B-21-0070
CITY OF PUYALLUP

City of Puyallup	
Development & Permitting Services	
ISSUED PERMIT	
Building	Planning
Engineering	Public Works
Fire	Traffic

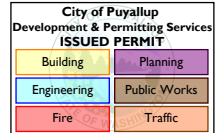# Structural Analysis and Calculations

for

Second Floor Addition
1922 5th Avenue SW
Puyallup, WA 98371

for

Jeff Strobl and Kay Wong
1922 5th Avenue SW
Puyallup, WA 98371

by

N.L. Olson & Associates, Inc.
2453 Bethel Avenue
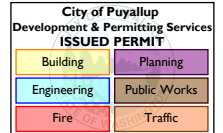Port Orchard, WA 98366
360-876-2284
NLO#11112-20

December-20

Scope of Work:

Engineering for second story addition to existing SFR.

Analysis was done using the 2015 International Building Code

Materials:

Reinforcing Steel: ASTM A615 Grade 60
Concrete: f'c = 2500 psi

Design Assumptions:

Soil Properties: 1500 psf Bearing Capacity, 250 psf/ft lateral capacity (assumed)
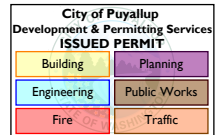
Design Wind: 110 MPH 3 sec gust

Seismic Zone D

S_s = 160%

S_1 = 60.0%

Snow Load: 30 psf Ground

EXITING FOUNDATION,
DUE TO FLOODPLAIN
INSPECTOR MAY REQUIRE
COPY OF GEOTECH

Dead Loads

Floor = 12   psf(3 Joists, 3 subfloor, 4 coverings, 12 HVAC)
Wall = 10   psf(1.5 studs, 2.5 sheathing, 0.5 insul. 3 paneling)
Roof = 15   psf (2 psf truss, 1 insulation, 3 ceiling, 5, roofing)

Live Loads

Floor, L_f =   40 psf   (60 psf Deck)
Roof, L_r =   25 psf

Snow Loads

Exposure Category C		(ASCE 7-10 26.7.3)
Risk Category II		(ASCE 7-10 1.5-1)
C_t =	1.1	(ASCE 7-10 Table 7-3)
C_e =	0.9	(ASCE 7-10 Table 7-2)
I_s =	1	(ASCE 7-10 Table 1.5-2)
C_s =	1	(ASCE 7-10 Figure 7-2)
P_g =	30 psf	(ASCE 7-10 Figure 7-1)

$P_f = 0.7 C_e \cdot C_t \cdot I_s \cdot P_g$

P_f =   20.79 psf   (ASCE 7-10 7.3-1)

$P_s = C_s \cdot P_f$

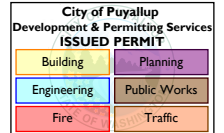P_s =   20.79 psf   (ASCE 7-10 7.4-1)

Use 25 psf for design

Wind Loads

V_{ult} = 110 mph (3 Sec. Gust)
Exposure B

Seismic Loads

Site Class D   (Assumed)
S_s =   1.6   (USGS)
S_1 =   0.6   (USGS)

Building Layout

67 ft
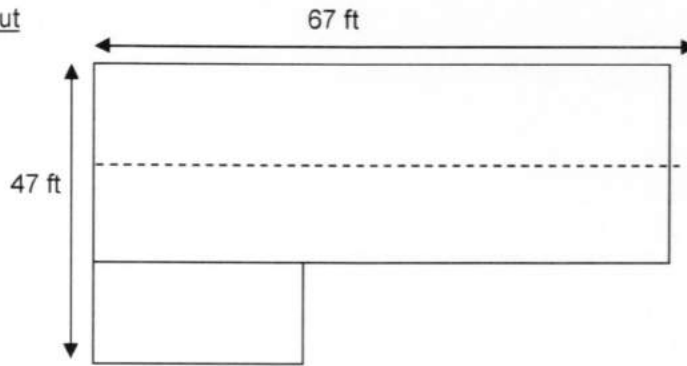
47 ft

Wind Loads (Simplified Envelope Method) (Per ASCE 7-10 Section 28.2-1)

F2
F1
Fb

hr = 4.5 ft
h2 = 9 ft
h1 = 9 ft

b = 67.00 ft
Case A - East-West Wind

F2
F1
Fb

hr = 4.5 ft
h2 = 9 ft
h1 = 9 ft

b = 47.00 ft
Case B - North-South Wind
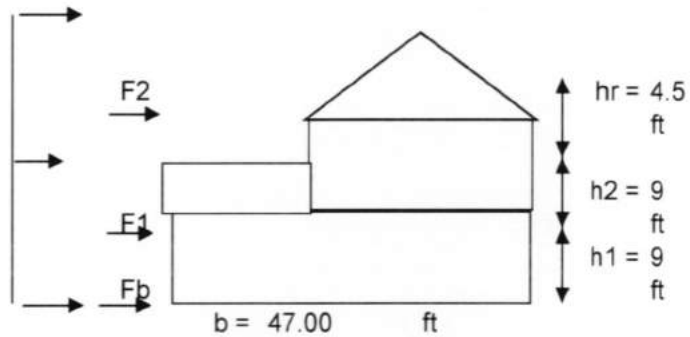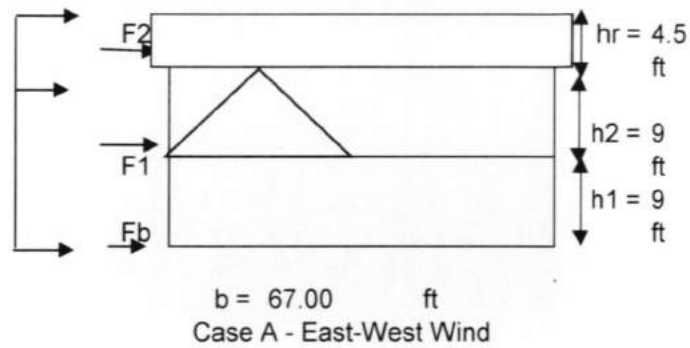
Roof Angle 5:12 or 27 degrees
V = 110 mph   (ASCE 7-10 Figure 26.5-1)
a = 4.7 ft
λ = 1
A = 24.1 psf   (ASCE 7-10 Figure 28.6-1)
B = 8 psf
C = 17.4 psf
D = 8 psf

Case A
F2 = 3280 lbs
F1 = 7972 lbs
Fb = 14999 lbs

Case B
F2= 8022 lbs
F1= 11244 lbs
Fb= 24888 lbs

Seismic Loads

Site Class D
Risk Category II

$$S_s = 1.6$$
$$F_a = 1$$
$$S_{ms} = F_a \cdot S_s = 1.6$$
$$S_{ds} = (2/3) \cdot S_{ms} = 1.000 \quad \blacktriangleright \text{Design Category} \quad D \quad \text{(ASCE 7-10 Table 11.6-1)}$$

(ASCE 7-10 Table 11.4-1)

$$S_1 = 0.6$$
$$F_v = 1.5$$
$$S_{m1} = S_1 \cdot F_v = 0.9$$
$$S_{d1} = (2/3) \cdot S_{m1} = 0.55 \quad \blacktriangleright \text{Design Category} \quad D \quad \text{(ASCE 7-10 Table 11.6-2)}$$
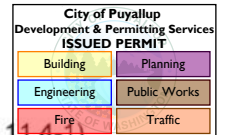
(ASCE 7-10 Table 11.4-2)

$$R = 6.5 \quad \text{(ASCE 7-10 Table 12.2-1)}$$
$$O = 3 \quad \text{(ASCE 7-10 Table 12.2-1)}$$
$$C_d = 4 \quad \text{(ASCE 7-10 Table 12.2-1)}$$
$$I_e = 1 \quad \text{(ASCE 7-10 Table 1.5-2)}$$

Approximate period per ASCE 7-10 Section 12.8.2.1

$$C_t = 0.02$$
$$x = 0.75$$
$$T_L = 6$$
$$T = 0.2169 \quad \text{seconds}$$

$$C_s = (S_{ds})/(R/I_e) = 0.1538$$
$$C_{smax} = 0.3902$$
$$C_{smin} = 0.044$$

Use $C_s = 0.154$

Weight of the Structure

Weight @ Roof =	30000	lbs
Weight @ 2nd Floor =	99000	lbs

$$W_{total} = 129000 \quad \text{lbs}$$

$$V = C_s W = 19846 \quad \text{lbs} \quad \text{Total applied earthquake load}$$

$$K = 1 \quad \text{(ASCE 7-10 12.8.3)}$$

$$C_{v2} = 0.405$$
$$C_{v1} = 0.595$$

F2 =	8046	lbs	(Includes 1/2 upper walls and roof)
F1 =	11800	lbs	(Includes 1/2 walls and 2nd floor)

Base Shear = 19846 lbs

North Wall (Second Floor) (Perforated Method) (Seismic)

$H =$	9 ft	(Wall height)
$W =$	36.83 ft	(Wall width)
$Wf =$	24.17 ft	(Wall width w/ full height sheathing)
$F =$	4022.9 lbs	(Horizontal load)
$w =$	105 lb/ft	(Vertical load)
	F	(Attatchment)

Check Shear

$\rho = 1.3$

$v = 367$ lb/ft $\qquad vs = 384$ lb/ft (SDPWS Table 4.3A)

$\varphi = 0.8$

Use 7/16in sheathing w/ 8d nails@ 6in edge spacing

Check Studs

$Co = 59.0\%$

$T = C = 1666.19$ lb $\qquad$ Try 2"x6" $\qquad A = 8.25$ $\qquad$ in^2

$fc = 201.96$ psi $\qquad Fc' = 2080$ psi $\qquad$ Works

$ft = 201.96$ psi $\qquad Ft' = 1260$ psi $\qquad$ Works

Use No.2 HF 2x6 @ wall ends

Check Anchors

$z = 1857.6$ lb/bolt $\qquad$ (NDS Table 11E, ts=1 1/2in, 5/8", HF)

$S = 5.07$ ft

Use 5/8in anchor bolts @ 48in

Check Holddowns

$Fto = -950.52$ lbs $\qquad$ No Net Uplift

No hold down required

Check Deflections

$Ga = 11$ $\qquad\qquad Cd = 4$ $\qquad$ (ASCE 7-10 12.8.6)

Wall Deflection = 1.47 in $\qquad$ Allowable Deflection =.02H = $\qquad$ 2.16 in

Meets deflection criteria

South Wall (Second Floor) (Segmented Method) (Seismic)

H =	5 ft	(Wall height)
W =	40.5 ft	(Wall width)
Wf =	40.5 ft	(Wall width w/ full height sheathing)
F =	4022.9 lbs	(Horizontal load)
w =	115.5 lb/ft	(Vertical load)
	F	(Attachment)

Check Shear

ρ = 1.3

v = 129 lb/ft   vs = 384 lb/ft (SDPWS Table 4.3A)

φ = 0.8

Use 7/16in sheathing w/ 8d nails@ 6in edge spacing

Check Studs

Co = 100.0%

T = C = 496.65 lb   Try 2"x6"   A = 8.25   in^2

fc = 60.20 psi   Fc' = 2080 psi   Works
ft = 60.20 psi   Ft' = 1260 psi   Works

Use No.2 HF 2x6 @ wall ends

Check Anchors

z = 1857.6 lb/bolt   (NDS Table 11E, ts=1 1/2in, 5/8", HF)
S = 14.39 ft

Use 5/8in anchor bolts @ 48in

Check Holddowns
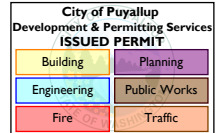
Fto = 212.52 lbs   Net Uplift

No Holdown Required

Check Deflections

Ga = 11   Cd = 4   (ASCE 7-10 12.8.6)
Wall Deflection = 0.36 in   Allowable Deflection =.02H = 1.2 in

Meets deflection criteria

East Wall (Second Floor) (Perforated Method) (Seismic)
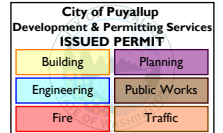
H =	9 ft	(Wall height)
W =	19.67 ft	(Wall width)
Wf =	13.34 ft	(Wall width w/ full height sheathing)
F =	1341 lbs	(Horizontal load)
w =	63 lb/ft	(Vertical load)
	F	(Attatchment)

Check Shear

$\rho = 1.3$

v = 218 lb/ft   vs = 384   lb/ft (SDPWS Table 4.3A)

$\varphi = 0.8$

Use 7/16in sheathing w/ 8d nails@ 6in edge spacing

Check Studs

Co = 60.0%

T = C = 1022.59 lb   Try 2"x6"   A = 8.25   in^2

fc = 123.95   psi   Fc' = 2080   psi   Works
ft = 123.95   psi   Ft' = 1260   psi   Works

Use No.2 HF 2x6 @ wall ends

Check Anchors

z = 1857.6   lb/bolt   (NDS Table 11E, ts=1 1/2in, 5/8", HF)
S = 8.53   ft

Use 5/8in anchor bolts @ 48in

Check Holddowns

Fto = -6.05   lbs   No Net Uplift

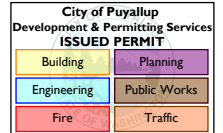**No Holdown Required**

Check Deflections

Ga = 11   Cd = 4   (ASCE 7-10 12.8.6)
Wall Deflection =   1.19 in   Allowable Deflection =.02H =   2.16 in

Meets deflection criteria

East Wall (Interior, Second Floor) (Segmented Method) (Seismic)

H =	9 ft	(Wall height)
W =	15 ft	(Wall width)
W_f =	15 ft	(Wall width w/ full height sheathing)
F =	2681.9 lbs	(Horizontal load)
w =	63 lb/ft	(Vertical load)
	F	(Attachment)

Check Shear

$\rho = 1.3$

$v = 232$ lb/ft $v_s = 384$ lb/ft (SDPWS Table 4.3A)

$\varphi = 0.8$

Use 7/16in sheathing w/ 8d nails@ 6in edge spacing

Check Studs

$C_o = 100.0\%$

$T = C = 1609.15$ lb   Try 2"x6" $A = 8.25$ in^2

$f_c = 195.05$ psi $F_c' = 2080$ psi   Works

$f_t = 195.05$ psi $F_t' = 1260$ psi   Works

Use No.2 HF 2x6 @ wall ends

Check Anchors

$z = 1857.6$ lb/bolt   (NDS Table 11E, ts=1 1/2in, 5/8", HF)

$S = 7.99$ ft

Use 5/8in anchor bolts @ 48in

Check Holddowns

$F_{to} = 1136.65$ lbs   Net Uplift

Use MSTC48B3

Check Deflections

$G_a = 11$ $C_d = 4$ (ASCE 7-10 12.8.6)

Wall Deflection = 1.39 in   Allowable Deflection =.02H =   2.16 in

Meets deflection criteria

West Wall (Interior, Second Floor) (Segmented Method) (Seismic)
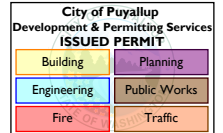
H =   9 ft   (Wall height)
W =   9.33 ft   (Wall width)
Wf =   9.33 ft   (Wall width w/ full height sheathing)
F =   2681.9 lbs   (Horizontal load)
w =   63 lb/ft   (Vertical load)
              F   (Attatchment)

Check Shear ρ = 1.3

v = 374   lb/ft   vs = 560   lb/ft (SDPWS Table 4.3A)
                             φ = 0.8

Use 7/16in sheathing w/ 8d nails@ 4in edge spacing

Check Studs   Co = 100.0%
T = C = 2587.05 lb   Try 2"x6"   A = 8.25   in^2

fc = 313.58 psi   Fc' = 2080 psi   Works
ft = 313.58 psi   Ft' = 1260 psi   Works

Use No.2 HF 2x6 @ wall ends

Check Anchors   z = 1857.6 lb/bolt   (NDS Table 11E, ts=1 1/2in, 5/8", HF)
                         S = 4.97   ft

Use 5/8in anchor bolts @ 48in

Check Holddowns   Fto = 3206 lbs   Net Uplift
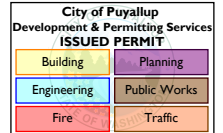
Use MSTC48B3

Check Deflections   Ga = 14   Cd = 4   (ASCE 7-10 12.8.6)
Wall Deflection = 2.01 in   Allowable Deflection =.02H =   2.16 in

Meets deflection criteria

West Wall (Second Floor) (Perforated Method) (Seismic)

H =	9 ft	(Wall height)
W =	19 ft	(Wall width)
Wf =	16 ft	(Wall width w/ full height sheathing)
F =	1341 lbs	(Horizontal load)
w =	63 lb/ft	(Vertical load)
	F	(Attatchment)

Check Shear ρ = 1.3

v = 182   lb/ft   vs = 384   lb/ft (SDPWS Table 4.3A)

φ = 0.8

Use 7/16in sheathing w/ 8d nails@ 6in edge spacing

Check Studs   Co = 60.0%

T = C = 1058.65 lb   Try 2"x6"   A = 8.25   in^2

fc = 128.32   psi   Fc' = 2080   psi   Works
ft = 128.32   psi   Ft' = 1260   psi   Works

Use No.2 HF 2x6 @ wall ends

Check Anchors   z = 1857.6   lb/bolt   (NDS Table 11E, ts=1 1/2in, 5/8", HF)
                  S = 10.23   ft

Use 5/8in anchor bolts @ 48in

Check Holddowns   Fto = 36.69   lbs   Net Uplift
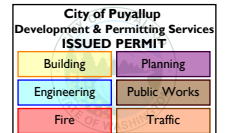
No Holddown Required

Check Deflections   Ga = 11   Cd = 4   (ASCE 7-10 12.8.6)
Wall Deflection =   1.09 in   Allowable Deflection =.02H =   2.16 in

Meets deflection criteria

North Wall (First Floor) (Segmented Method) (Seismic)

H =	8 ft	(Wall height)
W =	21 ft	(Wall width)
Wf =	21 ft	(Wall width w/ full height sheathing)
F =	8153 lbs	(Horizontal load)
w =	228.2 lb/ft	(Vertical load)
	F	(Attatchment)

Check Shear

$\rho = 1.3$

v = 505   lb/ft   vs = 560   lb/ft (SDPWS Table 4.3A)

$\varphi = 0.8$

Use 7/16in sheathing w/ 8d nails@ 4in edge spacing

Check Studs

Co = 100.0%

T = C = 3105.91 lb   Try 2"x6"   A = 8.25   in^2

fc = 376.47   psi   Fc' = 2080   psi   Works
ft = 376.47   psi   Ft' = 1260   psi   Works

Use No.2 HF 2x6 @ wall ends

Check Anchors

z = 1857.6   lb/bolt   (NDS Table 11E, ts=1 1/2in, 5/8", HF)
S = 3.68   ft

Use 5/8in anchor bolts @ 36in

Check Holddowns

Fto = 3777   lbs   Net Uplift

Use HDU5

Check Deflections
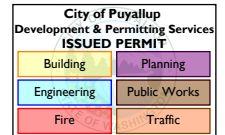
Ga = 14   Cd = 4   (ASCE 7-10 12.8.6)
Wall Deflection =   1.57 in   Allowable Deflection =.02H =   1.92
                                                                      in

Meets deflection criteria

South Wall (First Floor) (Segmented Method) (Seismic)

H =	8 ft	(Wall height)
W =	18.25 ft	(Wall width)
W_f =	18.25 ft	(Wall width w/ full height sheathing)
F =	9923.1 lbs	(Horizontal load)
w =	228.2 lb/ft	(Vertical load)
	F	(Attatchment)

Check Shear

ρ = 1.3

v = 707   lb/ft v_s = 720   lb/ft (SDPWS Table 4.3A)

φ = 0.8

Use 7/16in sheathing w/ 8d nails@ 3in edge spacing

Check Studs

C_o = 100.0%

$T = C$ = 4349.84 lb   Try 2"x6" A = 8.25   in^2

f_c = 527.25   psi F_c' = 2080   psi   Works
f_t = 527.25   psi F_t' = 1260   psi   Works

Use No.2 HF 2x6 @ wall ends

Check Anchors

z = 1857.6   lb/bolt   (NDS Table 11E, ts=1 1/2in, 5/8", HF)
S = 2.63   ft

Use 5/8in anchor bolts @ 30in

Check Holddowns

F_{to} = 5312   lbs   Net Uplift

Use HDU5/MSTC66B3

Check Deflections

G_a = 17 C_d = 4   (ASCE 7-10 12.8.6)
Wall Deflection = 1.83 in   Allowable Deflection =.02H =   1.92 in

Meets deflection criteria

West Wall (First Floor) (Segmented Method) (Seismic)

H =	8 ft	(Wall height)
W =	15 ft	(Wall width)
Wf =	15 ft	(Wall width w/ full height sheathing)
F =	6383 lbs	(Horizontal load)
w =	119 lb/ft	(Vertical load)
	F	(Attatchment)

Check Shear

$\rho = 1.3$

$v = 553$ lb/ft $vs = 560$ lb/ft (SDPWS Table 4.3A)

$\varphi = 0.8$

Use 7/16in sheathing w/ 8d nails@ 4in edge spacing

Check Studs

$Co = 100.0\%$

$T = C = 3404.24$ lb   Try 2"x6" $A = 8.25$ in^2

$fc = 412.64$ psi $Fc' = 2080$ psi   Works
$ft = 412.64$ psi $Ft' = 1260$ psi   Works

Use No.2 HF 2x6 @ wall ends

Check Anchors

$z = 1857.6$ lb/bolt   (NDS Table 11E, ts=1 1/2in, 5/8", HF)
$S = 3.36$ ft

Use 5/8in anchor bolts @ 36in

Check Holddowns

$Fto = 4069$ lbs   Net Uplift
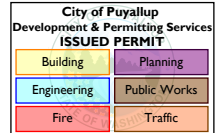
Use HDU5

Check Deflections

$Ga = 14$ $Cd = 4$ (ASCE 7-10 12.8.6)

Wall Deflection = 1.85 in   Allowable Deflection =.02H =   1.92 in

Meets deflection criteria

East Wall (First Floor) (Segmented Method) (Seismic)

H =	8 ft	(Wall height)
W =	20 ft	(Wall width)
Wf =	20 ft	(Wall width w/ full height sheathing)
F =	6383 lbs	(Horizontal load)
w =	119 lb/ft	(Vertical load)
	F	(Attachment)

Check Shear

$\rho = 1.3$

$v = 415$ lb/ft $vs = 560$ lb/ft (SDPWS Table 4.3A)

$\varphi = 0.8$

Use 7/16in sheathing w/ 8d nails@ 4in edge spacing

Check Studs

$Co = 100.0\%$

$T = C = 2553.18$ lb   Try 2"x6" $A = 8.25$ in^2

$fc = 309.48$ psi $Fc' = 2080$ psi   Works
$ft = 309.48$ psi $Ft' = 1260$ psi   Works

Use No.2 HF 2x6 @ wall ends

Check Anchors

$z = 1857.6$ lb/bolt   (NDS Table 11E, ts=1 1/2in, 5/8", HF)
$S = 4.48$ ft

Use 5/8in anchor bolts @ 36in

Check Holddowns

$Fto = 3051$ lbs   Net Uplift
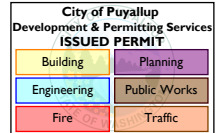
Use HDU5

Check Deflections

$Ga = 14$ $Cd = 4$ (ASCE 7-10 12.8.6)
Wall Deflection =   1.38 in   Allowable Deflection =.02H =   1.92 in

Meets deflection criteria

Level			
Member Name	**Results**	**Current Solution**	**Comments**
Floor: Joist 24'	Passed	1 piece(s) 14" TJI® 560 @ 16" OC	
Floor: Joist 16'	Passed	1 piece(s) 14" TJI® 230 @ 16" OC	
Floor: Joist 24' with cant.	Passed	1 piece(s) 14" TJI® 560 @ 16" OC	

ForteWEB Software Operator	Job Notes
Nicholas Levengood N.L. Olson & Associates (360) 535-3705 nlevengood17@gmail.com	

Weyerhaeuser

Level, Floor: Joist 24'

1 piece(s) 14" TJI® 560 @ 16" OC
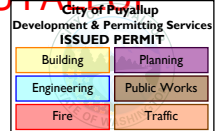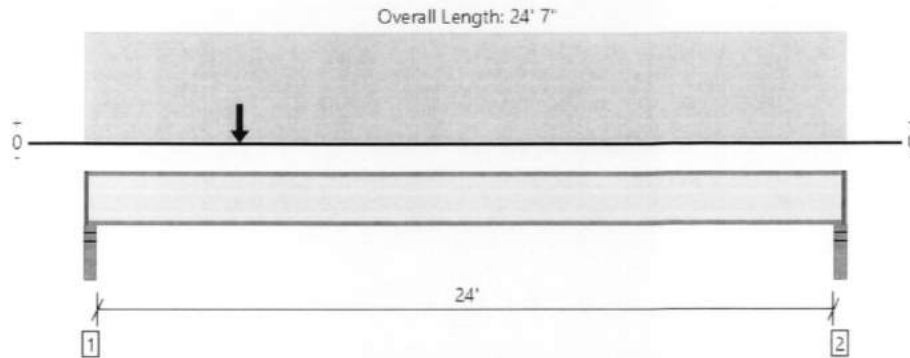
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CITY OF PUYALLUP

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Building	Planning
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Fire	Traffic

Overall Length: 24' 7"

24'

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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1045 @ 2 1/2"	1396 (2.25")	Passed (75%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1032 @ 3 1/2"	2390	Passed (43%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	5678 @ 11' 6 15/16"	11275	Passed (50%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.443 @ 12' 3 1/2"	0.604	Passed (L/654)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.653 @ 12' 1 3/8"	1.208	Passed (L/444)	--	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 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- 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: 1/2" Gypsum ceiling.

Supports	Bearing Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Floor Live	Roof Live	Snow	Total	
1 - Stud wall - HF	3.50"	2.25"	1.75"	397	656	337	337	1727	1 1/4" Rim Board
2 - Stud wall - HF	3.50"	2.25"	1.75"	246	656	83	83	1068	1 1/4" Rim Board

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	8' 1" o/c	
Bottom Edge (Lu)	24' 5" o/c	

- TJI joists are only analyzed using Maximum Allowable bracing solutions.
- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 24' 7"	16"	12.0	40.0	-	-	Default Load
2 - Point (lb)	5'	N/A	250	-	420	420	

Weyerhaeuser Notes

ForteWEB Software Operator	Job Notes
Nicholas Levengood N.L. Olson & Associates (360) 535-3705 nlevengood17@gmail.com	

Weyerhaeuser

MEMBER REPORT

PASSED

Level, Floor: Joist 16'
1 piece(s) 14" TJI® 230 @ 16" OC

City of Puyallup
Development & Permitting Services
ISSUED PERMIT

Building	Planning
Engineering	Public Works
Fire	Traffic

Overall Length: 18' 10"

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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	544 @ 2 1/2"	1183 (2.25")	Passed (46%)	1.00	1.0 D + 1.0 L (Alt Spans)
Shear (lbs)	563 @ 16' 3 1/2"	1945	Passed (29%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2075 @ 7' 11 3/8"	4990	Passed (42%)	1.00	1.0 D + 1.0 L (Alt Spans)
Live Load Defl. (in)	0.163 @ 8' 3 7/8"	0.406	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.192 @ 8' 2 1/4"	0.811	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)
TJ-Pro™ Rating	56	40	Passed	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/480) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- 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: 1/2" Gypsum ceiling.

Supports	Bearing Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Floor Live	Roof Live	Snow	Total	
1 - Stud wall - HF	3.50"	2.25"	1.75"	107	444/-4	-40	-40	551/-84	1 1/4" Rim Board
2 - Stud wall - HF	3.50"	3.50"	3.50"	394	570	380	380	1724	Blocking

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' 6" o/c	
Bottom Edge (Lu)	9' 3" o/c	

- TJI joists are only analyzed using Maximum Allowable bracing solutions.
- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 18' 10"	16"	12.0	40.0	-	-	Default Load
2 - Point (lb)	18' 3 15/16"	N/A	200	-	340	340	

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

ForteWEB Software Operator	Job Notes
Nicholas Levengood
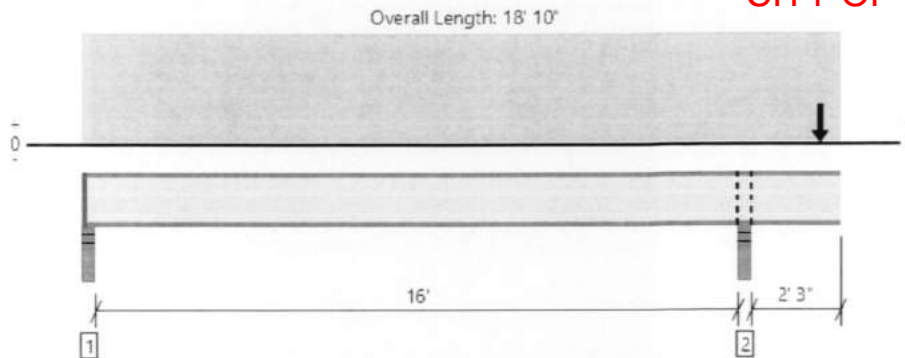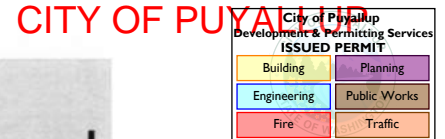N.L. Olson & Associates
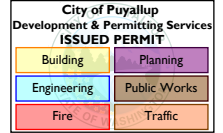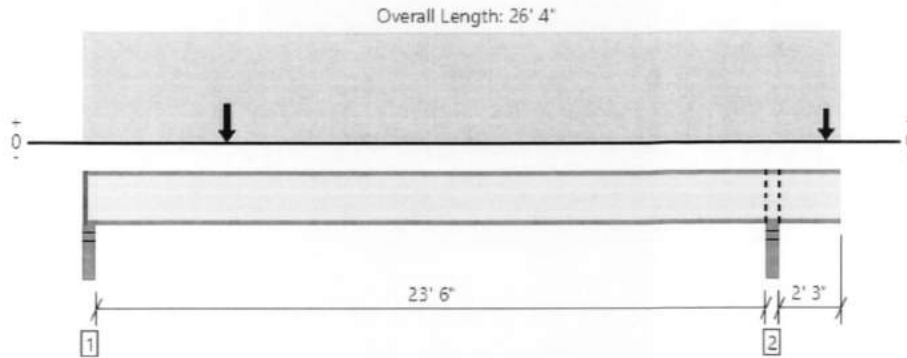(360) 535-3705
nlevengood17@gmail.com	

Weyerhaeuser

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File Name: Strobl
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Level, Floor: Joist 24' with cant.
1 piece(s) 14" TJI® 560 @ 16" OC

B-21-0070
CITY OF PUYALLUP

Overall Length: 26' 4"

23' 6"   2' 3"

1   2

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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1003 @ 2 1/2"	1396 (2.25")	Passed (72%)	1.00	1.0 D + 1.0 L (Alt Spans)
Shear (lbs)	990 @ 3 1/2"	2390	Passed (41%)	1.00	1.0 D + 1.0 L (Alt Spans)
Moment (Ft-lbs)	5275 @ 11' 1 3/8"	11275	Passed (47%)	1.00	1.0 D + 1.0 L (Alt Spans)
Live Load Defl. (in)	0.414 @ 12' 7/8"	0.593	Passed (L/688)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.584 @ 11' 9 3/4"	1.186	Passed (L/487)	--	1.0 D + 1.0 L (Alt Spans)
TJ-Pro™ Rating	37	30	Passed	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/480) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- 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 Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Floor Live	Roof Live	Snow	Total	
1 - Stud wall - HF	3.50"	2.25"	1.75"	367	644/-1	305	305	1621/-1	1 1/4" Rim Board
2 - Stud wall - HF	3.50"	3.50"	3.50"	495	767	459	459	2180	Blocking

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	8' 5" o/c	
Bottom Edge (Lu)	14' 7" o/c	

- TJI joists are only analyzed using Maximum Allowable bracing solutions.
- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 26' 4"	16"	12.0	40.0	-	-	Default Load
2 - Point (lb)	25' 9 15/16"	N/A	200	-	350	350	
3 - Point (lb)	5'	N/A	240	-	400	400	

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

ForteWEB Software Operator	Job Notes
Nicholas Levengood
N.L. Olson & Associates
(360) 535-3705
nlevengood17@gmail.com	

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Project ID:
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B-21-0070
CITY OF PUYALLUP

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Multiple Simple Beam

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OLS...N ...OCIA...

Description : Roof Framing

Wood Beam Design : Ridge Beam

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

BEAM Size : 5.5x15, GLB, Fully Braced
Using Load Resistance Factor Design with ASCE 7-10 Load Combinations, Major Axis Bending

Wood Species : DF/DF   Wood Grade : 24F-V4

Fb - Tension	2,400.0 psi	Fc - Prll	1,650.0 psi	Fv	265.0 psi	Ebend- xx	1,800.0 ksi	Density	31.210 pcf
Fb - Compr	1,850.0 psi	Fc - Perp	650.0 psi	Ft	1,100.0 psi	Eminbend - xx	950.0 ksi		

Applied Loads

Beam self weight calculated and added to loads
Unif Load: D = 0.0150, Lr = 0.0250, S = 0.0250 k/ft, Trib= 10.0 ft

Design Summary

Max fb/Fb Ratio = 0.511 : 1
fb : Actual : 2,052.20 psi at 10.830 ft in Span # 1
Fb : Allowable : 4,014.70 psi
Load Comb : +1.20D+1.60Lr+0.50L+1.60H

Max fv/FvRatio = 0.229 : 1
fv : Actual : 105.01 psi at 0.000 ft in Span # 1
Fv : Allowable : 457.92 psi
Load Comb : +1.20D+1.60Lr+0.50L+1.60H

D(0.150) Lr(0.250) S(0.250)

5.5x15
21.660 ft

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	1.82		2.71	2.71			
Right Support	1.82		2.71	2.71			
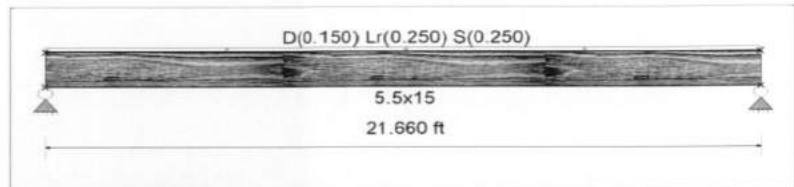
Max Deflections
Transient Downward	0.447 in	Total Downward	0.747 in
Ratio	581	Ratio	347
	LC: Lr Only		LC: +D+Lr+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : Rafters

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

BEAM Size : 2x12, Sawn, Fully Braced
Using Load Resistance Factor Design with ASCE 7-10 Load Combinations, Major Axis Bending

Wood Species : Hem-Fir   Wood Grade : No.2

Fb - Tension	850.0 psi	Fc - Prll	1,300.0 psi	Fv	150.0 psi	Ebend- xx	1,300.0 ksi	Density	26.840 pcf
Fb - Compr	850.0 psi	Fc - Perp	405.0 psi	Ft	525.0 psi	Eminbend - xx	470.0 ksi		

Applied Loads

Beam self weight calculated and added to loads
Unif Load: D = 0.0150, Lr = 0.0250, S = 0.0250 k/ft, Trib= 2.0 ft

Design Summary

Max fb/Fb Ratio = 0.557 : 1
fb : Actual : 817.66 psi at 6.000 ft in Span # 1
Fb : Allowable : 1,468.80 psi
Load Comb : +1.20D+1.60Lr+0.50L+1.60H

Max fv/FvRatio = 0.209 : 1
fv : Actual : 54.08 psi at 11.080 ft in Span # 1
Fv : Allowable : 259.20 psi
Load Comb : +1.20D+1.60Lr+0.50L+1.60H

D(0.030) Lr(0.050) S(0.050)

2x12
12.0 ft

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.20		0.30	0.30			
Right Support	0.20		0.30	0.30			

Max Deflections
Transient Downward	0.101 in	Total Downward	0.169 in
Ratio	1420	Ratio	854
	LC: Lr Only		LC: +D+Lr+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

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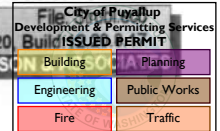
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CITY OF PUYALLUP

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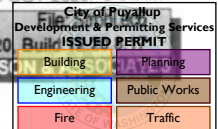
Wood Beam Design : Dormer Header

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

BEAM Size :   2-2x12, Sawn, Fully Braced
Using Load Resistance Factor Design with ASCE 7-10 Load Combinations, Major Axis Bending

Wood Species : Hem-Fir   Wood Grade : No.2

| Fb - Tension | 850.0 psi | Fc - Prll | 1,300.0 psi | Fv | 150.0 psi | Ebend- xx | 1,300.0 ksi | Density | 26.840 pcf |
| Fb - Compr | 850.0 psi | Fc - Perp | 405.0 psi | Ft | 525.0 psi | Eminbend - xx | 470.0 ksi | | |

Applied Loads

Beam self weight calculated and added to loads
Unif Load: D = 0.0150, Lr = 0.0250, S = 0.0250 k/ft, Trib= 2.0 ft
Point: D = 0.2250, Lr = 0.3750, S = 0.3750 k @ 2.50 ft

Design Summary

Max fb/Fb Ratio =   0.190 : 1
fb : Actual :   279.44 psi at 2.500 ft in Span # 1
Fb : Allowable :   1,468.80 psi
Load Comb :   +1.20D+1.60Lr+0.50L+1.60H

Max fv/FvRatio =   0.108 : 1
fv : Actual :   27.94 psi at 4.067 ft in Span # 1
Fv : Allowable :   259.20 psi
Load Comb :   +1.20D+1.60Lr+0.50L+1.60H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.20		0.31	0.31			
Right Support	0.20		0.31	0.31			

D(0.030) Lr(0.050) S(0.050)

2-2x12
5.0 ft
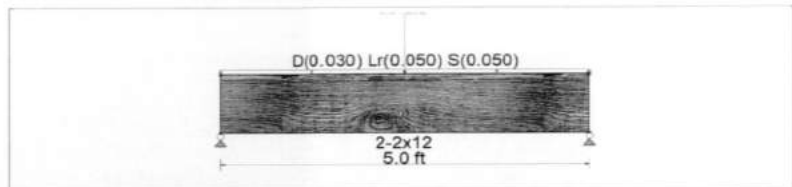
Max Deflections

Transient Downward	0.005 in	Total Downward	0.009 in
Ratio	9999	Ratio	7058
	LC: Lr Only		LC: +D+Lr+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : Dbl Rafter

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

BEAM Size :   2-2x12, Sawn, Fully Braced
Using Load Resistance Factor Design with ASCE 7-10 Load Combinations, Major Axis Bending

Wood Species : Hem-Fir   Wood Grade : No.2

| Fb - Tension | 850.0 psi | Fc - Prll | 1,300.0 psi | Fv | 150.0 psi | Ebend- xx | 1,300.0 ksi | Density | 26.840 pcf |
| Fb - Compr | 850.0 psi | Fc - Perp | 405.0 psi | Ft | 525.0 psi | Eminbend - xx | 470.0 ksi | | |

Applied Loads

Beam self weight calculated and added to loads
Unif Load: D = 0.0150, Lr = 0.0250, S = 0.0250 k/ft, Trib= 4.0 ft
Point: D = 0.20, Lr = 0.310, S = 0.310 k @ 4.250 ft

Design Summary

Max fb/Fb Ratio =   0.777 : 1
fb : Actual :   1,141.13 psi at 4.920 ft in Span # 1
Fb : Allowable :   1,468.80 psi
Load Comb :   +1.20D+1.60Lr+0.50L+1.60H

Max fv/FvRatio =   0.290 : 1
fv : Actual :   75.21 psi at 0.000 ft in Span # 1
Fv : Allowable :   259.20 psi
Load Comb :   +1.20D+1.60Lr+0.50L+1.60H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.53		0.80	0.80			
Right Support	0.47		0.71	0.71			

D(0.060) Lr(0.10) S(0.10)

2-2x12
12.0 ft

Max Deflections

Transient Downward	0.139 in	Total Downward	0.230 in
Ratio	1039	Ratio	626
	LC: Lr Only		LC: +D+Lr+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

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**B-21-0070
CITY OF PUYALLUP**

Multiple Simple Beam

Lic. # : KW-06002029

City of Puyallup
Development & Permitting Services
ISSUED PERMIT

Building	Planning
Engineering	Public Works
Fire	Traffic

Wood Beam Design : Ridge Board

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

BEAM Size : 2x12, Sawn, Fully Braced
Using Load Resistance Factor Design with ASCE 7-10 Load Combinations, Major Axis Bending

Wood Species : Hem-Fir   Wood Grade : No.2

Fb - Tension	850.0 psi	Fc - Prll	1,300.0 psi	Fv	150.0 psi	Ebend- xx	1,300.0 ksi
Fb - Compr	850.0 psi	Fc - Perp	405.0 psi	Ft	525.0 psi	Eminbend - xx	470.0 ksi

Density 26.840 pcf

Applied Loads

Beam self weight calculated and added to loads
Unif Load: D = 0.0150, Lr = 0.0250, S = 0.0250 k/ft, Trib= 2.50 ft

Design Summary

Max fb/Fb Ratio = 0.691 : 1
fb : Actual : 1,015.63 psi at 6.000 ft in Span # 1
Fb : Allowable : 1,468.80 psi
Load Comb : +1.20D+1.60Lr+0.50L+1.60H

Max fv/FvRatio = 0.259 : 1
fv : Actual : 67.18 psi at 11.080 ft in Span # 1
Fv : Allowable : 259.20 psi
Load Comb : +1.20D+1.60Lr+0.50L+1.60H

D(0.03750) Lr(0.06250) S(0.06250)

2x12
12.0 ft

Max Reactions (k)

	D	L	Lr	S	W	E	H
Left Support	0.24		0.38	0.38			
Right Support	0.24		0.38	0.38			
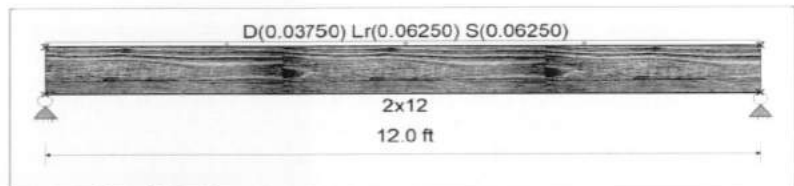
Max Deflections

Transient Downward	0.127 in	Total Downward	0.209 in
Ratio	1136	Ratio	688
	LC: Lr Only		LC: +D+Lr+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : Lower Rafters

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

BEAM Size : 2x6, Sawn, Fully Braced
Using Load Resistance Factor Design with ASCE 7-10 Load Combinations, Major Axis Bending

Wood Species : Hem-Fir   Wood Grade : No.2

Fb - Tension	850.0 psi	Fc - Prll	1,300.0 psi	Fv	150.0 psi	Ebend- xx	1,300.0 ksi
Fb - Compr	850.0 psi	Fc - Perp	405.0 psi	Ft	525.0 psi	Eminbend - xx	470.0 ksi

Density 26.840 pcf

Applied Loads

Beam self weight calculated and added to loads
Unif Load: D = 0.0150, Lr = 0.0250, S = 0.0250 k/ft, Trib= 2.0 ft

Design Summary

Max fb/Fb Ratio = 0.306 : 1
fb : Actual : 584.36 psi at 2.500 ft in Span # 1
Fb : Allowable : 1,909.44 psi
Load Comb : +1.20D+1.60Lr+0.50L+1.60H

Max fv/FvRatio = 0.169 : 1
fv : Actual : 43.92 psi at 4.550 ft in Span # 1
Fv : Allowable : 259.20 psi
Load Comb : +1.20D+1.60Lr+0.50L+1.60H

D(0.030) Lr(0.050) S(0.050)

2x6
5.0 ft

Max Reactions (k)

	D	L	Lr	S	W	E	H
Left Support	0.08		0.13	0.13			
Right Support	0.08		0.13	0.13			

Max Deflections

Transient Downward	0.026 in	Total Downward	0.043 in
Ratio	2294	Ratio	1407
	LC: Lr Only		LC: +D+Lr+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

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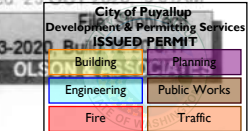Engineer:
Project ID:
Project Descr:

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Multiple Simple Beam

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Wood Beam Design : Typical Second Floor Header

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

BEAM Size : 2-2x8, Sawn, Fully Braced
Using Load Resistance Factor Design with ASCE 7-10 Load Combinations, Major Axis Bending

Wood Species : Hem-Fir   **Wood Grade :** No.2

Fb - Tension	850.0 psi	Fc - Prll	1,300.0 psi	Fv	150.0 psi	Ebend- xx	1,300.0 ksi	Density 26.840 pcf
Fb - Compr	850.0 psi	Fc - Perp	405.0 psi	Ft	525.0 psi	Eminbend - xx	470.0 ksi	

Applied Loads

Beam self weight calculated and added to loads
Unif Load: D = 0.0150, Lr = 0.0250, S = 0.0250 k/ft, Trib= 10.0 ft

Design Summary

Max fb/Fb Ratio = 0.759 : 1
   fb : Actual : 1,337.54 psi at 3.165 ft in Span # 1
   Fb : Allowable : 1,762.56 psi
   Load Comb : +1.20D+1.60Lr+0.50L+1.60H

Max fv/FvRatio = 0.401 : 1
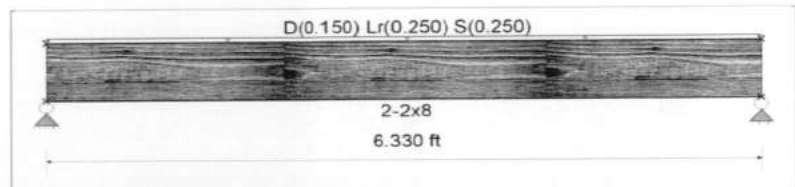   fv : Actual : 103.83 psi at 5.739 ft in Span # 1
   Fv : Allowable : 259.20 psi
   Load Comb : +1.20D+1.60Lr+0.50L+1.60H

D(0.150) Lr(0.250) S(0.250)

2-2x8
6.330 ft

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.49		0.79	0.79			
Right Support	0.49		0.79	0.79			

Max Deflections

Transient Downward	0.073 in	Total Downward	0.118 in
Ratio	1036	Ratio	641
LC: Lr Only		LC: +D+Lr+H	
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
LC:		LC:	

Wood Beam Design : Gable Second Floor Header

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

BEAM Size : 6x10, Sawn, Fully Braced
Using Load Resistance Factor Design with ASCE 7-10 Load Combinations, Major Axis Bending

Wood Species : Hem-Fir   **Wood Grade :** No.2

Fb - Tension	850.0 psi	Fc - Prll	1,300.0 psi	Fv	150.0 psi	Ebend- xx	1,300.0 ksi	Density 26.840 pcf
Fb - Compr	850.0 psi	Fc - Perp	405.0 psi	Ft	525.0 psi	Eminbend - xx	470.0 ksi	

Applied Loads

Beam self weight calculated and added to loads
Unif Load: D = 0.0150, Lr = 0.0250, S = 0.0250 k/ft, Trib= 2.0 ft
Point: D = 1.70, Lr = 2.80, S = 2.80 k @ 1.50 ft

Design Summary

Max fb/Fb Ratio = 0.782 : 1
   fb : Actual : 1,148.11 psi at 1.498 ft in Span # 1
   Fb : Allowable : 1,468.80 psi
   Load Comb : +1.20D+1.60Lr+0.50L+1.60H

Max fv/FvRatio = 0.585 : 1
   fv : Actual : 151.56 psi at 0.000 ft in Span # 1
   Fv : Allowable : 259.20 psi
   Load Comb : +1.20D+1.60Lr+0.50L+1.60H

D(0.030) Lr(0.050) S(0.050)

6x10
6.330 ft

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	1.42		2.29	2.29			
Right Support	0.53		0.82	0.82			
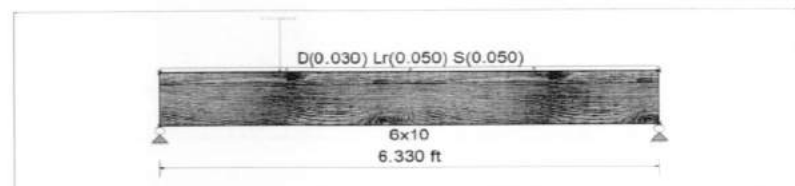
Max Deflections

Transient Downward	0.037 in	Total Downward	0.060 in
Ratio	2042	Ratio	1256
LC: Lr Only		LC: +D+Lr+H	
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
LC:		LC:	

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Wood Beam Design : Stair Dormer Header

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

BEAM Size :   6x8, Sawn, Fully Braced
Using Load Resistance Factor Design with ASCE 7-10 Load Combinations, Major Axis Bending

Wood Species : Hem-Fir   **Wood Grade :** No.2

Fb - Tension	850.0 psi	Fc - Prll	1,300.0 psi	Fv	150.0 psi	Ebend- xx	1,300.0 ksi	Density	26.840 pcf
Fb - Compr	850.0 psi	Fc - Perp	405.0 psi	Ft	525.0 psi	Eminbend - xx	470.0 ksi		

Applied Loads

Beam self weight calculated and added to loads
Unif Load: D = 0.0150, Lr = 0.0250, S = 0.0250 k/ft, Trib= 3.0 ft

Design Summary

Max fb/Fb Ratio   =   0.091 : 1
  fb : Actual :   133.26 psi   at   2.500 ft in Span # 1
  Fb : Allowable :   1,468.80 psi
  Load Comb :   +1.20D+1.60Lr+0.50L+1.60H

Max fv/FvRatio =   0.048 : 1
 fv : Actual :   12.55 psi   at   4.383 ft in Span # 1
  Fv : Allowable :   259.20 psi
  Load Comb :   +1.20D+1.60Lr+0.50L+1.60H

Max Reactions	(k)	D	L	Lr	S	W	E	H
Left Support		0.13		0.19	0.19			
Right Support		0.13		0.19	0.19			

D(0.0450) Lr(0.0750) S(0.0750)

6x8

5.0 ft

Max Deflections			
Transient Downward	0.004 in	Total Downward	0.007 in
Ratio	9999	Ratio	8354
	LC: Lr Only		LC: +D+Lr+H
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

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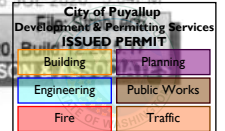
Description : Floor Framing

Wood Beam Design : Garage Door Header

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

BEAM Size : 3.5x10.5, GLB, Fully Braced
Using Load Resistance Factor Design with ASCE 7-10 Load Combinations, Major Axis Bending

Wood Species : DF/DF **Wood Grade :** 24F-V4

Fb - Tension	2,400.0 psi	Fc - Prll	1,650.0 psi	Fv	265.0 psi	Ebend- xx	1,800.0 ksi	Density	31.210 pcf
Fb - Compr	1,850.0 psi	Fc - Perp	650.0 psi	Ft	1,100.0 psi	Eminbend - xx	950.0 ksi		

Applied Loads

Unif Load: D = 0.0150, Lr = 0.0250, S = 0.0250 k/ft, Trib= 15.0 ft
Unif Load: D = 0.0120, L = 0.040 k/ft, Trib= 12.0 ft

Design Summary

Max fb/Fb Ratio = 0.786 : 1
fb : Actual : 3,261.34 psi at 5.000 ft in Span # 1
Fb : Allowable : 4,147.20 psi
Load Comb : +1.20D+0.50Lr+1.60L+1.60H

Max fv/FvRatio = 0.515 : 1
fv : Actual : 235.90 psi at 9.133 ft in Span # 1
Fv : Allowable : 457.92 psi
Load Comb : +1.20D+0.50Lr+1.60L+1.60H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	1.85	2.40	1.88	1.88			
Right Support	1.85	2.40	1.88	1.88			

D(0.2250) L+(0.3750) S(0.3750)

3.5x10.5
10.0 ft
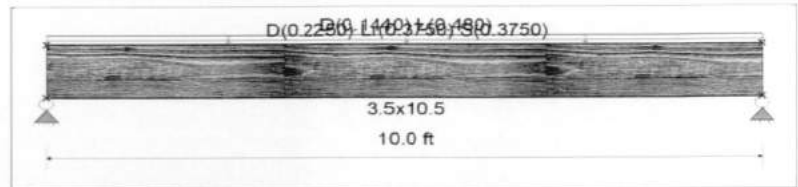
Max Deflections			
Transient Downward	0.179 in	Total Downward	0.376 in
Ratio	671	Ratio	319
	LC: L Only	C: +D+0.750Lr+0.750L+H	
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : 6' header (North Wall)

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

BEAM Size : 3-2x12, Sawn, Fully Braced
Using Load Resistance Factor Design with ASCE 7-10 Load Combinations, Major Axis Bending

Wood Species : Douglas Fir-Larch **Wood Grade :** No.2

Fb - Tension	900.0 psi	Fc - Prll	1,350.0 psi	Fv	180.0 psi	Ebend- xx	1,600.0 ksi	Density	31.210 pcf
Fb - Compr	900.0 psi	Fc - Perp	625.0 psi	Ft	575.0 psi	Eminbend - xx	580.0 ksi		

Applied Loads

Unif Load: D = 0.0150, Lr = 0.0250, S = 0.0250 k/ft, Trib= 10.0 ft
Unif Load: D = 0.0120, L = 0.040 k/ft, Trib= 12.0 ft
Point: D = 1.50, Lr = 2.50, S = 2.50 k @ 1.670 ft

Design Summary

Max fb/Fb Ratio = 0.860 : 1
fb : Actual : 1,337.09 psi at 1.680 ft in Span # 1
Fb : Allowable : 1,555.20 psi
Load Comb : +1.20D+1.60Lr+0.50L+1.60H

Max fv/FvRatio = 0.595 : 1
fv : Actual : 185.21 psi at 0.000 ft in Span # 1
Fv : Allowable : 311.04 psi
Load Comb : +1.20D+1.60Lr+0.50L+1.60H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	1.96	1.44	2.55	2.55			
Right Support	1.30	1.44	1.45	1.45			

D(0.150) L+(0.250) S(0.250)

3-2x12
6.0 ft
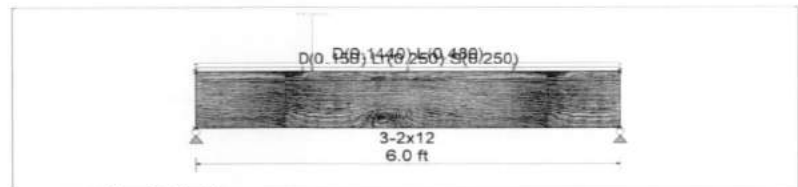
Max Deflections			
Transient Downward	0.026 in	Total Downward	0.052 in
Ratio	2781	Ratio	1380
	LC: Lr Only	C: +D+0.750Lr+0.750L+H	
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

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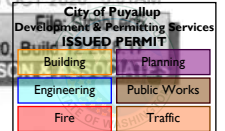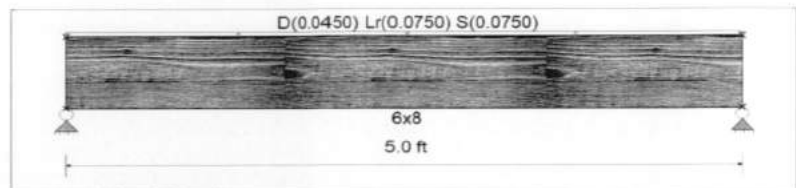Project ID:
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Wood Beam Design : 3' header (North Wall)

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

BEAM Size : 2-2x6, Sawn, Fully Braced
Using Load Resistance Factor Design with ASCE 7-10 Load Combinations, Major Axis Bending

Wood Species : Hem-Fir					Wood Grade : No.2		
Fb - Tension	850.0 psi	Fc - Prll	1,300.0 psi	Fv	150.0 psi	Ebend- xx	1,300.0 ksi	Density	26.840 pcf
Fb - Compr	850.0 psi	Fc - Perp	405.0 psi	Ft	525.0 psi	Eminbend - xx	470.0 ksi		

Applied Loads

Unif Load: D = 0.0150, Lr = 0.0250, S = 0.0250 k/ft, Trib= 10.0 ft
Unif Load: D = 0.0120, L = 0.040 k/ft, Trib= 12.0 ft

Design Summary

Max fb/Fb Ratio   =   0.582 : 1
  fb : Actual :   1,111.95 psi   at   1.500 ft in Span # 1
  Fb : Allowable :   1,909.44 psi
  Load Comb :   +1.20D+0.50Lr+1.60L+1.60H

Max fv/FvRatio =   0.459 : 1
  fv : Actual :   118.92 psi   at   2.550 ft in Span # 1
  Fv : Allowable :   259.20 psi
  Load Comb :   +1.20D+0.50Lr+1.60L+1.60H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.44	0.72	0.38	0.38			
Right Support	0.44	0.72	0.38	0.38			

D(0.150) Lr(0.250) S(0.250)
2-2x6
3.0 ft
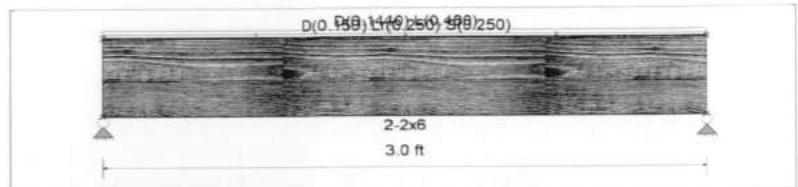
Max Deflections
Transient Downward	0.016 in	Total Downward	0.029 in
Ratio	2213	Ratio	1262
	LC: L Only	C: +D+0.750Lr+0.750L+H	
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : South Wall header

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

BEAM Size : 2-2x12, Sawn, Fully Braced
Using Load Resistance Factor Design with ASCE 7-10 Load Combinations, Major Axis Bending

Wood Species : Douglas Fir-Larch					Wood Grade : No.2		
Fb - Tension	900.0 psi	Fc - Prll	1,350.0 psi	Fv	180.0 psi	Ebend- xx	1,600.0 ksi	Density	31.210 pcf
Fb - Compr	900.0 psi	Fc - Perp	625.0 psi	Ft	575.0 psi	Eminbend - xx	580.0 ksi		

Applied Loads

Unif Load: D = 0.0150, Lr = 0.0250, S = 0.0250 k/ft, Trib= 12.0 ft
Unif Load: D = 0.0120, L = 0.040 k/ft, Trib= 12.0 ft
Point: D = 0.90, Lr = 1.40, S = 1.40 k @ 1.750 ft

Design Summary

Max fb/Fb Ratio   =   0.561 : 1
  fb : Actual :   872.84 psi   at   1.750 ft in Span # 1
  Fb : Allowable :   1,555.20 psi
  Load Comb :   +1.20D+1.60Lr+0.50L+1.60H

Max fv/FvRatio =   0.367 : 1
  fv : Actual :   114.02 psi   at   2.567 ft in Span # 1
  Fv : Allowable :   311.04 psi
  Load Comb :   +1.20D+1.60Lr+0.50L+1.60H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	1.02	0.84	1.23	1.23			
Right Support	1.02	0.84	1.23	1.23			

D(0.90) Lr(1.40) S(1.40)
2-2x12
3.50 ft
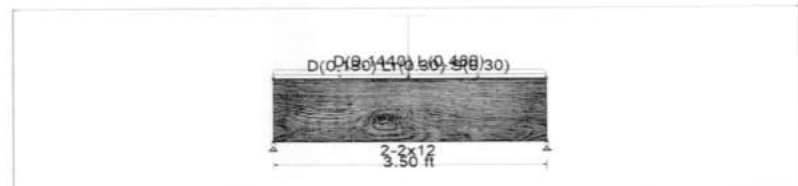
Max Deflections
Transient Downward	0.006 in	Total Downward	0.011 in
Ratio	7498	Ratio	3914
	LC: Lr Only	C: +D+0.750Lr+0.750L+H	
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

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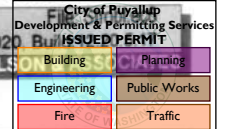Project ID:
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Wood Beam Design : North Wall header 8'

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

BEAM Size : 3-2x12, Sawn, Fully Braced
Using Load Resistance Factor Design with ASCE 7-10 Load Combinations, Major Axis Bending

Wood Species : Douglas Fir-Larch   Wood Grade : No.2

Fb - Tension	900.0 psi	Fc - Prll	1,350.0 psi	Fv	180.0 psi	Ebend-xx	1,600.0 ksi	Density	31.210 pcf
Fb - Compr	900.0 psi	Fc - Perp	625.0 psi	Ft	575.0 psi	Eminbend - xx	580.0 ksi		

Applied Loads

Unif Load: D = 0.0150, Lr = 0.0250, S = 0.0250 k/ft, Trib= 10.0 ft
Unif Load: D = 0.0120, L = 0.040 k/ft, Trib= 12.0 ft
Point: D = 1.50, Lr = 2.50, S = 2.50 k @ 1.250 ft

Design Summary

Max fb/Fb Ratio = 0.974 : 1
fb : Actual : 1,514.64 psi at 3.093 ft in Span # 1
Fb : Allowable : 1,555.20 psi
Load Comb : +1.20D+1.60Lr+0.50L+1.60H

Max fv/FvRatio = 0.756 : 1
fv : Actual : 235.21 psi at 0.000 ft in Span # 1
Fv : Allowable : 311.04 psi
Load Comb : +1.20D+1.60Lr+0.50L+1.60H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	2.44	1.92	3.11	3.11			
Right Support	1.41	1.92	1.39	1.39			

3-2x12
8.0 ft

Max Deflections

Transient Downward	0.052 in	Total Downward	0.125 in
Ratio	1844	Ratio	769
	LC: L Only	C: +D+0.750Lr+0.750L+H	
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : Floor Beam 1

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

BEAM Size : 3.5x14, VersaLam, Fully Braced
Using Load Resistance Factor Design with ASCE 7-10 Load Combinations, Major Axis Bending

Wood Species : iLevel Truss Joist   Wood Grade : Parallam PSL 1.8E

Fb - Tension	2,400.0 psi	Fc - Prll	2,500.0 psi	Fv	190.0 psi	Ebend- xx	1,800.0 ksi	Density	45.070 pcf
Fb - Compr	2,400.0 psi	Fc - Perp	425.0 psi	Ft	1,755.0 psi	Eminbend - xx	914.88 ksi		

Applied Loads

Unif Load: D = 0.0150, Lr = 0.0250, S = 0.0250 k/ft, Trib= 8.50 ft
Unif Load: D = 0.0120, L = 0.040 k/ft, Trib= 9.0 ft
Point: D = 0.70, Lr = 1.10, S = 1.10 k @ 12.250 ft

Design Summary

Max fb/Fb Ratio = 0.849 : 1
fb : Actual : 3,519.84 psi at 8.320 ft in Span # 1
Fb : Allowable : 4,147.20 psi
Load Comb : +1.20D+0.50Lr+1.60L+1.60H

Max fv/FvRatio = 0.718 : 1
fv : Actual : 235.79 psi at 14.880 ft in Span # 1
Fv : Allowable : 328.32 psi
Load Comb : +1.20D+0.50Lr+1.60L+1.60H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	2.05	2.88	1.96	1.96			
Right Support	2.42	2.88	2.54	2.54			

3.5x14
16.0 ft
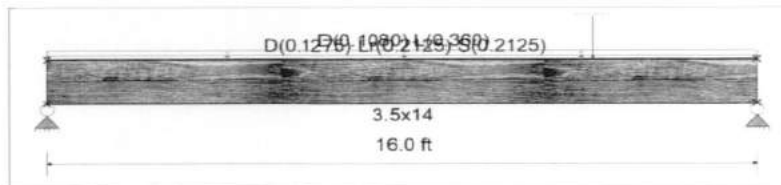
Max Deflections

Transient Downward	0.370 in	Total Downward	0.787 in
Ratio	518	Ratio	244
	LC: L Only	C: +D+0.750Lr+0.750L+H	
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

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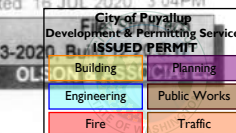Engineer:
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Wood Beam Design : Floor Beam 2

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

BEAM Size : 3-1.75x14, Microllam LVL, Fully Braced
Using Load Resistance Factor Design with ASCE 7-10 Load Combinations, Major Axis Bending

Wood Species : iLevel Truss Joist   **Wood Grade :** MicroLam LVL 1.9 E

Fb - Tension	2600 psi	Fc - Prll	2510 psi	Fv	285 psi	Ebend- xx	1900 ksi	Density	42.01 pcf
Fb - Compr	2600 psi	Fc - Perp	750 psi	Ft	1555 psi	Eminbend - xx	965.71 ksi		

Applied Loads

Beam self weight calculated and added to loads
Unif Load: D = 0.0150, Lr = 0.0250, S = 0.0250 k/ft, 0.0 ft to 5.0 ft, Trib= 3.0 ft
Unif Load: D = 0.0120, L = 0.040 k/ft, Trib= 1.330 ft
Point: D = 0.60, Lr = 1.0, S = 1.0 k @ 19.0 ft

Design Summary

Max fb/Fb Ratio = 0.205 : 1
fb : Actual : 919.84 psi at 13.600 ft in Span # 1
Fb : Allowable : 4,492.80 psi
Load Comb : +1.20D+0.50Lr+1.60L+1.60H

Max fv/FvRatio = 0.112 : 1
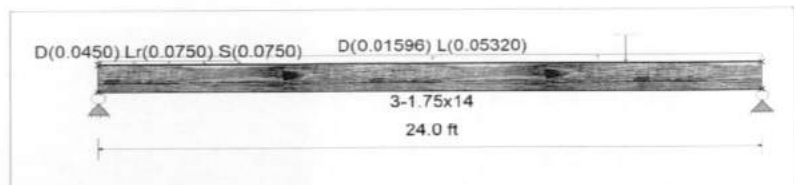fv : Actual : 55.20 psi at 22.880 ft in Span # 1
Fv : Allowable : 492.48 psi
Load Comb : +1.20D+1.60Lr+0.50L+1.60H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.78	0.64	0.54	0.54			
Right Support	0.95	0.64	0.83	0.83			

D(0.0450) Lr(0.0750) S(0.0750)   D(0.01596) L(0.05320)

3-1.75x14
24.0 ft

Max Deflections

Transient Downward	0.175 in	Total Downward	0.463 in
Ratio	1645	Ratio	621
	LC: L Only	C: +D+0.750Lr+0.750L+H	
Transient Upward	0.000 in	Total Upward	0.000 in
Ratio	9999	Ratio	9999
	LC:		LC:

Wood Beam Design : Triple Rim South

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

BEAM Size : 3.5x14, X-Beam, Fully Braced
Using Load Resistance Factor Design with ASCE 7-10 Load Combinations, Major Axis Bending

Wood Species : iLevel Truss Joist   **Wood Grade :** TimberStrand LSL 1.55E

Fb - Tension	2,325.0 psi	Fc - Prll	2,050.0 psi	Fv	310.0 psi	Ebend- xx	1,550.0 ksi	Density	45.010 pcf
Fb - Compr	2,325.0 psi	Fc - Perp	800.0 psi	Ft	1,070.0 psi	Eminbend - xx	787.82 ksi		

Applied Loads

Beam self weight calculated and added to loads
Unif Load: D = 0.0120, L = 0.040 k/ft, Trib= 7.50 ft

Design Summary

Max fb/Fb Ratio = 0.604 : 1
fb : Actual : 2,425.58 psi at 8.775 ft in Span # 1
Fb : Allowable : 4,017.60 psi
Load Comb : +1.20D+0.50Lr+1.60L+1.60H

Max fv/FvRatio = 0.306 : 1
fv : Actual : 163.70 psi at 17.550 ft in Span # 1
Fv : Allowable : 535.68 psi
Load Comb : +1.20D+0.50Lr+1.60L+1.60H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.92	2.62					
Right Support	1.55	4.41					

D(0.090) L(0.30)

3.5x14   3.5x14
18.670 ft   4.750 ft
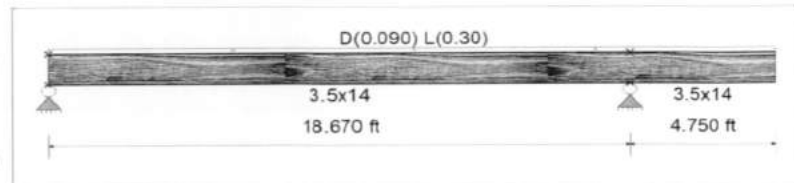
Max Deflections

Transient Downward	0.563 in	Total Downward	0.761 in
Ratio	397	Ratio	294
	LC: L Only	LC: +D+L+H	
Transient Upward	-0.372 in	Total Upward	-0.503 in
Ratio	306	Ratio	226
	LC: L Only	LC: +D+L+H	

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Project Title:
Engineer:
Project ID:
Project Descr:

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Multiple Simple Beam

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Lic. # : KW-06002029

Wood Beam Design : Triple Rim North

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10

BEAM Size : **3.5x14, X-Beam, Fully Braced**
Using Load Resistance Factor Design with ASCE 7-10 Load Combinations, Major Axis Bending

Wood Species : iLevel Truss Joist   Wood Grade : TimberStrand LSL 1.55E

Fb - Tension	2,325.0 psi	Fc - Prll	2,050.0 psi	Fv	310.0 psi	Ebend- xx	1,550.0 ksi	Density 45.010 pcf
Fb - Compr	2,325.0 psi	Fc - Perp	800.0 psi	Ft	1,070.0 psi	Eminbend - xx	787.82 ksi	

Applied Loads

Beam self weight calculated and added to loads
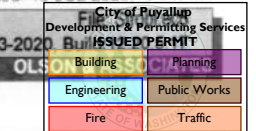Unif Load: D = 0.0120, L = 0.040 k/ft, Trib= 3.0 ft

Design Summary

Max fb/Fb Ratio =   0.252 : 1
fb : Actual :   1,014.34 psi   at   8.775 ft in Span # 1
Fb : Allowable :   4,017.60 psi
Load Comb :   +1.20D+0.50Lr+1.60L+1.60H

Max fv/FvRatio =   0.144 : 1
fv : Actual :   77.15 psi at 18.670 ft in Span # 1
Fv : Allowable :   535.68 psi
Load Comb :   +1.20D+0.50Lr+1.60L+1.60H

Max Reactions (k)	D	L	Lr	S	W	E	H
Left Support	0.45	1.05					
Right Support	0.75	1.76					

D(0.0360) L(0.120)

3.5x14
18.670 ft

3.5x14
4.750 ft
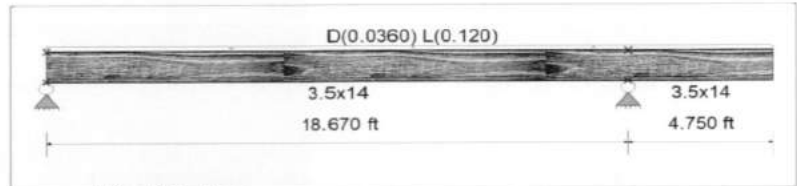
Max Deflections

Transient Downward	0.225 in	Total Downward	0.322 in
Ratio	994	Ratio	696
	LC: L Only		LC: +D+L+H
Transient Upward	-0.149 in	Total Upward	-0.213 in
Ratio	764	Ratio	536
	LC: L Only		LC: +D+L+H

N.L. Olson & Associates, Inc.
2453 Bethel Road
Port Orchard,WA 98367
(360) 876-2284

Project Title:
Engineer:
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General Footing

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Description :   30" Ftg.

Code References

Calculations per ACI 318-14, IBC 2015, CBC 2016, ASCE 7-10
Load Combinations Used : ASCE 7-10

General Information

Material Properties				Soil Design Values		
f'c : Concrete 28 day strength	=	2.50 ksi		Allowable Soil Bearing	=	1.50 ksf
fy : Rebar Yield	=	60.0 ksi		Increase Bearing By Footing Weight	=	No
Ec : Concrete Elastic Modulus	=	3,122.0 ksi		Soil Passive Resistance (for Sliding)	=	250.0 pcf
Concrete Density	=	145.0 pcf		Soil/Concrete Friction Coeff.	=	0.30
φ Values Flexure	=	0.90				
Shear	=	0.750		**Increases based on footing Depth**		

Analysis Settings

Min Steel % Bending Reinf.	=		Footing base depth below soil surface = 0.0 ft
Min Allow % Temp Reinf.	=	0.00180	Allow press. increase per foot of depth = 0.0 ksf
Min. Overturning Safety Factor	=	1.0 : 1	when footing base is below = 0.0 ft
Min. Sliding Safety Factor	=	1.0 : 1	**Increases based on footing plan dimension**
Add Ftg Wt for Soil Pressure	:	Yes	Allowable pressure increase per foot of depth
Use ftg wt for stability, moments & shears	:	Yes	
Add Pedestal Wt for Soil Pressure	:	No	when max. length or width is greater than = 0.0 ksf
Use Pedestal wt for stability, mom & shear	:	No	= 0.0 ft

Dimensions

Width parallel to X-X Axis	=	2.50 ft
Length parallel to Z-Z Axis	=	2.50 ft
Footing Thickness	=	8.0 in

Pedestal dimensions...		
px : parallel to X-X Axis	=	0.0 in
pz : parallel to Z-Z Axis	=	0.0 in
Height	=	0.0 in
Rebar Centerline to Edge of Concrete...		
at Bottom of footing	=	3.0 in
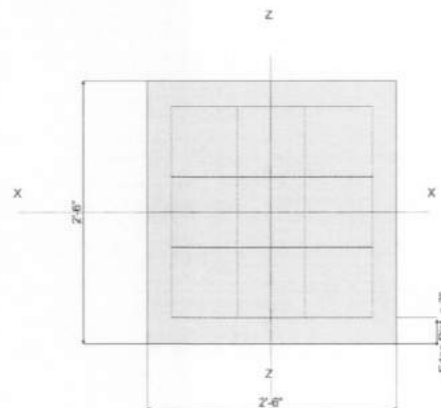
Reinforcing

Bars parallel to X-X Axis			
Number of Bars	=		4.0
Reinforcing Bar Size	=	#	4
Bars parallel to Z-Z Axis			
Number of Bars	=		4
Reinforcing Bar Size	=	#	4

Bandwidth Distribution Check (ACI 15.4.4.2)
Direction Requiring Closer Separation   n/a

\# Bars required within zone   n/a
\# Bars required on each side of zone   n/a

Applied Loads

		D	Lr	L	S	W	E	H
P : Column Load	=	2.520	2.040	2.880	2.040	0.0	0.0	0.0 k
OB : Overburden	=	0.0	0.0	0.0	0.0	0.0	0.0	0.0 ksf
M-xx	=	0.0	0.0	0.0	0.0	0.0	0.0	0.0 k-ft
M-zz	=	0.0	0.0	0.0	0.0	0.0	0.0	0.0 k-ft
V-x	=	0.0	0.0	0.0	0.0	0.0	0.0	0.0 k
V-z	=	0.0	0.0	0.0	0.0	0.0	0.0	0.0 k
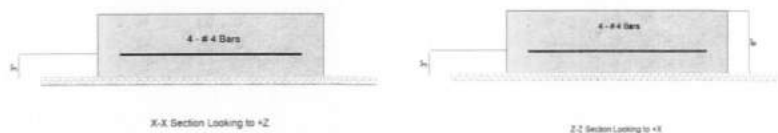
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Project Title:
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General Footing

Lic. # : KW-06002029   Licensee : OLSON ...

Description :   30" Ftg.

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.7267	Soil Bearing	1.090 ksf	1.50 ksf	+D+0.750L+0.750S+0.5250E+H about Z-
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.1624	Z Flexure (+X)	1.082 k-ft/ft	6.658 k-ft/ft	+1.20D+0.50L+1.60L+1.60H
PASS	0.1624	Z Flexure (-X)	1.082 k-ft/ft	6.658 k-ft/ft	+1.20D+0.50L+1.60L+1.60H
PASS	0.1624	X Flexure (+Z)	1.082 k-ft/ft	6.658 k-ft/ft	+1.20D+0.50L+1.60L+1.60H
PASS	0.1624	X Flexure (-Z)	1.082 k-ft/ft	6.658 k-ft/ft	+1.20D+0.50L+1.60L+1.60H
PASS	0.2538	1-way Shear (+X)	19.034 psi	75.0 psi	+1.20D+0.50L+1.60L+1.60H
PASS	0.2538	1-way Shear (-X)	19.034 psi	75.0 psi	+1.20D+0.50L+1.60L+1.60H
PASS	0.2538	1-way Shear (+Z)	19.034 psi	75.0 psi	+1.20D+0.50L+1.60L+1.60H
PASS	0.2538	1-way Shear (-Z)	19.034 psi	75.0 psi	+1.20D+0.50L+1.60L+1.60H
PASS	0.5620	2-way Punching	84.305 psi	150.0 psi	+1.20D+0.50L+1.60L+1.60H

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc (in)	Zecc (in)	Actual Soil Bearing Stress @ Location Bottom, -Z	Top, +Z	Left, -X	Right, +X	Actual / Allow Ratio
X-X. +D+H	1.50	n/a	0.0	0.4999	0.4999	n/a	n/a	0.333
X-X. +D+L+H	1.50	n/a	0.0	0.9607	0.9607	n/a	n/a	0.641
X-X. +D+Lr+H	1.50	n/a	0.0	0.8263	0.8263	n/a	n/a	0.551
X-X. +D+S+H	1.50	n/a	0.0	0.8263	0.8263	n/a	n/a	0.551
X-X. +D+0.750Lr+0.750L+H	1.50	n/a	0.0	1.090	1.090	n/a	n/a	0.727
X-X. +D+0.750L+0.750S+H	1.50	n/a	0.0	1.090	1.090	n/a	n/a	0.727
X-X. +D+0.60W+H	1.50	n/a	0.0	0.4999	0.4999	n/a	n/a	0.333
X-X. +D+0.70E+H	1.50	n/a	0.0	0.4999	0.4999	n/a	n/a	0.333
X-X. +D+0.750L+0.750L+0.450W+H	1.50	n/a	0.0	1.090	1.090	n/a	n/a	0.727
X-X. +D+0.750L+0.750S+0.450W+H	1.50	n/a	0.0	1.090	1.090	n/a	n/a	0.727
X-X. +D+0.750L+0.750S+0.5250E+H	1.50	n/a	0.0	1.090	1.090	n/a	n/a	0.727
X-X. +0.60D+0.60W+0.60H	1.50	n/a	0.0	0.2999	0.2999	n/a	n/a	0.200
X-X. +0.60D+0.70E+0.60H	1.50	n/a	0.0	0.2999	0.2999	n/a	n/a	0.200
Z-Z. +D+H	1.50	0.0	n/a	n/a	n/a	0.4999	0.4999	0.333
Z-Z. +D+L+H	1.50	0.0	n/a	n/a	n/a	0.9607	0.9607	0.641
Z-Z. +D+Lr+H	1.50	0.0	n/a	n/a	n/a	0.8263	0.8263	0.551
Z-Z. +D+S+H	1.50	0.0	n/a	n/a	n/a	0.8263	0.8263	0.551
Z-Z. +D+0.750Lr+0.750L+H	1.50	0.0	n/a	n/a	n/a	1.090	1.090	0.727
Z-Z. +D+0.750L+0.750S+H	1.50	0.0	n/a	n/a	n/a	1.090	1.090	0.727
Z-Z. +D+0.60W+H	1.50	0.0	n/a	n/a	n/a	0.4999	0.4999	0.333
Z-Z. +D+0.70E+H	1.50	0.0	n/a	n/a	n/a	0.4999	0.4999	0.333
Z-Z. +D+0.750Lr+0.750L+0.450W+H	1.50	0.0	n/a	n/a	n/a	1.090	1.090	0.727
Z-Z. +D+0.750L+0.750S+0.450W+H	1.50	0.0	n/a	n/a	n/a	1.090	1.090	0.727
Z-Z. +D+0.750L+0.750S+0.5250E+H	1.50	0.0	n/a	n/a	n/a	1.090	1.090	0.727
Z-Z. +0.60D+0.60W+0.60H	1.50	0.0	n/a	n/a	n/a	0.2999	0.2999	0.200
Z-Z. +0.60D+0.70E+0.60H	1.50	0.0	n/a	n/a	n/a	0.2999	0.2999	0.200

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X. +1.40D+1.60H	0.4410	+Z	Bottom	0.1728	Min Temp %	0.320	6.658	OK
X-X. +1.40D+1.60H	0.4410	-Z	Bottom	0.1728	Min Temp %	0.320	6.658	OK
X-X. +1.20D+0.50Lr+1.60L+1.60H	1.082	+Z	Bottom	0.1728	Min Temp %	0.320	6.658	OK
X-X. +1.20D+0.50Lr+1.60L+1.60H	1.082	-Z	Bottom	0.1728	Min Temp %	0.320	6.658	OK
X-X. +1.20D+1.60L+0.50S+1.60H	1.082	+Z	Bottom	0.1728	Min Temp %	0.320	6.658	OK
X-X. +1.20D+1.60L+0.50S+1.60H	1.082	-Z	Bottom	0.1728	Min Temp %	0.320	6.658	OK
N-X. +1.20D+1.60Lr+0.50L+1.60H	0.9660	+Z	Bottom	0.1728	Min Temp %	0.320	6.658	OK
X-X. +1.20D+1.60Lr+0.50L+1.60H	0.9660	-Z	Bottom	0.1728	Min Temp %	0.320	6.658	OK
X-X. +1.20D+1.60Lr+0.50W+1.60H	0.7860	+Z	Bottom	0.1728	Min Temp %	0.320	6.658	OK
X-X. +1.20D+1.60Lr+0.50W+1.60H	0.7860	-Z	Bottom	0.1728	Min Temp %	0.320	6.658	OK

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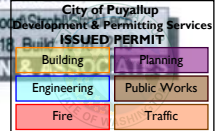Project ID:
Project Descr:

**B-21-0070
CITY OF PUYALLUP**

General Footing

Lic. # : KW-06002029   Licensee : OLSON...

Description : 30" Ftg.

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.20D+0.50L+1.60S+1.60H	0.9660	+Z	Bottom	0.1728	Min Temp %	0.320	6.658	OK
X-X, +1.20D+0.50L+1.60S+1.60H	0.9660	-Z	Bottom	0.1728	Min Temp %	0.320	6.658	OK
X-X, +1.20D+1.60S+0.50W+1.60H	0.7860	+Z	Bottom	0.1728	Min Temp %	0.320	6.658	OK
X-X, +1.20D+1.60S+0.50W+1.60H	0.7860	-Z	Bottom	0.1728	Min Temp %	0.320	6.658	OK
X-X, +1.20D+0.50Lr+0.50L+W+1.60H	0.6855	+Z	Bottom	0.1728	Min Temp %	0.320	6.658	OK
X-X, +1.20D+0.50Lr+0.50L+W+1.60H	0.6855	-Z	Bottom	0.1728	Min Temp %	0.320	6.658	OK
X-X, +1.20D+0.50L+0.50S+W+1.60H	0.6855	+Z	Bottom	0.1728	Min Temp %	0.320	6.658	OK
X-X, +1.20D+0.50L+0.50S+W+1.60H	0.6855	-Z	Bottom	0.1728	Min Temp %	0.320	6.658	OK
X-X, +1.20D+0.50L+0.20S+E+1.60H	0.6090	+Z	Bottom	0.1728	Min Temp %	0.320	6.658	OK
X-X, +1.20D+0.50L+0.20S+E+1.60H	0.6090	-Z	Bottom	0.1728	Min Temp %	0.320	6.658	OK
X-X, +0.90D+W+0.90H	0.2835	+Z	Bottom	0.1728	Min Temp %	0.320	6.658	OK
X-X, +0.90D+W+0.90H	0.2835	-Z	Bottom	0.1728	Min Temp %	0.320	6.658	OK
X-X, +0.90D+E+0.90H	0.2835	+Z	Bottom	0.1728	Min Temp %	0.320	6.658	OK
X-X, +0.90D+E+0.90H	0.2835	-Z	Bottom	0.1728	Min Temp %	0.320	6.658	OK
Z-Z, +1.40D+1.60H	0.4410	-X	Bottom	0.1728	Min Temp %	0.320	6.658	OK
Z-Z, +1.40D+1.60H	0.4410	+X	Bottom	0.1728	Min Temp %	0.320	6.658	OK
Z-Z, +1.20D+0.50Lr+1.60L+1.60H	1.082	-X	Bottom	0.1728	Min Temp %	0.320	6.658	OK
Z-Z, +1.20D+0.50Lr+1.60L+1.60H	1.082	+X	Bottom	0.1728	Min Temp %	0.320	6.658	OK
Z-Z, +1.20D+1.60L+0.50S+1.60H	1.082	-X	Bottom	0.1728	Min Temp %	0.320	6.658	OK
Z-Z, +1.20D+1.60L+0.50S+1.60H	1.082	+X	Bottom	0.1728	Min Temp %	0.320	6.658	OK
Z-Z, +1.20D+1.60Lr+0.50L+1.60H	0.9660	-X	Bottom	0.1728	Min Temp %	0.320	6.658	OK
Z-Z, +1.20D+1.60Lr+0.50L+1.60H	0.9660	+X	Bottom	0.1728	Min Temp %	0.320	6.658	OK
Z-Z, +1.20D+1.60Lr+0.50W+1.60H	0.7860	-X	Bottom	0.1728	Min Temp %	0.320	6.658	OK
Z-Z, +1.20D+1.60Lr+0.50W+1.60H	0.7860	+X	Bottom	0.1728	Min Temp %	0.320	6.658	OK
Z-Z, +1.20D+0.50L+1.60S+1.60H	0.9660	-X	Bottom	0.1728	Min Temp %	0.320	6.658	OK
Z-Z, +1.20D+0.50L+1.60S+1.60H	0.9660	+X	Bottom	0.1728	Min Temp %	0.320	6.658	OK
Z-Z, +1.20D+1.60S+0.50W+1.60H	0.7860	-X	Bottom	0.1728	Min Temp %	0.320	6.658	OK
Z-Z, +1.20D+1.60S+0.50W+1.60H	0.7860	+X	Bottom	0.1728	Min Temp %	0.320	6.658	OK
Z-Z, +1.20D+0.50Lr+0.50L+W+1.60H	0.6855	-X	Bottom	0.1728	Min Temp %	0.320	6.658	OK
Z-Z, +1.20D+0.50Lr+0.50L+W+1.60H	0.6855	+X	Bottom	0.1728	Min Temp %	0.320	6.658	OK
Z-Z, +1.20D+0.50L+0.50S+W+1.60H	0.6855	-X	Bottom	0.1728	Min Temp %	0.320	6.658	OK
Z-Z, +1.20D+0.50L+0.50S+W+1.60H	0.6855	+X	Bottom	0.1728	Min Temp %	0.320	6.658	OK
Z-Z, +1.20D+0.50L+0.20S+E+1.60H	0.6090	-X	Bottom	0.1728	Min Temp %	0.320	6.658	OK
Z-Z, +1.20D+0.50L+0.20S+E+1.60H	0.6090	+X	Bottom	0.1728	Min Temp %	0.320	6.658	OK
Z-Z, +0.90D+W+0.90H	0.2835	-X	Bottom	0.1728	Min Temp %	0.320	6.658	OK
Z-Z, +0.90D+W+0.90H	0.2835	+X	Bottom	0.1728	Min Temp %	0.320	6.658	OK
Z-Z, +0.90D+E+0.90H	0.2835	-X	Bottom	0.1728	Min Temp %	0.320	6.658	OK
Z-Z, +0.90D+E+0.90H	0.2835	+X	Bottom	0.1728	Min Temp %	0.320	6.658	OK

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D+1.60H	7.76 psi	7.76 psi	7.76 psi	7.76 psi	7.76 psi	75.00 psi	0.10	OK
+1.20D+0.50Lr+1.60L+1.60H	19.03 psi	19.03 psi	19.03 psi	19.03 psi	19.03 psi	75.00 psi	0.25	OK
+1.20D+1.60L+0.50S+1.60H	19.03 psi	19.03 psi	19.03 psi	19.03 psi	19.03 psi	75.00 psi	0.25	OK
+1.20D+1.60Lr+0.50L+1.60H	17.00 psi	17.00 psi	17.00 psi	17.00 psi	17.00 psi	75.00 psi	0.23	OK
+1.20D+1.60Lr+0.50W+1.60H	13.83 psi	13.83 psi	13.83 psi	13.83 psi	13.83 psi	75.00 psi	0.18	OK
+1.20D+0.50L+1.60S+1.60H	17.00 psi	17.00 psi	17.00 psi	17.00 psi	17.00 psi	75.00 psi	0.23	OK
+1.20D+1.60S+0.50W+1.60H	13.83 psi	13.83 psi	13.83 psi	13.83 psi	13.83 psi	75.00 psi	0.18	OK
+1.20D+0.50Lr+0.50L+W+1.60H	12.07 psi	12.07 psi	12.07 psi	12.07 psi	12.07 psi	75.00 psi	0.16	OK
+1.20D+0.50L+0.50S+W+1.60H	12.07 psi	12.07 psi	12.07 psi	12.07 psi	12.07 psi	75.00 psi	0.16	OK
+1.20D+0.50L+0.20S+E+1.60H	10.72 psi	10.72 psi	10.72 psi	10.72 psi	10.72 psi	75.00 psi	0.14	OK
+0.90D+W+0.90H	4.99 psi	4.99 psi	4.99 psi	4.99 psi	4.99 psi	75.00 psi	0.07	OK
+0.90D+E+0.90H	4.99 psi	4.99 psi	4.99 psi	4.99 psi	4.99 psi	75.00 psi	0.07	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D+1.60H	34.38 psi	150.00 psi	0.2292	OK
+1.20D+0.50Lr+1.60L+1.60H	84.31 psi	150.00 psi	0.562	OK
+1.20D+1.60L+0.50S+1.60H	84.31 psi	150.00 psi	0.562	OK
+1.20D+1.60Lr+0.50L+1.60H	75.30 psi	150.00 psi	0.502	OK
+1.20D+1.60Lr+0.50W+1.60H	61.27 psi	150.00 psi	0.4085	OK
+1.20D+0.50L+1.60S+1.60H	75.30 psi	150.00 psi	0.502	OK

N.L. Olson & Associates, Inc.
2453 Bethel Road
Port Orchard, WA 98367
(360) 876-2284

Project Title:
Engineer:
Project ID:
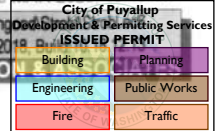Project Descr:

General Footing

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Description :   30" Ftg.

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.20D+1.60S+0.50W+1.60H	61.27 psi	150.00 psi	0.4085	OK
+1.20D+0.50Lr+0.50L+W+1.60H	53.44 psi	150.00 psi	0.3562	OK
+1.20D+0.50L+0.50S+W+1.60H	53.44 psi	150.00 psi	0.3562	OK
+1.20D+0.50L+0.20S+E+1.60H	47.47 psi	150.00 psi	0.3165	OK
+0.90D+W+0.90H	22.10 psi	150.00 psi	0.1473	OK
+0.90D+E+0.90H	22.10 psi	150.00 psi	0.1473	OK