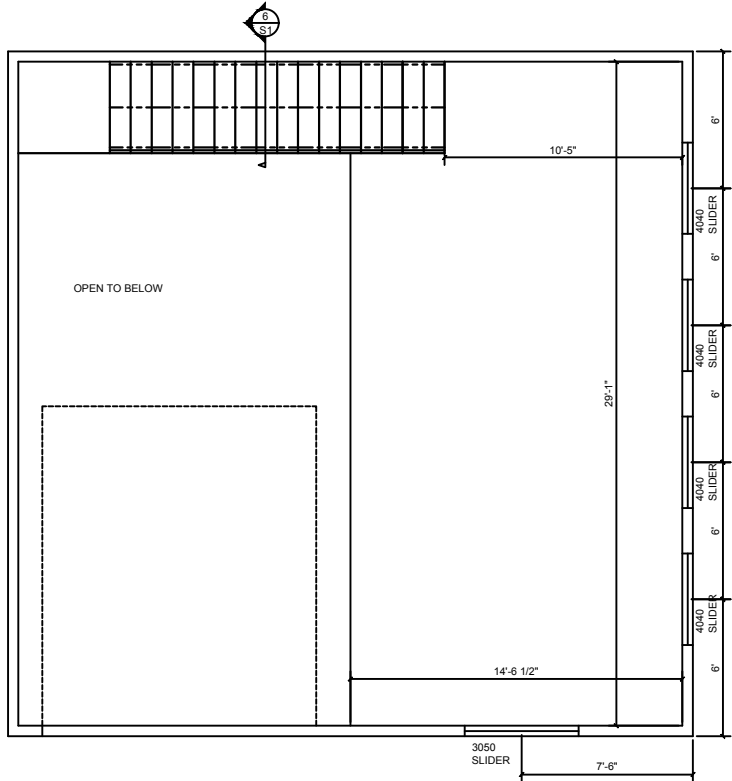
YEAGER GARAGE	ELEVATIONS
---------------	------------

PROJECT: YEAGER GARAGE 10709 LARSON RD. ANDERSON ISLAND, WA. 98303	CLIENT: SCOTT YEAGER 10709 LARSON RD. ANDERSON ISLAND, WA. 98303
---	---

DRAWN BY: EBA
DATE: 03-09-2017
AGENCY NO.:
SHEET: A1 OF 4
JOB NO.: 17-036



1 1ST FLOOR PLAN
SCALE: 1/4" = 1' - 0"



2 2ND FLOOR PLAN
SCALE: 1/4" = 1' - 0"

NOTES & SPECIFICATIONS:

STRUCTURAL SPECIFICATIONS:

GENERAL NOTES

- CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND SITE CONDITIONS BEFORE STARTING WORK. THE ENGINEER SHALL BE NOTIFIED OF ANY DISCREPANCY. CHANGES, OMISSIONS OR SUBSTITUTIONS ARE NOT PERMITTED WITHOUT WRITTEN APPROVAL OF THE ENGINEER.
- THE DESIGN, ADEQUACY AND SAFETY OF ERECTION BRACING, SHORING, TEMPORARY SUPPORTS, ETC., IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR, AND HAS NOT BEEN CONSIDERED BY THE ENGINEER. THE CONTRACTOR IS RESPONSIBLE FOR THE STABILITY OF THE STRUCTURE PRIOR TO THE COMPLETION OF ALL SHEAR WALLS, ROOF AND FLOOR DIAPHRAGMS AND FINISHED MATERIALS. THE CONTRACTOR SHALL PROVIDE THE NECESSARY BRACING TO PROVIDE STABILITY PRIOR TO THE APPLICATION OF THE ABOVE MENTIONED COMPONENTS.
- THE WORK DONE ON THIS PROJECT IS TO COMPLY WITH THE 2015 INTERNATIONAL RESIDENTIAL CODE, 2015 INTERNATIONAL BUILDING CODE, 2015 INTERNATIONAL MECHANICAL CODE, 2015 UNIFORM PLUMBING CODE, CURRENT EDITION OF WASHINGTON STATE ENERGY & VENTILATION CODES AND AS AMENDED & ADOPTED BY THE STATE OF WASHINGTON.
- ALL GARAGE EXTERIOR WALL STUDS ARE 2x6 D.F.#2 @ 16" O.C. UNLESS NOTED OTHERWISE, (UNO).
- ALL EXTERIOR & INTERIOR BEARING WALL HEADERS AND BEAMS TO BE 4x10 D.F.#2 UNO
- MAIN FLOOR CEILING HEIGHT IS 9'-0" SEE ELEVATION
- ALL EXTERIOR & INTERIOR BRACED WALL PANEL BOTTOM PLATES TO DBL. JOIST OR DBL. BLOCKING w/ (3) 16d NAILS @ 16" O.C.
- WINDOWS ARE VINYL FRAME WITH INSULATED DBL. GLAZING, LOW-E GLAZING & ARGON GAS.
- MAIN FLOOR HEADERS ARE AT 15' 0", (UNO).

DESIGN CRITERIA (2015 IRC)

- | | ROOF | FLOOR |
|---|--------|--------|
| 1. VERTICAL LOADS | | |
| GROUND SNOW LOAD: | 25 PSF | |
| LIVE LOAD: | 25 PSF | 40 PSF |
| DEAD LOAD: | 15 PSF | 15 PSF |
| 2. LATERAL WIND LOAD: 110 MPH EXPOSURE B | | |
| 3. LATERAL SEISMIC LOADS: ZONE D | | |
| 4. SEISMIC: S _s = 1.326 & S ₁ = 0.530 | | |

FOUNDATION

- DESIGN ALLOWABLE SOIL BEARING PRESSURE: 1,500 PSF
- FOOTINGS SHALL BEAR ON NATIVE, INORGANIC, UNDISTURBED SOIL.
- ALL EXTERIOR FOOTINGS SHALL EXTEND 1'-0" MIN BELOW FINISHED GRADE.
- ALL INTERIOR CONTINUOUS FOOTINGS TO BE 8" DEEP WITH (2) #4 CONT. BARS, (UNO).
- COMPACTION OF BACKFILL MATERIAL:
 - PIPES, PARKING LOTS, SIDEWALKS, SLABS ON GRADE: 95% COMPACTION ASTM D-698 (STANDARD PROCTOR)
 - FOOTINGS AND FOUNDATIONS: 95% COMPACTION ASTM D-1557 (MODIFIED PROCTOR)
 - PLANTING BEDS, GRASS AREAS: 90% COMPACTION
- FOUNDATION WALL AND FOOTING SIZE AND REINFORCING TO SUIT LOCAL CODES AND SOIL CONDITIONS
- CONTRACTOR TO VERIFY ALL DIMENSIONS AND HOLDOWN LOCATIONS
- HOLDOWNS SHALL BE TIED IN PLACE PRIOR TO FOUNDATION INSPECTION
- SILLS SHALL BE BOLTED TO THE FOUNDATION WITH 5/8" DIAMETER X 10" ANCHOR BOLTS AND 0.229"x 3"x 3" STEEL PLATE WASHER AT A MAXIMUM SPACING OF 4'-0" O.C. EACH BRACED OR SHEAR PANEL SHALL HAVE A MINIMUM OF TWO (UNO).

CONCRETE

- COMPRESSIVE STRENGTH:
 - CURBS, SIDEWALKS, FOOTINGS, SLABS: F_c = 3,000 PSI @ 28 DAYS - 6 SACK MIX, (PROJECT DESIGN w/ 1500PSI CONC. HOWEVER PROJECT IS SPEC'd w/ 3000 PSI CONC. THEREFORE NO SPECIAL CONCRETE INSPECTION REQUIRED.

STRUCTURAL AND MISCELLANEOUS STEEL

- SHAPES, PLATES AND BARS: ASTM A36, F_y = 36 KSI
- BOLTS: ASTM A307 MACHINE BOLTS (MB), ASTM A325 HIGH STRENGTH BOLTS (HSB)
 - MIN. EDGE DISTANCE: 1.5dBOLT
 - MIN. END DISTANCE:
COMPRESSION: 4dBOLT
TENSION: 7dBOLT
 - MIN. BOLT SPACING: 4dBOLT
- REINFORCEMENT: ASTM A615 GRADE 60 FOR #4 AND LARGER, GRADE 40 FOR #3

WOOD

- SAWN LUMBER: NO. 2 & BETTER DOUGLAS FIR-LARCH, WWPA GRADING RULES.
- BEAMS AND STRINGERS: NO. 2 & BETTER DOUGLAS FIR-LARCH
- POSTS AND TIMBERS: STANDARD DOUGLAS FIR-LARCH, F_c = 1300 PSI
- SHEATHING: APA RATED SHEATHING
- CONNECTORS: "SIMPSON" OR APPROVED EQUAL AS INDICATED ON THE DRAWINGS
- NAILING: PER IRC TABLE R602.3(1)
- GLU-LAMS: 24F-V4, F_b = 2400 PSI, MOE = 1.8X10⁶ PSI, F_v = 165 PSI
- PRESSURE TREATED LUMBER (PT); HEM-FIR, NO.2 OR BETTER
- STRUCTURAL MEMBERS SHALL NOT BE CUT FOR PIPES, ETC., UNLESS SPECIFICALLY NOTED OR DETAILED ON THE DRAWINGS
- ALL UPPER FLOOR JOIST ARE 2X8DF #2 OR BTR @ 16" O.C.
- PROVIDE SOLID BLOCKING BETWEEN JOIST OVER ALL SUPPORT BEAMS AND GIRDERS
- PROVIDE DBL. BLOCKING UNDER ALL SHEAR WALL PANELS
- FLOOR SHEATHING IS 3/4" T&G PLYWOOD, GLUED AND NAILED
- PROVIDE DOUBLE JOIST AT ALL WALLS RUNNING PARALLEL TO FLOOR JOISTS

PROPRIETARY PRODUCTS

- ROOF TRUSSES SHALL BE DESIGNED AND FABRICATED TO WITHSTAND THE LOADS LISTED UNDER "DESIGN CRITERIA." TRUSS LENGTH AS SHOWN ON THE PLANS MAY DIFFER SLIGHTLY FROM THE REQUIRED LENGTH. CONTRACTOR SHALL FIELD VERIFY SPACING OF EXISTING FOUNDATION WALL PER MANUFACTURER'S RECOMMENDATION
- SIDING AND ROOFING MATERIAL: SUBMIT TYPE AND COLOR TO OWNER FOR APPROVAL

GENERAL NOTES

- BLOCK BETWEEN FLOORS IS REQUIRED FOR ALL COLUMNS (UNO).
- ALL EXTERIOR WALLS SHALL BE 2x6 FRAMED WALL WITH INSULATION.
- PROVIDE FIRE PROTECTION PER APPLICABLE CODE.
- PROVIDE EDGE BLOCKING FOR ALL SHEAR PANELS.

ROOF

- ROOF PANELS SHALL BE INSTALLED AS DESCRIBED BELOW:
 - 1/2" CDX PLYWOOD OR OSB WITH 8D COMMON OR GALV. BOX NAILS @ 6" O.C. AT PANEL EDGES AND @ 12" O.C. IN PANEL FIELD.
 - ALL PANEL EDGES SHALL BE EDGE CLIPPED.
 - CONNECT ALL TRUSSES TO DOUBLE TOP PLATE OF WALL WITH H2.5 CLIP W/ (5/8d TRUSS & (5) 8d PLATES
- ROOF SLOPE IS 2 IN 12, SEE ELEVATION
- ALL NAILING PER 2015 IBC TABLE 2304.9.1
- PROVIDE STC CLIPS @ ALL TRUSS TO WALL CONNECTIONS, SEE DETAILS
- PROVIDE DBL. STUDS @ ALL GIRDER TRUSSES, UNLESS NOTED OTHERWISE
- ROOF SHEATHING IS 7/16" OSB SHEATHING w/ PSCL CLIPS,
1/2" CCX @ EXPOSED OVERHANGS
- ROOF SOFFIT TO BE OPEN w/ SCREENED VENT BLOCKING, [(3) 2" HOLES PER BLOCK]
- FACIA BOARD IS 5/4x8
- BARGE BOARD IS 1x2 TRIM OVER 5/4x8

FLOOR SHEATHING

- FLOOR PANELS SHALL BE INSTALLED AS DESCRIBED BELOW:
 - 3/4" T&G CDX PLYWOOD WITH 10D COMMON OR GALV. BOX NAILS @ 6" O.C. AT PANEL EDGES AND @ 12" O.C. IN PANEL FIELD. INSTALL PER THE TYPICAL DIAPHRAGM NAILING DETAIL.

ENERGY CODE NOTES

- A MINIMUM OF 75% OF PERMANENTLY INSTALLED LAMPS IN LIGHTING FIXTURES SHALL BE HIGH-EFFICACY LAMPS.
- PROVIDE A PROGRAMMABLE THERMOSTAT FOR THE PRIMARY SPACE CONDITIONING SYSTEM WITHIN EACH DWELLING UNIT PER SEC C403.2.4.8.
- TO THE MAXIMUM EXTENT POSSIBLE INSULATION SHALL EXTEND OVER THE FULL COMPONENT

THE LAND DEVELOPER'S ENGINEERED SOLUTION
a division of THE LAND DEVELOPER, LLC

110 RUBY ST., TUMATEER, WA. 98501
PO BOX 4420, TUNWATER, WA. 98501
(360) 250-3973
E-MAIL: erik@thelanddeveloper.com



DATE: _____

REVISIONS: _____

YEAGER GARAGE

1ST FLOOR AND 2ND
FLOOR PLAN

PROJECT: YEAGER GARAGE
10709 LARSON RD.
ANDERSON ISLAND, WA. 98303

CLIENT: SCOTT YEAGER
10709 LARSON RD.
ANDERSON ISLAND, WA. 98303

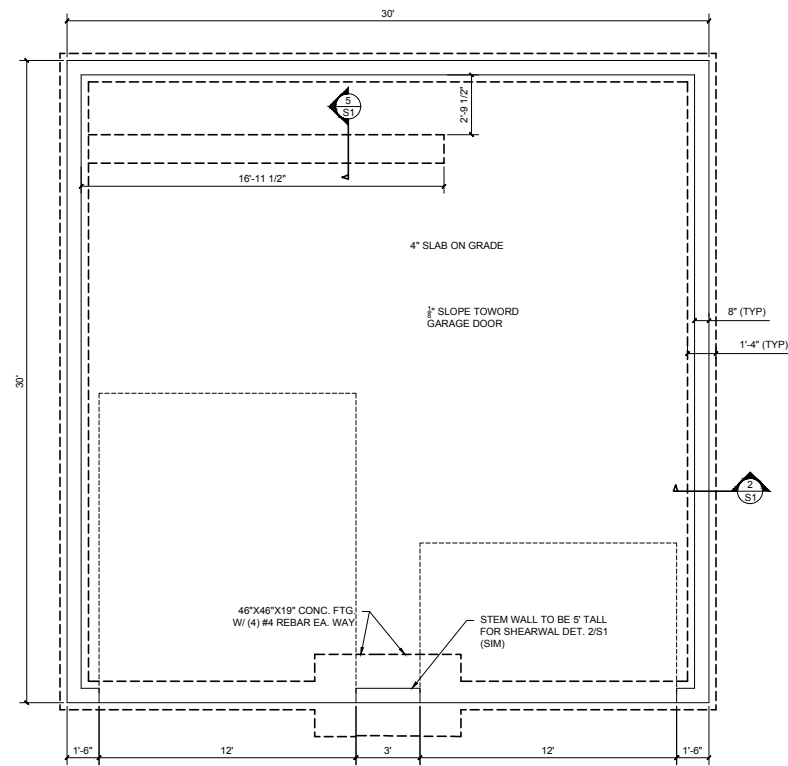
DRAWN BY: EBA

DATE: 03-09-2017

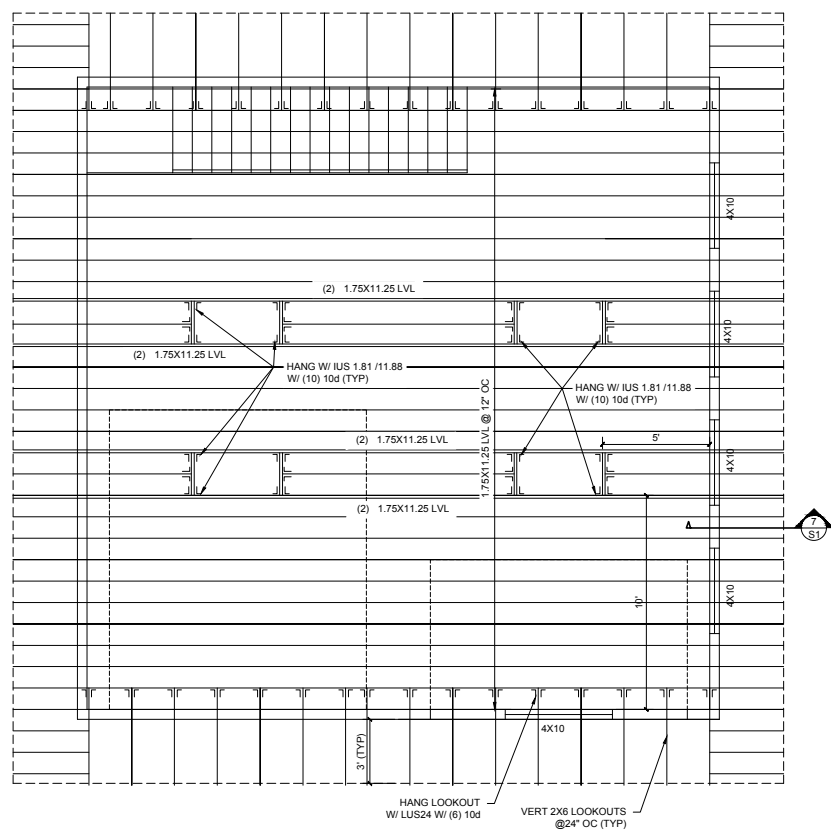
AGENCY NO.: _____

SHEET: A2 OF 4

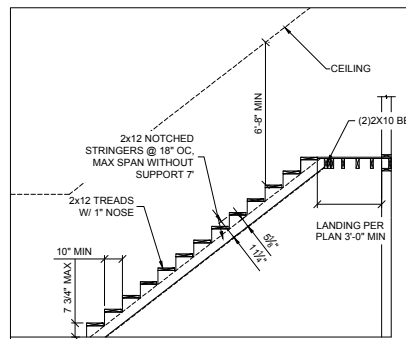
JOB NO.: 17-036



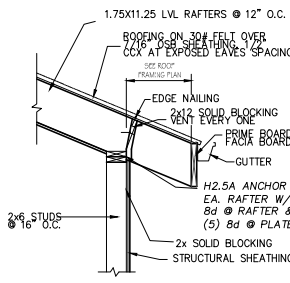
1 FOUNDATION & 1ST FLOOR FRAMING PLAN
SCALE: 1/4" = 1' - 0"



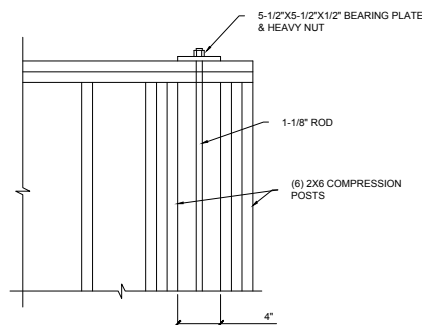
3 ROOF FRAMING PLAN
SCALE: 1/4" = 1' - 0"



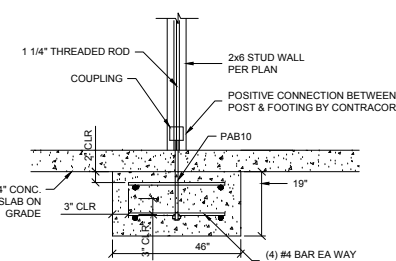
6 STAIR TYPICAL DETAIL
SCALE: 1/4" = 1' - 0"



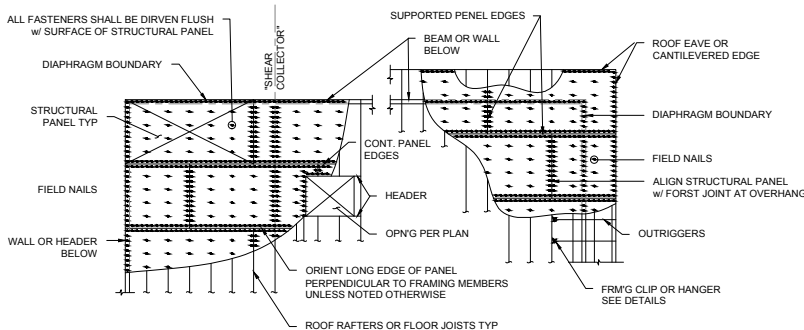
7 RAFTER EAVE DETAIL
SCALE: 1/2" = 1' - 0"



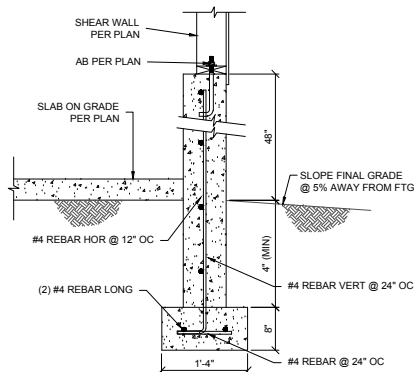
8 HD7 HOLDOWN TOP PLATE DETAIL $T_{ALL} = 26690$ lb
SCALE: 1" = 1' - 0"



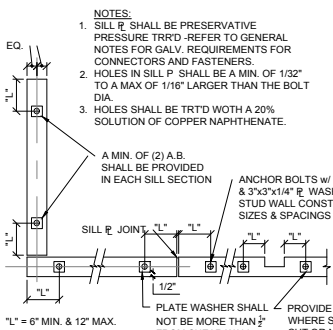
9 HD7 FOUNDATION ANCHOR DETAIL $T_{ALL} = 26690$ lb
SCALE: 3/4" = 1' - 0"



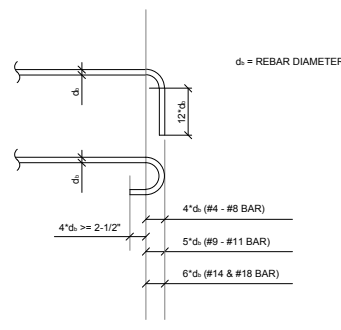
1 TYPICAL DIAPHRAGM NAILING
SCALE: 3/16" = 1' - 0"



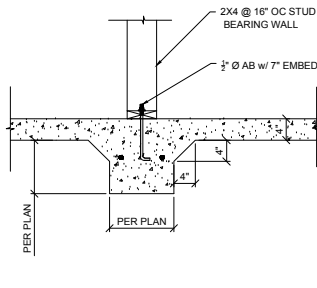
2 TYPICAL FOUNDATION DETAIL
SCALE: 3/4" = 1' - 0"



3 TYPICAL SILL R. ANCHORAGE
SCALE: 1/2" = 1' - 0"



4 REBAR HOOK DETAIL
SCALE: 1-1/2" = 1' - 0"



5 INTERIOR FOUNDATION DETAIL
SCALE: 3/4" = 1' - 0"

THE LAND DEVELOPER'S ENGINEERED SOLUTION
a division of THE LAND DEVELOPER, LLC
110 RUBY ST., TUMWATER, WA. 98501
PO BOX 4420, TUMWATER, WA. 98501
(360) 250-3973
E-MAIL: erik@thelanddeveloper.com



REVISIONS: DATE:

YEAGER GARAGE

FOUNDATION, 1ST FLOOR, 2ND
FLOOR, & ROOF FRAMING PLAN

PROJECT:
YEAGER GARAGE
10709 LARSON RD.
ANDERSON ISLAND, WA. 98303
CLIENT:
SCOTT YEAGER
10709 LARSON RD.
ANDERSON ISLAND, WA. 98303

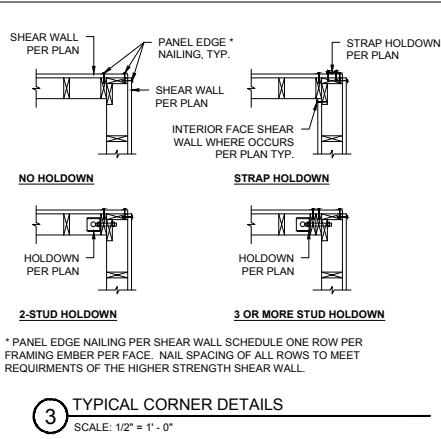
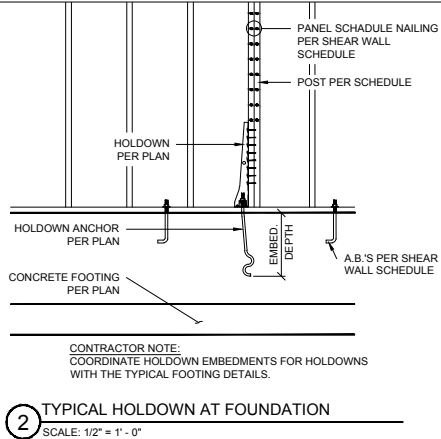
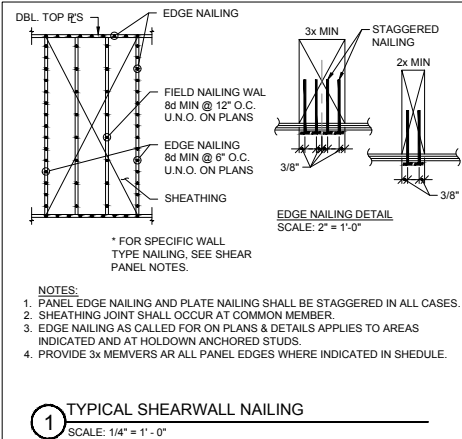
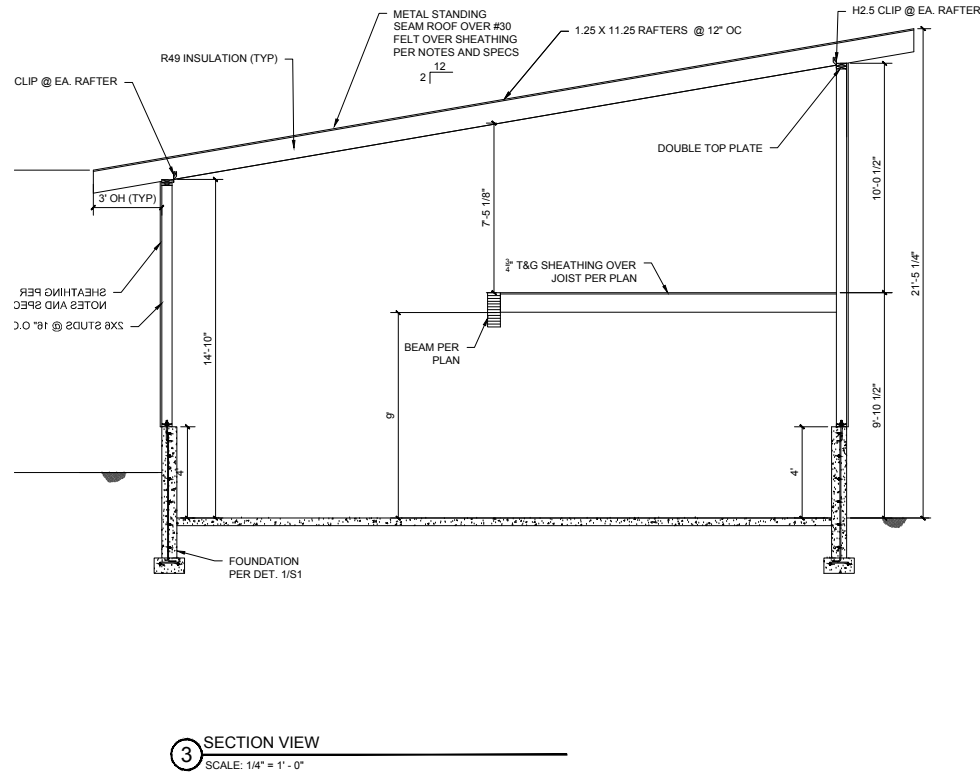
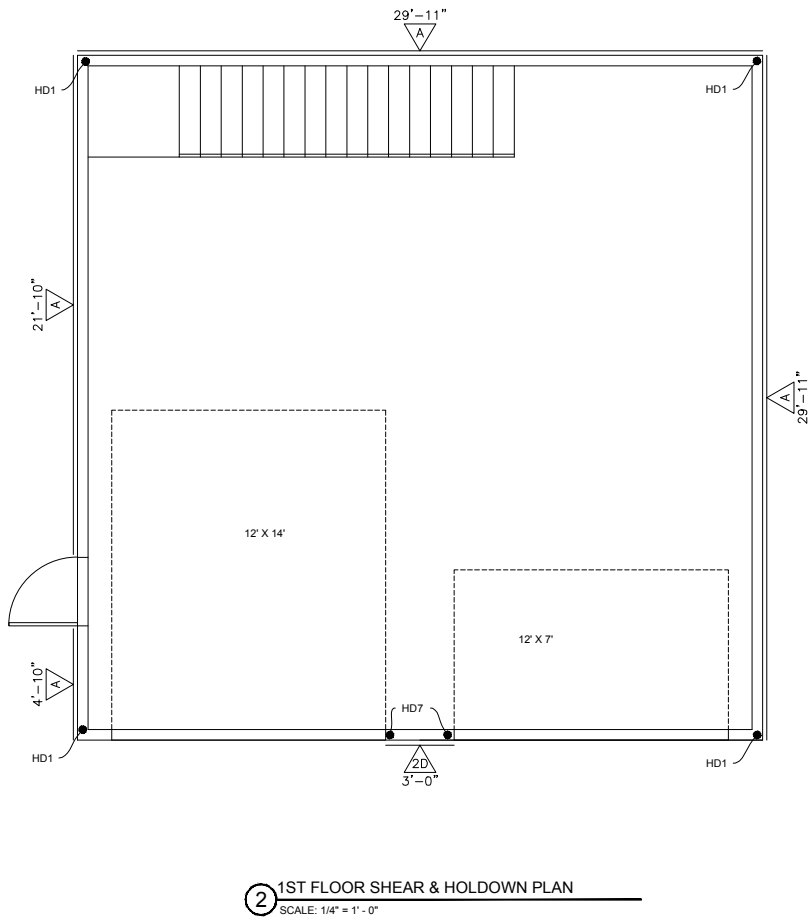
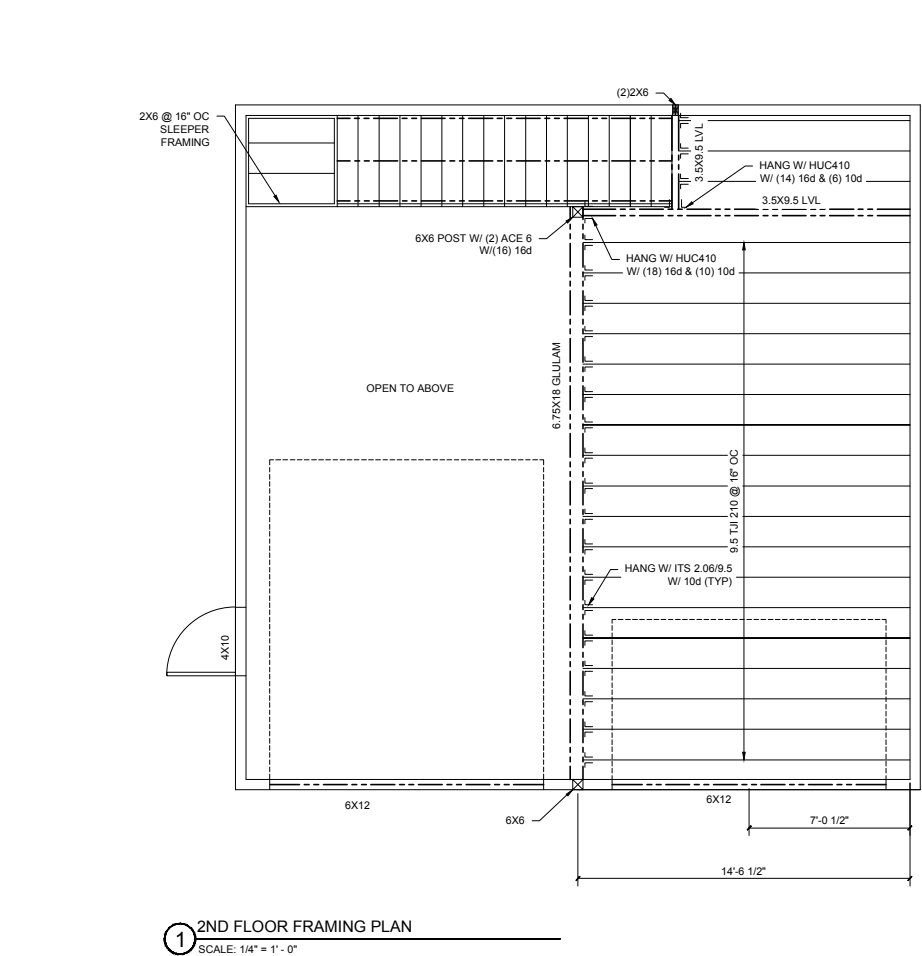
DRAWN BY: EBA

DATE: 03-09-2017

AGENCY NO.:

SHEET: S1 OF 4

JOB NO.: 17-036



SHEAR WALL SCHEDULE									
MARK	SHEATING	NO. OF SIDES	EDGE NAIL	FIELD NAIL	PLATE NAIL	SHEAR CLIP	MUDSILL ANCHORS		SHEAR WALL NOTES
							2X MUDSILL	3X MUDSILL	
A	7/16" Sheathing, plywood siding except Group 5 Species	Single	8d @ 6"	8d @ 12"	16d BOX NAIL @ 7" O.C. (OR 6" O.C. TOE NAIL) OR 1/4" SDS @ 1'-6" O.C.	LTP4 @ 2'-6"	5/8" x 10" @ 4'-0"	5/8" x 12" @ 6'-0"	1,2,3,4,5
2D	7/16" Sheathing, plywood siding except Group 5 Species	Double	8d @ 2"	8d @ 12"	1/4" SDS @ 0'-5"	LTP4 @ 0'-6"	5/8" x 10" @ 1'-1"	3/4" x 12" @ 1'-4"	1,2,3,4,5,11,12
ALT 2D	19/32" Sheathing, plywood siding (Structural I)	Single	(2) rows of 10d @ 2"	10d @ 2"	1/4" SDS @ 0'-5"	LTP4 @ 0'-6"	5/8" x 10" @ 1'-1"	3/4" x 12" @ 1'-4"	1,3,4,7,8,9,11,12

(#) Reference applicable shearwall note below.

SHEAR WALL NOTES

- THERE SHALL BE A CONTINUOUS FOOTING UNDER ALL BRACED PANELS.
- WALL SHALL BE FRAMED WITH STUDS AT 16" O.C. OR PANELS ARE APPLIED WITH LONG DIMENSION ACROSS STUDS.
- PLATE NAILING SHALL CONNECT BOTTOM PLATE TO BLOCKING AND BLOCKING TO SHEARWALL PLATES BELOW. SDS SCREW SHALL BE 5" LONG FOR CONNECTING BOTTOM PLATE TO BLOCKING, AND 6" LONG FOR CONNECTING DOUBLE TOP PLATE TO BLOCKING.
- SHEAR CLIP CAN BE USED TO TRANSFER SHEARWALL SHEAR VALUE IN LIEU OF PLATE NAILING.
- LTP4 W/ (12) 8dX1-1/2"
- PLATE WASHERS SHALL EXTEND TO WITHIN 1/2" OF THE EDGE OF THE BOTTOM PLATE ON THE SIDE(S) WITH SHEATHING OR OTHER MATERIAL WITH UNIT SHEAR CAPACITY OF 400 PLF FOR WIND OR SEISMIC.
- WALL SHALL BE FRAMED WITH STUDS AT 8" O.C. OR PANELS ARE APPLIED WITH LONG DIMENSION ACROSS STUDS.
- ALL FRAMING MEMBERS RECEIVING EDGE NAILING FROM ABUTTING PANELS SHALL NOT BE LESS THAN A SINGLE 4-INCH NOMINAL MEMBER FASTENED IN ACCORDANCE WITH 2015 IBC SECTION 2306.1 TO TRANSFER THE DESIGN SHEAR VALUE BETWEEN FRAMING MEMBERS. WOOD STRUCTURAL PANEL.
- JOINT AND SILL PLATE NAILING SHALL BE STAGGERED IN ALL CASES. ALL PANEL EDGES AND SHEATHING EDGES SHALL BE BLOCKED.
- PLYWOOD SHALL BE RATED STRUCTURAL I, 32 OC AND BE 5-PLY.
- LTP4 W/ (12) 8dX1-1/2"
- PLATE WASHERS SHALL EXTEND TO WITHIN 1/2" OF THE EDGE OF THE BOTTOM PLATE ON THE SIDE(S) WITH SHEATHING OR OTHER MATERIAL WITH UNIT SHEAR CAPACITY OF 400 PLF FOR WIND OR SEISMIC

VERTICAL HOLDOWN STRAPS:

(HD1) TALL=2,550 lb
HDU2-SDS2.5 W/ (6) SDS 1/4"x25/2" INTO (2)2x W/ SSB16 A.B. W/ (13" MIN EMBED) or 1/2" TITEN HD W/ (4" MIN EMBED), OR STD10 W/ (18) 16d SINKERS (FOLLOW MANUF.)

(HD7) TALL 26,690 lb
REF DET 11 & 12

THE LAND DEVELOPER'S ENGINEERED SOLUTION
a division of THE LAND DEVELOPER, LLC
110 RUBY ST., TUMATEER, WA. 98501
PO BOX 4420, TUNAWATER, WA. 98501
(360) 250-3973
E-MAIL: erik@thelanddeveloper.com



DATE: _____

REVISIONS: _____

YEAGER GARAGE

2ND FLOOR FRAMING PLAN, SHEAR AND HOLDOWN & SECTION

PROJECT:
YEAGER GARAGE
10709 LARSON RD.
ANDERSON ISLAND, WA. 98303

CLIENT:
SCOTT YEAGER
10709 LARSON RD.
ANDERSON ISLAND, WA. 98303

DRAWN BY: EBA

DATE: 03-09-2017

AGENCY NO.: _____

SHEET: S2 OF 4

JOB NO.: 17-036

Company Name _____		DESIGNED _____	JOB NO. _____
PROJECT _____		CHECKED _____	SHT _____ OF _____
SUBJECT _____		DATE _____	

Building Information

No. of stories 1

Building height for lateral calculations (ft) 15.00

Building weight (lbs) 27216

Redundancy Factor:

N-S: 1.3

E-W: 1.3

Floor Information

Floor_ID 1st

Floor net area (sf) 1296

Floor opening area (sf) 0

Average height (ft) 15.00

Diaphragms

Floor diaphragms for 1st									
Diaphragm name	Area (sf)	Effective seismic weight (psf)						Type	Remarks
		DL	Walls	Snow	Storage	Partitions	Total		
D1	1296	15.00	6.00	0.00	0.00	0.00	21.00	Roof	Ignore opening in weight calculations

Company Name _____	DESIGNED _____	JOB NO. _____
PROJECT _____	CHECKED _____	SHT _____ OF _____
SUBJECT _____	DATE _____	

Seismic Loads

Design code 2015 IBC (ASCE 7-10)
Lateral force calculation method Equivalent Lateral Force Procedure

Seismic data:

Building occupancy category	II. Standard	Table 1-1
Importance factor I	1.00	Table 11.5-1
Soil site class	D. Stiff soil profile	Table 20-3-1
Response Spectral Acc. (0.2 sec) (S_S)	1.33	Fig 22-1 through 22-14
Design Response Spectral Acc. (0.2 sec) (S_S)	1.33	Fig 22-1 through 22-14
Response Spectral Acc. (1.0 sec) (S_1)	0.53	Fig 22-1 through 22-14
T_L (sec)	6.00	Fig 22-15 through 22-20
F_a	1.00	Table 11.4-1
F_v	1.50	Table 11.4-2
Max. Considered earthquake acc. S_{MS}	1.33	(11.4-1)
Max. Considered earthquake acc. S_{M1}	0.80	(11.4-2)
Design spectral acc. at short period S_{DS}	0.88	(11.4-3)
Design spectral acc. at 1 s period S_{D1}	0.53	(11.4-4)
Seismic design category based on short period	D	Table 11.6-1
Seismic design category based on 1 S period	D	Table 11.6-2
Is $S_1 > 0.75$	False	Sec 11.6
Project seismic design category	D	
Seismic force resisting system	13. Light-framed walls sheathed with wood structural panels rated for shear resistance or steel sheets	Table 12.2-1
Response modification coefficient R	6.50	Table 12.2-1
System overstrength coefficient Ω_o	3.00	
Subtract 0.50 of Resistance Factor for flexible diaphragms	True	
Approximate fundamental period parameters	$C_t = 0.02$ $x = 0.75$	Table 12.8-2
Building height (ft)	15.00	
Building period $T = T_a$ (sec)	0.15	(12.8-7)
Regular structure and 5 stories or less?	True	
Maximum $S_{ss} = 1.50$	False	Sec 12.8.1.3
Base Shear Adjustment Factor	1	
Minimum C_s	0.01	12.8.5
Seismic response coefficient C_s	0.14	(12.8-2)
Adjusted C_s	0.14	

Seismic load: $V = C_s W = 0.14 W$

For allowable stress design $0.7 E = 0.7 * 0.14 = 0.0952 W$

Company Name _____		DESIGNED _____	JOB NO. _____
PROJECT _____		CHECKED _____	SHT _____ OF _____
SUBJECT _____		DATE _____	

Total effective weight (lbs) = 27216

Total seismic force (ASD) (lbs) = 2591

Vertical seismic load distribution:

$$F_x = C_{vx} V$$

$$C_{vx} = \frac{w_x h_x^k}{\sum_{i=1}^n w_i h_i^k} \quad (12.8-11)$$

T 0.15

K 1.00

Sec 12.8.3

Floor	Wx (lbs)	hx (ft)	Wx * hx lb.ft	$\frac{Wx * hx}{\sum(W_i * h_i)}$	Fx (lbs)
1st	27216	15.00	408240	1.0000	2591

Sum(W)= 27216

Sum(W*h)= 408240

Diaphragm design force:

$$F_{px} = \frac{\sum_{i=x}^n F_i}{\sum_{i=x}^n w_i} w_{px} \quad 12.10.1$$

Minimum value = $0.2 S_{SD} W_{px}$

Sec 12.10.1

Needn't to exceed = $0.4 S_{SD} W_{px}$

Diaphragm seismic forces:

Floor	Sum(Fi) (lbs)	Sum(Wi) (lbs)	Wpx (lbs)	$\frac{\sum(F_i)}{\sum(W_i)} W_{px}$	Min. Value	Max. Value	Fpx (lbs)
1st	2591	27216	27216	2591	4812	9624	4812

Seismic force verification:

Direction	Base Seismic Forces (lbs)							Sum Wall Forces (lbs)	% Difference
	Masses			Forces		Point Seismic	Total Base Shear		
	Sum of diaphragm masses	Sum point mass	Total mass	Seismic factor	Seismic force from mass				
N-S	27216	0	27216	0.0952	2591	0	2591	2591	0.000
E-W	27216	0	27216	0.0952	2591	0	2591	2591	0.000

Company Name _____	DESIGNED _____	JOB NO. _____
PROJECT _____	CHECKED _____	SHT _____ OF _____
SUBJECT _____	DATE _____	

Wind Loads

Design Code: International Building Code 2009
Wind Standard: ASCE7-05 (Method 2 - All Heights)

(REF PAGE ONE FOR JUSTIFICATION OF
 COMPLIANCE WITH IBC2015.)

Wind Data

Exposure B

Enclosure Enclosed Building

Category II

Wind Speed 85 MPH

Mean Roof Height 20.92 ft

Importance Factor I_w 1

Hill Shape: No Topographic Obstructions

Velocity Coefficient q_z $0.00256 K_z K_{zt} K_d V^2 I_w$ (6-15)

Velocity Coefficient q_h $0.00256 K_h K_{zt} K_d V^2 I_w$ (6-15)

Directionality Factor K_d 0.85 Table 6-4

Gust Effect Factor G 0.85 6.5.8.1

Pressures for MWFRS p qGC_p (6-17)

K_h 0.63

North/South C_p :

Windward Wall C_p 0.80

Leeward Wall C_p -0.50

(L/B) 1.00

East/West C_p :

Windward Wall C_p 0.80

Leeward Wall C_p -0.50

(L/B) 1.00

Company Name _____		DESIGNED _____	JOB NO. _____
PROJECT _____		CHECKED _____	SHT _____ OF _____
SUBJECT _____		DATE _____	

Wind Load Distribution (North/South)

Elev. Z (ft)	K _z	K _{zt}	q _z (psf)	p (Wall-Windward) (psf)
0-15	0.57	1.00	9.04	6.14
20.00	0.62	1.00	9.81	6.67
20.92	0.63	1.00	9.94	6.76

p (Wall-Leeward) (psf) -4.22

p (Roof Windward) (psf) 0.00

p (Roof Leeward) (psf) -10.00

Wind Load Distribution (East/West)

Elev. Z (ft)	K _z	K _{zt}	q _z (psf)	p (Wall-Windward) (psf)
0-15	0.57	1.00	9.04	6.14
20.00	0.62	1.00	9.81	6.67
20.92	0.63	1.00	9.94	6.76

p (Wall-Leeward) (psf) -4.22

p (Roof Windward) (psf) 2.29

p (Roof Leeward) (psf) -7.71

Company Name _____		DESIGNED _____	JOB NO. _____
PROJECT _____		CHECKED _____	SHT _____ OF _____
SUBJECT _____		DATE _____	

Shear line reactions and shear wall forces

Floor ID: 1st

Shear line ID	Reaction (lbs)		Shear wall ID	Shear wall forces (lbs)		R*	Wall type
	Seismic	Wind		Seismic	Wind		
1	1295	2517	1-1	1059	2058	6.50	Segmented
			1-2	236	459	6.50	Segmented
2	1295	2517	2-1	1295	2517	6.50	Segmented
a	1286	3279	a-1	1286	3279	6.50	Segmented
b	1305	3330	b-1	1305	3330	6.50	Pre-manufactured

Company Name _____		DESIGNED _____	JOB NO. _____	
PROJECT _____		CHECKED _____	SHT _____ OF _____	
SUBJECT _____		DATE _____		

Shear Wall Schedule

Mark	Sheathing	No. of sides	Edge Nail	Field Nail	Plate Nail	Shear Clip	Mudsill Anchors		Allowable Shear (plf)	Material	Remarks
							2X Mudsill	3X Mudsill			
A	7/16" Sheathing, plywood siding except Group 5 Species	Single	8d @ 6"	8d @ 12"	16d @ 0'-1"	LTP4 @ 0'-4"	5/8" x 10" @ 2'-1"	5/8" x 12" @ 4'-0"	260	DF	1
B	7/16" Sheathing, plywood siding except Group 5 Species	Single	8d @ 4"	8d @ 12"	16d @ 0'-1"	LTP4 @ 0'-4"	5/8" x 10" @ 1'-7"	5/8" x 12" @ 3'-2"	350	DF	1
C	7/16" Sheathing, plywood siding except Group 5 Species	Single	8d @ 3"	8d @ 12"	16d @ 0'-1"	LTP4 @ 0'-4"	5/8" x 10" @ 1'-1"	5/8" x 12" @ 2'-3"	490	DF	1,2
D	7/16" Sheathing, plywood siding except Group 5 Species	Single	8d @ 2"	8d @ 12"	16d @ 0'-1"	LTP4 @ 0'-4"	N/A	5/8" x 12" @ 1'-9"	640	DF	1,2
E	19/32" Sheathing, plywood siding except Group 5 Species	Single	10d @ 2"	10d @ 12"	1/4"x6" SDS @ 0'-5"	LTP4 @ 0'-4"	N/A	5/8" x 12" @ 1'-3"	870	DF	1,2
2C	3/8" Sheathing, plywood siding except Group 5 Species	Double	8d @ 3"	8d @ 12"	1/4"x6" SDS @ 0'-6"	LTP4 @ 0'-4"	N/A	3/4" x 12" @ 2'-0"	980	DF	1,2
2D	7/16" Sheathing, plywood siding except Group 5 Species	Double	8d @ 2"	8d @ 12"	1/4"x6" SDS @ 0'-5"	LTP4 @ 0'-4"	N/A	3/4" x 12" @ 1'-8"	1,280	DF	1,2
E2	19/32" Sheathing, plywood siding except Group 5 Species	Double	10d @ 2"	10d @ 12"	1/4"x6" SDS @ 0'-3"	LTP4 @ 0'-4"	N/A	5/8" x 12" @ 0'-7"	1,740	DF	1,2

- 1 WALL SHALL BE FRAMED WITH STUDS AT 16" O.C. OR PANELS ARE APPLIED WITH LONG DIMENSION ACROSS STUDS.
- 2 ALL FRAMING MEMBERS RECEIVING EDGE NAILING FROM ABUTTING PANELS SHALL NOT BE LESS THAN A SINGLE 3-INCH NOMINAL MEMBER OR TWO 2-INCH NOMINAL MEMBERS FASTEND IN ACCORDANCE WITH SECTION 2306.1 TO TRANSFER THE DESIGN SHEAR VALUE BETWEEN FRAMING MEMBERS. WOOD STRUCTURAL PANEL JOINT AND SILL PLATE NAILING SHALL BE STAGGERED IN ALL CASES.
- 3 ALL HARDWARE SHALL BE USP STRUCTURAL CONNECTORS U.O.N.

Company Name _____		DESIGNED _____	JOB NO. _____
PROJECT _____		CHECKED _____	SHT _____ OF _____
SUBJECT _____		DATE _____	

Shear Wall Design

1st walls

Wall ID	Length (ft)	Net Height (ft)	H / W	Shear (plf)		Wall type	Allowable shear (plf)	Adjusted allowable shear (plf)		Wall Drift (in)	Hold-Down		Remarks
				Wind	Seismic			Wind	Seismic		End I	End J	
1-1	21'-10"	15'-0"	0.69	94	63	A	260	364	260	0.30			
1-2	4'-10"	15'-0"	3.08	94	63	A	260	364	169	1.27	none	none	
2-1	29'-11"	15'-0"	0.50	84	56	A	260	364	260	0.25			
a-1	30'-0"	15'-0"	0.50	109	56	A	260	364	260	0.25			
b-1													1

1 See pre-manufactured walls report

Company Name	DESIGNED _____	JOB NO. _____
PROJECT _____	CHECKED _____	SHT _____ OF _____
SUBJECT _____	DATE _____	

HOLD-DOWN SCHEDULE

Mark	Fastener	Minimum Wood Member	Anchor Bolt	Capacity (lbs)	Remarks
none	none	(2) 2 x 4	5/8" A.B.	1000	

Company Name _____		DESIGNED _____	JOB NO. _____
PROJECT _____		CHECKED _____	SHT _____ OF _____
SUBJECT _____		DATE _____	

Uplift Calculations

Load Cases:

$$0.6D + W$$

$$(0.6 - 0.14S_{DS})D + 0.7pQ_E$$

1st Walls

Post ID	Shear Wall	Reactions (lbs)			Wall Height (ft)	Net Uplift (lbs)	Hold Down
		DL	W	0.7E			
UP9	1-2	1869	-1411	-944	15	-290	none
UP10	1-1	6842	-1411	-944	15	2314	
UP13	a-1	5078	-1640	-836	15	1407	NR
	1-1	5994	-1411	-944	15	1910	
UP14	1-2	1277	-1411	-944	15	-645	none
UP15	a-1	5069	-1640	-836	15	1402	NR
	2-1	8306	-1258	-842	15	3114	
UP16	2-1	8319	-1258	-842	15	3120	
UP18	b-1	285	-24976	-12728	15	-24805	PP
UP17	b-1	285	-24976	-12728	15	-24805	PP

- NR indicates that no hold-down is required because there is no net uplift.
- No Selection indicates that uplift value is larger than available hold-down capacities defined in database.
- PP indicates hold-down attached to a pre-manufactured shear wall panel.

Company Name _____		DESIGNED _____	JOB NO. _____	
PROJECT _____		CHECKED _____	SHT _____ OF _____	
SUBJECT _____		DATE _____		

Diaphragm Design

Floor_ID: 1st

Diaphragm_ID: D1

Code Check

Diaphragm Shear: Passed

Nailing

Load Direction: E-W

Span	Sheathing		Nailing		Min. member thickness (in)	Diaphragm type	Case ID	Effective depth (ft)		Seismic shear (plf)		Wind shear (plf)		Chord force (lbs)		Check
	Grade	Thickness (in)	Boundary	Other edges				For shear	For bending	Applied shear	Allowable shear	Applied shear	Allowable shear	Seismic	Wind	
a-b	Sheathing and Single-Floor	15/32	8d@6	8d@6	2	Unblocked	4	36.00	36.00	55	180	76	252.5	393	540	P

Load Direction: N-S

Span	Sheathing		Nailing		Min. member thickness (in)	Diaphragm type	Case ID	Effective depth (ft)		Seismic shear (plf)		Wind shear (plf)		Chord force (lbs)		Check
	Grade	Thickness (in)	Boundary	Other edges				For shear	For bending	Applied shear	Allowable shear	Applied shear	Allowable shear	Seismic	Wind	
1-2	Sheathing and Single-Floor	15/32	8d@6	8d@6	2	Unblocked	2	36.00	36.00	56	180	58	252.5	401	419	P

Company Name _____	DESIGNED _____	JOB NO. _____
PROJECT _____	CHECKED _____	SHT _____ OF _____
SUBJECT _____	DATE _____	

Project Load Combinations

Design Code: IBC 2009 NOTE: BY OBSERVATION CALCS. COMPLY WITH IBC 2015

ID	Load Combination Name	Dead	Live	Roof Live	Snow Balanced	Snow Unbalanced	Seismic (0.7 QE)	Wind	LDF
1	D	1.000	0	0	0	0	0	0	0.9
2	D+L	1.000	1.000	0	0	0	0	0	1
3	D+Lr	1.000	0	1.000	0	0	0	0	1.25
4	D+S (Balanced)	1.000	0	0	1.000	0	0	0	1.15
5	D+S (Unbalanced)	1.000	0	0	0	1.000	0	0	1.15
6	D+0.75L+0.75Lr	1.000	0.750	0.750	0	0	0	0	1.25
7	D+0.75L+0.75S (Balanced)	1.000	0.750	0	0.750	0	0	0	1.15
8	D+0.75L+0.75S (Unbalanced)	1.000	0.750	0	0	0.750	0	0	1.15
9	D+0.7E (North)	1.000	0	0	0	0	1.000	0	1.6
10	D+0.7E (South)	1.000	0	0	0	0	1.000	0	1.6
11	D+0.7E (East)	1.000	0	0	0	0	1.000	0	1.6
12	D+0.7E (West)	1.000	0	0	0	0	1.000	0	1.6
13	D+0.7E (North)+0.75L+0.75Lr	1.000	0.750	0.750	0	0	1.000	0	1.6
14	D+0.7E (South)+0.75L+0.75Lr	1.000	0.750	0.750	0	0	1.000	0	1.6
15	D+0.7E (East)+0.75L+0.75Lr	1.000	0.750	0.750	0	0	1.000	0	1.6
16	D+0.7E (West)+0.75L+0.75Lr	1.000	0.750	0.750	0	0	1.000	0	1.6
17	D+0.7E (North)+0.75L+0.75S (Balanced)	1.000	0.750	0	0.750	0	1.000	0	1.6
18	D+0.7E (North)+0.75L+0.75S (Unbalanced)	1.000	0.750	0	0	0.750	1.000	0	1.6
19	D+0.7E (South)+0.75L+0.75S (Balanced)	1.000	0.750	0	0.750	0	1.000	0	1.6
20	D+0.7E (South)+0.75L+0.75S (Unbalanced)	1.000	0.750	0	0	0.750	1.000	0	1.6
21	D+0.7E (East)+0.75L+0.75S (Balanced)	1.000	0.750	0	0.750	0	1.000	0	1.6
22	D+0.7E (East)+0.75L+0.75S (Unbalanced)	1.000	0.750	0	0	0.750	1.000	0	1.6
23	D+0.7E (West)+0.75L+0.75S (Balanced)	1.000	0.750	0	0.750	0	1.000	0	1.6
24	D+0.7E (West)+0.75L+0.75S (Unbalanced)	1.000	0.750	0	0	0.750	1.000	0	1.6
25	0.6D+0.7E (North)	0.600	0	0	0	0	1.000	0	1.6
26	0.6D+0.7E (South)	0.600	0	0	0	0	1.000	0	1.6
27	0.6D+0.7E (East)	0.600	0	0	0	0	1.000	0	1.6
28	0.6D+0.7E (West)	0.600	0	0	0	0	1.000	0	1.6
29	D+W (North)	1.000	0	0	0	0	0	1.000	1.6

Company Name _____	DESIGNED _____	JOB NO. _____
PROJECT _____	CHECKED _____	SHT _____ OF _____
SUBJECT _____	DATE _____	

Project Load Combinations

Design Code: IBC 2009 NOTE: BY OBSERVATION CALCS. COMPLY WITH IBC 2015

ID	Load Combination Name	Dead	Live	Roof Live	Snow Balanced	Snow Unbalanced	Seismic (0.7 QE)	Wind	LDF
30	D+W (South)	1.000	0	0	0	0	0	1.000	1.6
31	D+W (East)	1.000	0	0	0	0	0	1.000	1.6
32	D+W (West)	1.000	0	0	0	0	0	1.000	1.6
33	D+0.75W (North)+0.75L+0.75Lr	1.000	0.750	0.750	0	0	0	0.750	1.6
34	D+0.75W (South)+0.75L+0.75Lr	1.000	0.750	0.750	0	0	0	0.750	1.6
35	D+0.75W (East)+0.75L+0.75Lr	1.000	0.750	0.750	0	0	0	0.750	1.6
36	D+0.75W (West)+0.75L+0.75Lr	1.000	0.750	0.750	0	0	0	0.750	1.6
37	D+0.75W (North)+0.75L+0.75S (Balanced)	1.000	0.750	0	0.750	0	0	0.750	1.6
38	D+0.75W (North)+0.75L+0.75S (Unbalanced)	1.000	0.750	0	0	0.750	0	0.750	1.6
39	D+0.75W (South)+0.75L+0.75S (Balanced)	1.000	0.750	0	0.750	0	0	0.750	1.6
40	D+0.75W (South)+0.75L+0.75S (Unbalanced)	1.000	0.750	0	0	0.750	0	0.750	1.6
41	D+0.75W (East)+0.75L+0.75S (Balanced)	1.000	0.750	0	0.750	0	0	0.750	1.6
42	D+0.75W (East)+0.75L+0.75S (Unbalanced)	1.000	0.750	0	0	0.750	0	0.750	1.6
43	D+0.75W (West)+0.75L+0.75S (Balanced)	1.000	0.750	0	0.750	0	0	0.750	1.6
44	D+0.75W (West)+0.75L+0.75S (Unbalanced)	1.000	0.750	0	0	0.750	0	0.750	1.6
45	06D+W (North)	0.600	0	0	0	0	0	1.000	1.6
46	06D+W (South)	0.600	0	0	0	0	0	1.000	1.6
47	06D+W (East)	0.600	0	0	0	0	0	1.000	1.6
48	06D+W (West)	0.600	0	0	0	0	0	1.000	1.6
49	(1.0+0.145SDS)D+0.7QoQE (North) ASCE 12.4.3.2 #5	1.128	0	0	0	0	2.500	0	1.92
50	(1.0+0.145SDS)D+0.7QoQE (South) ASCE 12.4.3.2 #5	1.128	0	0	0	0	2.500	0	1.92
51	(1.0+0.145SDS)D+0.7QoQE (East) ASCE 12.4.3.2 #5	1.128	0	0	0	0	2.500	0	1.92
52	(1.0+0.145SDS)D+0.7QoQE (West) ASCE 12.4.3.2 #5	1.128	0	0	0	0	2.500	0	1.92
53	(1.0+0.105SDS)D+0.525QoQE(North)+0.75L+0.75Lr ASCE 12.4.3.2 #6	1.093	0.750	0.750	0	0	1.875	0	1.92
54	(1.0+0.105SDS)D+0.525QoQE(South)+0.75L+0.75Lr ASCE 12.4.3.2 #6	1.093	0.750	0.750	0	0	1.875	0	1.92
55	(1.0+0.105SDS)D+0.525QoQE(East)+0.75L+0.75Lr ASCE 12.4.3.2 #6	1.093	0.750	0.750	0	0	1.875	0	1.92
56	(1.0+0.105SDS)D+0.525QoQE(West)+0.75L+0.75Lr ASCE 12.4.3.2 #6	1.093	0.750	0.750	0	0	1.875	0	1.92
57	(1.0+0.105SDS)D+0.525QoQE(North)+0.75L+0.75S ASCE 12.4.3.2 #6	1.093	0.750	0	0.750	0	1.875	0	1.92
58	(1.0+0.105SDS)D+0.525QoQE(North)+0.75L+0.75S(U) ASCE 12.4.3.2 #6	1.093	0.750	0	0	0.750	1.875	0	1.92
59	(1.0+0.105SDS)D+0.525QoQE(South)+0.75L+0.75S ASCE 12.4.3.2 #6	1.093	0.750	0	0.750	0	1.875	0	1.92

Company Name _____	DESIGNED _____	JOB NO. _____
PROJECT _____	CHECKED _____	SHT _____ OF _____
SUBJECT _____	DATE _____	

Project Load Combinations

Design Code: IBC 2009 **NOTE:** BY OBSERVATION CALCS. COMPLY WITH IBC 2015

ID	Load Combination Name	Dead	Live	Roof Live	Snow Balanced	Snow Unbalanced	Seismic (0.7 QE)	Wind	LDF
60	(1.0+0.105SDS)D+0.525ΩoQE(South)+0.75L+0.75S(U) ASCE 12.4.3.2 #6	1.093	0.750	0	0	0.750	1.875	0	1.92
61	(1.0+0.105SDS)D+0.525ΩoQE(East)+0.75L+0.75S ASCE 12.4.3.2 #6	1.093	0.750	0	0.750	0	1.875	0	1.92
62	(1.0+0.105SDS)D+0.525ΩoQE(East)+0.75L+0.75S(U) ASCE 12.4.3.2 #6	1.093	0.750	0	0	0.750	1.875	0	1.92
63	(1.0+0.105SDS)D+0.525ΩoQE(West)+0.75L+0.75S ASCE 12.4.3.2 #6	1.093	0.750	0	0.750	0	1.875	0	1.92
64	(1.0+0.105SDS)D+0.525ΩoQE(West)+0.75L+0.75S(U) ASCE 12.4.3.2 #6	1.093	0.750	0	0	0.750	1.875	0	1.92
65	(0.6-0.145SDS)D+0.7ΩoQE (North) ASCE 12.4.3.2 #8	0.472	0	0	0	0	2.500	0	1.92
66	(0.6-0.145SDS)D+0.7ΩoQE (South) ASCE 12.4.3.2 #8	0.472	0	0	0	0	2.500	0	1.92
67	(0.6-0.145SDS)D+0.7ΩoQE (East) ASCE 12.4.3.2 #8	0.472	0	0	0	0	2.500	0	1.92
68	(0.6-0.145SDS)D+0.7ΩoQE (West) ASCE 12.4.3.2 #8	0.472	0	0	0	0	2.500	0	1.92

Company Name	DESIGNED	JOB NO.
PROJECT	CHECKED	SHT OF
SUBJECT	DATE	

Design Code: IBC 2009 / NDS 2005
Opening_ID: O1 **Location:** 1st **Passed**
 Center span Ls (ft): 12.00 Section Type: Douglas Fir - Larch No.2
 Left Cantilever Lc (ft): 0 Section Name: 4x10
 Right Cantilever Lr (ft): 0 Opening Thickness: 3.50 in.
 Ignore shear within (d)? False Opening Depth: 9.25 in.
 Include own weight? True A: 32.38 in²
 Lu top (ft): 12.25 Sxx: 49.91 in³
 Lu bottom (ft): 12.25 Syy: 18.89 in³
 Slenderness Ratio: 14 Fb Base Allowable: 900 psi
 Adjustment factors: CF=1.200 Fb Adjust Allowable (CD = 1): 1059 psi
 Fv Allowable (CD = 1): 180 psi
 Fc Allowable (CD = 1): 1350 psi
 E: 1600 ksi

Analysis Summary:

Load Combination	Max. Bending			Max. Shear		Reaction (lbs)	
	Max Moment (k.lf.)	Shear (lbs)	Location (ft)	Max Shear (lbs)	Location (ft)	Left	Right
D	1.74	12	5.94	-575	12.12	574	581
D+Lr	2.84	19	5.94	-938	12.12	938	952

Code Check:

Load Combination	LDF	Max. Bending			Max. Shear			Required bearing area (i ²)	
		Critical fb (psi)	Fb (psi)	% Code Check	Max fv (psi)	Fv (psi)	% Code Check	Left	Right
D	0.90	418	953	43.9	27	162	16.4	1.26	1.27
D+Lr	1.25	683	1309	52.2	43	225	19.3	2.06	2.09

Total Load Deflection:

Span ID	Applied (in)	Allowable (in)	Location (ft)	Deflection Check	Load Combination
P1-P2	0.204	0.60	5.94	Passed L/722	D+Lr

Total Live Load Deflection:

SpanID	Applied (in)	Allowable (in)	Location (ft)	Deflection Check
P1-P2	0.079	0.40	5.94	Passed L/999+

Company Name _____		DESIGNED _____	JOB NO. _____
PROJECT _____		CHECKED _____	SHT _____ OF _____
SUBJECT _____		DATE _____	

Design Code: IBC 2009 / NDS 2005

Opening_ID: O2 Location: 1st Passed

Center span Ls (ft):	12.00	Section Type:	Douglas Fir - Larch No.2
Left Cantilever Lc (ft):	0	Section Name:	4x10
Right Cantilever Lr (ft):	0	Opening Thickness:	3.50 in.
Ignore shear within (d)?	False	Opening Depth:	9.25 in.
Include own weight?	True	A:	32.38 in ²
Lu top (ft):	12.25	Sxx:	49.91 in ³
Lu bottom (ft):	12.25	Syy:	18.89 in ³
Slenderness Ratio:	14	Fb Base Allowable:	900 psi
Adjustment factors:	CF=1.200	Fb Adjust Allowable (CD = 1):	1059 psi
		Fv Allowable (CD = 1):	180 psi
		Fc Allowable (CD = 1):	1350 psi
		E:	1600 ksi

Analysis Summary:

Load Combination	Max. Bending			Max. Shear		Reaction (lbs)	
	Max Moment (k.lf.)	Shear (lbs)	Location (ft)	Max Shear (lbs)	Location (ft)	Left	Right
D	1.74	12	5.94	-575	12.12	574	581
D+Lr	2.84	19	5.94	-938	12.12	938	952

Code Check:

Load Combination	LDF	Max. Bending			Max. Shear			Required bearing area (i ²)	
		Critical fb (psi)	Fb (psi)	% Code Check	Max fv (psi)	Fv (psi)	% Code Check	Left	Right
D	0.90	418	953	43.9	27	162	16.4	1.26	1.27
D+Lr	1.25	683	1309	52.2	43	225	19.3	2.06	2.09

Total Load Deflection:

Span ID	Applied (in)	Allowable (in)	Location (ft)	Deflection Check	Load Combination
P5-P6	0.204	0.60	5.94	Passed L/722	D+Lr

Total Live Load Deflection:

SpanID	Applied (in)	Allowable (in)	Location (ft)	Deflection Check
P5-P6	0.079	0.40	5.94	Passed L/999+

Company Name	DESIGNED	JOB NO.
PROJECT	CHECKED	SHT OF
SUBJECT	DATE	

Design Code: IBC 2009 / NDS 2005

Opening_ID: O3 Location: 1st Passed

Center span Ls (ft):	3.00	Section Type:	Douglas Fir - Larch No.2
Left Cantilever Lc (ft):	0	Section Name:	4x10
Right Cantilever Lr (ft):	0	Opening Thickness:	3.50 in.
Ignore shear within (d)?	False	Opening Depth:	9.25 in.
Include own weight?	True	A:	32.38 in ²
Lu top (ft):	3.25	Sxx:	49.91 in ³
Lu bottom (ft):	3.25	Syy:	18.89 in ³
Slenderness Ratio:	8	Fb Base Allowable:	900 psi
Adjustment factors:	CF=1.200	Fb Adjust Allowable (CD = 1):	1075 psi
		Fv Allowable (CD = 1):	180 psi
		Fc Allowable (CD = 1):	1350 psi
		E:	1600 ksi

Analysis Summary:

Load Combination	Max. Bending			Max. Shear		Reaction (lbs)	
	Max Moment (k.lf.)	Shear (lbs)	Location (ft)	Max Shear (lbs)	Location (ft)	Left	Right
D	0.45	-198	1.12	430	0.00	430	292
D+Lr	0.96	-472	1.12	877	0.00	877	566

Code Check:

Load Combination	LDF	Max. Bending			Max. Shear			Required bearing area (i ²)	
		Critical fb (psi)	Fb (psi)	% Code Check	Max fv (psi)	Fv (psi)	% Code Check	Left	Right
D	0.90	109	968	11.3	20	162	12.3	0.94	0.64
D+Lr	1.25	230	1341	17.1	41	225	18.1	1.92	1.24

Total Load Deflection:

Span ID	Applied (in)	Allowable (in)	Location (ft)	Deflection Check	Load Combination
UP9-UP10	0.004	0.15	1.44	Passed L/999+	D+Lr

Total Live Load Deflection:

SpanID	Applied (in)	Allowable (in)	Location (ft)	Deflection Check
UP9-UP10	0.002	0.10	1.44	Passed L/999+

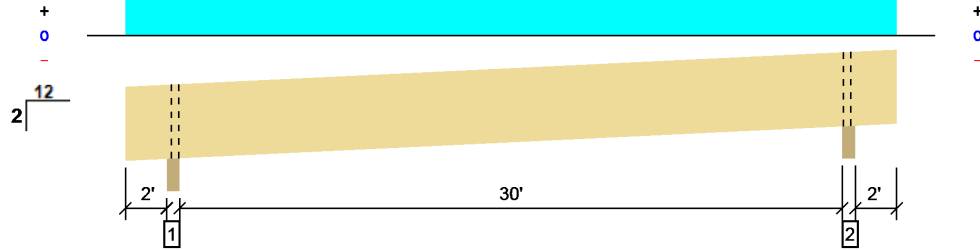
01: Level

Member Name	Results	Current Solution	Comments
RJ1	Passed	1 Piece(s) 1 3/4" x 11 1/4" 1.9E Microllam® LVL @ 12" OC	
FJ1	Passed	1 Piece(s) 9 1/2" TJI® 210 @ 16" OC	
B1	Passed	1 Piece(s) 6 3/4" x 18" 24F-V4 DF Glulam	

Forte Software Operator	Job Notes
CHRISTOPHER ARNOLD The Land Developer (360) 827-4306 chris@thelanddeveloper.com	

1 piece(s) 1 3/4" x 11 1/4" 1.9E Microllam® LVL @ 12" OC

Overall Sloped Length: 35' 2 5/8"



All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal. Drawing is Conceptual

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	696 @ 2' 1 3/4"	2639 (3.50")	Passed (26%)	--	1.0 D + 1.0 S (Adj Spans)
Shear (lbs)	567 @ 3' 2 5/8"	4302	Passed (13%)	1.15	1.0 D + 1.0 S (Adj Spans)
Moment (Ft-lbs)	4548 @ 17' 3 1/2"	9650	Passed (47%)	1.15	1.0 D + 1.0 S (Alt Spans)
Live Load Defl. (in)	1.237 @ 17' 3 1/2"	1.535	Passed (L/298)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	1.980 @ 17' 3 1/2"	2.047	Passed (L/186)	--	1.0 D + 1.0 S (Alt Spans)

System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2012
Design Methodology : ASD
Member Pitch: 2/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Overhang deflection criteria: LL (2L/240) and TL (2L/180).
- Bracing (Lu): All compression edges (top and bottom) must be braced at 9' 2" o/c unless detailed otherwise. Proper attachment and positioning of lateral bracing is required to achieve member stability.
- A 4% increase in the moment capacity has been added to account for repetitive member usage.
- Excessive upward deflection has occurred at the end of the overhang.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Beveled Plate - SPF	3.50"	3.50"	1.50"	263	433	696	Blocking
2 - Beveled Plate - SPF	3.50"	3.50"	1.50"	263	433	696	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Loads	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 34' 7"	12"	15.0	25.0	ROOF

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Refer to current Weyerhaeuser literature for installation details. (www.woodbywy.com) Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC ES under technical reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports refer to http://www.woodbywy.com/services/s_CodeReports.aspx.

The product application, input design loads, dimensions and support information have been provided by Forte Software Operator

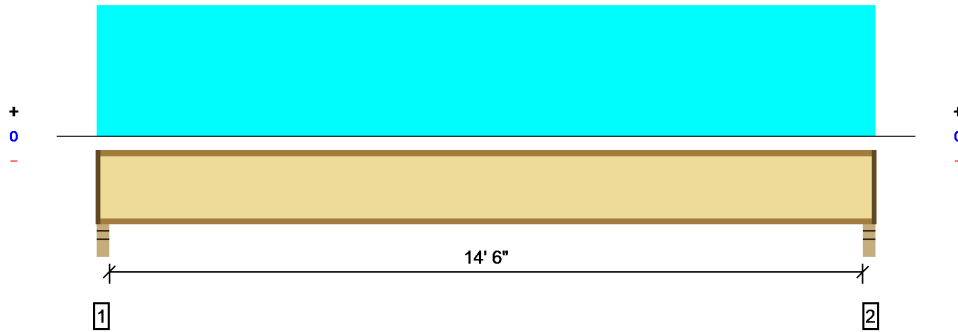


Forte Software Operator	Job Notes
CHRISTOPHER ARNOLD The Land Developer (360) 827-4306 chris@thelanddeveloper.com	

6/6/2017 3:18:35 PM
Forte v5.1, Design Engine: V6.5.1.1
Job.4te

1 piece(s) 9 1/2" TJI® 210 @ 16" OC

Overall Length: 15' 1"



All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.; Drawing is Conceptual

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	545 @ 2 1/2"	1134 (2.25")	Passed (48%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	532 @ 3 1/2"	1330	Passed (40%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1972 @ 7' 6 1/2"	3000	Passed (66%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.271 @ 7' 6 1/2"	0.367	Passed (L/650)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.372 @ 7' 6 1/2"	0.733	Passed (L/473)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	40	40	Passed	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2012
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Bracing (Lu): All compression edges (top and bottom) must be braced at 3' 11 15/16" o/c unless detailed otherwise. Proper attachment and positioning of lateral bracing is required to achieve member stability.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: None

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Stud wall - SPF	3.50"	2.25"	1.75"	151	402	553	1 1/4" Rim Board
2 - Stud wall - SPF	3.50"	2.25"	1.75"	151	402	553	1 1/4" Rim Board

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.

Loads	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 15' 1"	16"	15.0	40.0	Residential - Living Areas

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Refer to current Weyerhaeuser literature for installation details. (www.woodbywy.com) Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC ES under technical reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports refer to http://www.woodbywy.com/services/s_CodeReports.aspx.

The product application, input design loads, dimensions and support information have been provided by Forte Software Operator

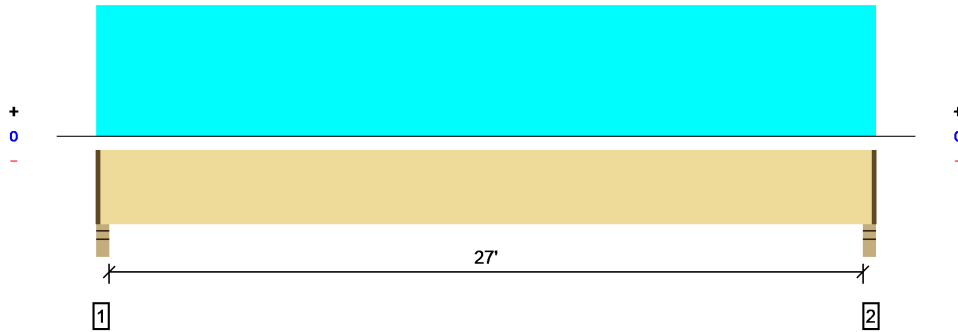


Forte Software Operator	Job Notes
CHRISTOPHER ARNOLD The Land Developer (360) 827-4306 chris@thelanddeveloper.com	

6/6/2017 3:18:35 PM
Forte v5.1, Design Engine: V6.5.1.1
Job.4te

1 piece(s) 6 3/4" x 18" 24F-V4 DF Glulam

Overall Length: 27' 7"



All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal. Drawing is Conceptual

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	6427 @ 2"	6455 (2.25")	Passed (100%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	5634 @ 1' 9 1/2"	21465	Passed (26%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	43582 @ 13' 8 1/4"	66350	Passed (66%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.672 @ 13' 9 1/2"	0.681	Passed (L/486)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.987 @ 13' 9 1/2"	1.362	Passed (L/331)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2012
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Bracing (Lu): All compression edges (top and bottom) must be braced at 27' 4 1/2" o/c unless detailed otherwise. Proper attachment and positioning of lateral bracing is required to achieve member stability.
- Critical positive moment adjusted by a volume factor of 0.91 that was calculated using length L = 27' 3".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Stud wall - SPF	3.50"	2.25"	2.24"	2059	4413	6472	1 1/4" Rim Board
2 - Stud wall - SPF	3.50"	2.25"	2.24"	2059	4413	6472	1 1/4" Rim Board

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	1 1/4" to 27' 5 3/4"	N/A	29.5		
1 - Uniform (PSF)	0 to 27' 7" (Front)	8'	15.0	40.0	Residential - Living Areas

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Refer to current Weyerhaeuser literature for installation details. (www.woodbywy.com) Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC ES under technical reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports refer to http://www.woodbywy.com/services/s_CodeReports.aspx.

The product application, input design loads, dimensions and support information have been provided by Forte Software Operator



Forte Software Operator	Job Notes
CHRISTOPHER ARNOLD The Land Developer (360) 827-4306 chris@thelanddeveloper.com	

6/6/2017 3:18:35 PM
Forte v5.1, Design Engine: V6.5.1.1
Job.4te