# PACIFIC NORTHWEST STRUCTURAL GROUP, LLC

A PROFESSIONAL ENGINEERING COMPANY

BASIC PERMIT PACKAGE REVIEWED FOR CODE COMPLIANCE WITH IRC 2015 KITSAP COUNTY BUILDING DEPARTMENT 6193 NE MALBON CT. KINGSTON, WA 98346 360.903.2803

# STRUCTURAL CALCULATIONS

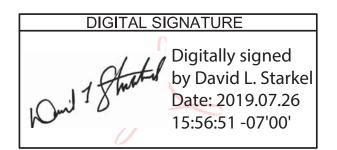
19-002c Red Barn Lane - Duplex 1400 NW Hogan Ln & Nels Nelson Rd NW Bremerton, WA 98311

Reviewed for code compliance with IRC 2015 Kitsap County Building Department lasmith@co.kitsap.wa.us 11/13/2020

ALL COMPUTATIONS AND ENGINEERING FOR THIS PROJECT HAVE BEEN PERFORMED BY MYSELF OR UNDER MY SUPERVISION.



26-JUL-19



Established Basic Permit #

19-03646

## Pacific Northwest Structural Group, LLC

Project	Red Barn Lane - Duplex 1400	Designer	DLS
Location	NW Hogan Ln & Nels Nelson Rd NW, Bremerton, WA	Project No.	19-002c
Client	Envision Northwest, LLC	Revised	15-Sep-18
	Design Live and Dead Loads, Soil Data	Reviseu	10-3ep-10

ROOF L			
	UAD :	1.5	PSF
Asphalt Shingles			
Re-Roof		1.5	PSF
Roof Shtg		1.5	PSF
Truss @ 24" oc		3.3	PSF
Insulation		1.6	PSF
Gypsum Shtg		2.2	PSF
			PSF
			PSF
SUB-T	OTAL	11.6	PSF
SLOPE CORRECTION "X:12"	5.00	1.1	
MISCELLANE	EOUS	2.4	PSF
ROOF DEAD I	OAD	15.0	PSF
ROOF SNOW I	OAD	25.0	PSF
REDUCED SNOW LOA	AD	N/A	PSF
ROOF LIVE I	OAD	16.0	PSF
EXTERIOR W	ALL LO		
Siding		4.0	PSF
Wall Shtg		1.5	PSF
2x6 @ 16" oc		1.7	PSF
Bottom & Top Plates		0.8	PSF
Insulation		0.5	PSF
Gypsum Shtg		2.2	PSF
Mech., Elec., & Misc.		0.3	PSF
EXTER. WALL DEAD I	OAD	11.0	PSF
Insulation Gypsum Shtg Mech., Elec., & Misc.	OAD	2.2 0.3	PSF PSF

INTERIOR WALL LOAD						
Gypsum Shtg	4.4	PSF				
2X4 @ 16" oc	1.1	PSF				
Insulation	0.5	PSF				
Bottom & Top Plates	0.8	PSF				
Mech., Elec., & Misc.	1.2	PSF				
INTERIOR WALL DEAD LOAD	8.0	PSF				

FLOOR LOAD							
Floor Covering	1.0	PSF					
Floor Shtg	2.3	PSF					
Floor Joist	3.3	PSF					
Insulation	1.3	PSF					
Gypsum Sheathing	5.6	PSF					
Mech., Elec., & Misc.	1.5	PSF					
		PSF					
FLOOR DEAD LOAD	15.0	PSF					
FLOOR LIVE LOAD	40.0	PSF					

DECK OR BALCONY DEAD LOAD						
2x Decking	4.5	PSF				
Deck Joist	3.3	PSF				
Mech., Elec., & Misc.	4.2	PSF				
		PSF				
DECK DEAD LOAD	12.0	PSF				
DECK LIVE LOAD	60.0	PSF				

		PSF
		PSF
FLOOR DEAD LOAD	-	PSF
FLOOR LIVE LOAD		PSF

The soil bearing shall be 1500 PSF unless a soil analysis has been preformed. Please revise the plans or provide a soil analysis showing the 2500 PSF.

SOILS DATA								
SOILS REPORT	/A							
GEOTECHNICAL ENGINEER	/A	/		DATE OF REPORT	N/A			
	/							
BASIC BEARING PR	ESSURE 🖌			ACTIVE SOI	PRES	SURE		
PADS & CONT. FNI	2,500	PSF		PASSIVE PRESSU	JRE	N/A	PCF	
INCREASE FOR WIDTH	H N/A	%		SOIL FRICT	ION	N/A		
INCREASE FOR DEPTH	H N/A	%		E.F.P. (Cantile	ver)	N/A	PCF	
MAX. SOIL PRESSURE	2,500	PSF		E.F.P. (Restrain	ned)	N/A	PCF	
ISOLATED FOUNDATIONS	S N/A	PSF						
			-					

DESIGN LIVE AND DEAD LOADS

C:\Users\dlsta\Dropbox\PNW Project Files\2019 Projects\19-002C Red Barn Lane - Duplex\ENGR\19-002c Design Criteria 2018.xlsxLoads



Established Basic Permit #

	Project	Red Barn Lane - Duplex 1400	Designer	DLS
Pacific Northwest	Location	NW Hogan Ln & Nels Nelson Rd NW, Brem	Project No.	19-002c
Structural Group, LLC	Client	Envision Northwest, LLC	Revised	15-Sep-18
	2	015 IBC Section 1609.6 Wind Loads	Neviseu	10-3ep-10

BUILDING DATA:

BOILDING DATA.							
Ultimate Design Wind Speed, V <sub>ult</sub>	110	MPH		Figure 1	609		
Exposure	В			1609.4		Exposure	Э
Roof Pitch		:12			В	С	D
θ=	22.62			_			
	Conditio						
Building Length	37.00						
Building Width	37.00	-					
1st Level Plate Height	9.08						
2nd Level Plate Height	9.08	-					
3rd Level Plate Height	8.08						
Gable Height	33.95						
Roof Height		ft					
Mean Roof Height h =		ft					
1609.6 Alternate All-Heights Method		1					
Wind directionality factor, K <sub>d</sub>	0.85						
Topographic Factor, K <sub>zt</sub>	1.00						
Velocity pressure factor, K <sub>z</sub>	0.70			ASCE 7-	10, 27.3	3-1	
IBC 2015 Table 160	09.6.2, Net	Pressure	e Coeffici	ents, C <sub>net</sub>			
Deservition			+ In	ternal	-	nternal	
Description			pres	sure	pr	essure	
Windward Wall				0.43		0.73	
Leeward Wall				(0.51)		(0.21)	
Sidewall				(0.66)		(0.35)	
Wind perpendicular to ridge Leeward re	oof or flat r	oof		(0.66)		(0.35)	
Wind parallel to ridge and flat roofs				(1.09)		(0.79)	
Windward roof slopes				0.03		0.34	
Description			Pres	sure			
Windward Wall				21.42	psf		
Leeward Wall				13.29	psf		
Sidewall				18.65	psf		
Wind perpendicular to ridge Leeward re	oof or flat r	oof		18.65	psf		
Windward roof slopes				6.83	psf		
					-		

Allowable Uniform Wind Load								
Level	Trans	sverse	Longitu	udinal				
1st Level Plate	189.1	plf	101.6	plf				
2nd Level Plate	178.7	plf	96.0	plf				
3rd Level Plate	115.7	plf	88.3	plf				

Established Basic Basic Bropbox/PN/V Project Files/2019 Projects/19-002C Red Barn Lane - Duplex/ENGR/19-002c Design Criteria

		Project	Red Barn Lane	Duplox 1400		Designer	DI S
Pacific Northwes							
	-	Location	NW Hogan Ln & Nels Nelson Rd NW, Breme		Ra NVV, Breme	Project No.	19-002C
Structural Group, L	Client	Envision North	,		Revised	15-Sep-18	
2015 IBC Sect				13 Earthquake	Loads		
4005		2015 Secti					
			on 1613, EAF	THQUAKE		11 4 2 ( Dofo	
Soil Site Class	D					11.4.2 ( Defa	,
Response Spectral Acc. (0.2 sec) $S_s$		1.39         ASCE 7-1           0.55         through 2					1
Response Spectral Acc.( 1.0 sec) S <sub>1</sub>	0.55				Ű		
Site Coefficient F <sub>a</sub>	1.00				ASCE 7-10		
Site Coefficient Fv	1.50	<b></b>				Table 11.4-2	
Max Considered Earthquake Acc. S <sub>MS</sub>	1.387	F <sub>a</sub> .S <sub>s</sub>			ASCE 7-10		
Max Considered Earthquake Acc. S <sub>M1</sub>	0.828	$F_{v}S_{1}$			ASCE 7-10	, ,	
@ 5% Damped Design S <sub>DS</sub>	0.925	2/3.S <sub>MS</sub>			ASCE 7-10	· /	
S <sub>D1</sub>	0.552	2/3.S <sub>M1</sub>			ASCE 7-10	· /	
Risk Category				II	ASCE 7-10	Table 1-1	
Design Category Consideration: In each of the two orthogonal directions.	the entrovin	noto fundamen	tal paried of	Yes	ASCE 7-10	116	
the structure, Ta, determined in accorda				res	ASCE /-10	11.0	
0.8Ts, where Ts is determined in accord							
In each of two orthogonal directions, the	fundamenta	l period of the	structure used	Yes			
to calculate the story drift is less than Ts		r ponou or the		100			
Diaphragms are rigid as defined in Sect	ion 12.3.1 or	for diaphragms	s that are	Yes			
flexible, the distance between vertical el	ements of the	e seismic force	-resisting				
	ements of the	e seismic force	-resisting				
flexible, the distance between vertical el	ements of the	e seismic force	-resisting		ASCE 7-10	11.4.1	
flexible, the distance between vertical el system does not exceed 40 ft.		e seismic force	-resisting			11.4.1 Table 11.6-1	
flexible, the distance between vertical el system does not exceed 40 ft. Seismic Design Category (SDC)	-	e seismic force	-resisting		ASCE 7-10		
flexible, the distance between vertical el system does not exceed 40 ft. Seismic Design Category (SDC) Seismic Design Category for 0.1 sec	- D	e seismic force	-resisting		ASCE 7-10	Table 11.6-1 Table 11.6-2	
flexible, the distance between vertical el system does not exceed 40 ft. Seismic Design Category (SDC) Seismic Design Category for 0.1 sec Seismic Design Category for 1.0 sec	- D D	e seismic force	-resisting		ASCE 7-10 ASCE 7-10	Table 11.6-1 Table 11.6-2 11.6	
flexible, the distance between vertical el system does not exceed 40 ft. Seismic Design Category (SDC) Seismic Design Category for 0.1 sec Seismic Design Category for 1.0 sec S1 < .75g	- D D - D	e seismic force			ASCE 7-10 ASCE 7-10 ASCE 7-10	Table 11.6-1 Table 11.6-2 11.6	
flexible, the distance between vertical el system does not exceed 40 ft. Seismic Design Category (SDC) Seismic Design Category for 0.1 sec Seismic Design Category for 1.0 sec S1 < .75g Seismic Design Category (SDC)	- D - D <b>A. BEARIN</b> 15. Light-	G WALL SYS		vith wood struct	ASCE 7-10 ASCE 7-10 ASCE 7-10 ASCE 7-10	Table 11.6-1 Table 11.6-2 11.6 11.6	esistance o
flexible, the distance between vertical el system does not exceed 40 ft. Seismic Design Category (SDC) Seismic Design Category for 0.1 sec Seismic Design Category for 1.0 sec S1 < .75g Seismic Design Category (SDC)	- D D - D <b>A. BEARIN</b>	G WALL SYS	TEMS	vith wood struct	ASCE 7-10 ASCE 7-10 ASCE 7-10 ASCE 7-10	Table 11.6-1 Table 11.6-2 11.6 11.6	esistance o
flexible, the distance between vertical el system does not exceed 40 ft. Seismic Design Category (SDC) Seismic Design Category for 0.1 sec Seismic Design Category for 1.0 sec S1 < .75g Seismic Design Category (SDC) Seismic Force-Resisting System	- D - D <b>A. BEARIN</b> 15. Light-	G WALL SYS	TEMS	vith wood struct	ASCE 7-10 ASCE 7-10 ASCE 7-10 ASCE 7-10	Table 11.6-1 Table 11.6-2 11.6 11.6	esistance o
flexible, the distance between vertical el system does not exceed 40 ft. Seismic Design Category (SDC) Seismic Design Category for 0.1 sec Seismic Design Category for 1.0 sec S1 < .75g Seismic Design Category (SDC) Seismic Force-Resisting System	- D - D <b>A. BEARIN</b> 15. Light-	G WALL SYS	TEMS	vith wood struct	ASCE 7-10 ASCE 7-10 ASCE 7-10 ASCE 7-10	Table 11.6-1 Table 11.6-2 11.6 11.6	esistance o
flexible, the distance between vertical el system does not exceed 40 ft. Seismic Design Category (SDC) Seismic Design Category for 0.1 sec Seismic Design Category for 1.0 sec S1 < .75g Seismic Design Category (SDC) Seismic Force-Resisting System	- D - D <b>A. BEARIN</b> 15. Light-	G WALL SYS	TEMS	vith wood struct	ASCE 7-10 ASCE 7-10 ASCE 7-10 ASCE 7-10	Table 11.6-1 Table 11.6-2 11.6 11.6	esistance o
flexible, the distance between vertical el system does not exceed 40 ft. Seismic Design Category (SDC) Seismic Design Category for 0.1 sec Seismic Design Category for 1.0 sec S1 < .75g Seismic Design Category (SDC) Seismic Force-Resisting System Footnotes ASCE 7 Section Where Detailing	- D - D <b>A. BEARIN</b> 15. Light-	G WALL SYS <sup>®</sup> frame (wood) v ets - -	TEMS	vith wood struct	ASCE 7-10 ASCE 7-10 ASCE 7-10 ASCE 7-10	Table 11.6-1 Table 11.6-2 11.6 11.6	esistance o
flexible, the distance between vertical el system does not exceed 40 ft. Seismic Design Category (SDC) Seismic Design Category for 0.1 sec Seismic Design Category for 1.0 sec S1 < .75g Seismic Design Category (SDC) Seismic Force-Resisting System Footnotes	- D D - D A. BEARIN 15. Light- steel sheet -	G WALL SYS <sup>®</sup> frame (wood) v ets - -	TEMS valls sheathed w	vith wood struct	ASCE 7-10 ASCE 7-10 ASCE 7-10 ASCE 7-10 Tural panels rate	Table 11.6-1 Table 11.6-2 11.6 11.6	esistance o
flexible, the distance between vertical el system does not exceed 40 ft. Seismic Design Category (SDC) Seismic Design Category for 0.1 sec Seismic Design Category for 1.0 sec S1 < .75g Seismic Design Category (SDC) Seismic Force-Resisting System Footnotes ASCE 7 Section Where Detailing Requirements Are Specified Building ht. h <sub>n</sub>	- D D A. BEARIN 15. Light- steel sheet - - - - - - - - - - - - - - - - - -	G WALL SYS frame (wood) v ets - - 14.5	TEMS valls sheathed w	ing Height (ft) :	ASCE 7-10 ASCE 7-10 ASCE 7-10 ASCE 7-10 Tural panels rate	Table 11.6-1 Table 11.6-2 11.6 11.6	esistance o
flexible, the distance between vertical el system does not exceed 40 ft. Seismic Design Category (SDC) Seismic Design Category for 0.1 sec Seismic Design Category for 1.0 sec S1 < .75g Seismic Design Category (SDC) Seismic Force-Resisting System Footnotes ASCE 7 Section Where Detailing Requirements Are Specified Building ht. h <sub>n</sub> C <sub>t</sub>	- D D A. BEARIN 15. Light- steel shee - 14.1 and 30.09	G WALL SYS frame (wood) v ets - - 14.5 ft x	TEMS valls sheathed v Limited Build 0.75	ing Height (ft) :	ASCE 7-10 ASCE 7-10 ASCE 7-10 ASCE 7-10 ural panels rate	Table 11.6-1 Table 11.6-2 11.6 11.6	esistance o
flexible, the distance between vertical el system does not exceed 40 ft. Seismic Design Category (SDC) Seismic Design Category for 0.1 sec Seismic Design Category for 1.0 sec S1 < .75g Seismic Design Category (SDC) Seismic Force-Resisting System Footnotes Footnotes ASCE 7 Section Where Detailing Requirements Are Specified Building ht. h <sub>n</sub> C <sub>t</sub>	- D D - D A. BEARIN 15. Light- steel shee - 14.1 and 30.09 0.020 1.400	G WALL SYS frame (wood) v ets - - 14.5 ft x for SD1 of	TEMS valls sheathed v Limited Build 0.75 0.552g	ing Height (ft) :	ASCE 7-10 ASCE 7-10 ASCE 7-10 ASCE 7-10 Urral panels rate	Table 11.6-1 Table 11.6-2 11.6 11.6 ed for shear r Table 12.8-1	esistance o
flexible, the distance between vertical el system does not exceed 40 ft. Seismic Design Category (SDC) Seismic Design Category for 0.1 sec Seismic Design Category for 1.0 sec S1 < .75g Seismic Design Category (SDC) Seismic Force-Resisting System Footnotes Footnotes ASCE 7 Section Where Detailing Requirements Are Specified Building ht. h <sub>n</sub> C <sub>t</sub> C <sub>u</sub> Approximate Fundamental Period, T <sub>a</sub>	- D D A. BEARIN 15. Light- steel sher  - 14.1 and 30.09 0.020 1.400 0.257	G WALL SYS frame (wood) v ets - - - 14.5 ft x for SD1 of sec	TEMS valls sheathed v Limited Build 0.75 0.552g C <sub>t</sub> .(h <sub>n</sub> ) <sup>x</sup>	ing Height (ft) :	ASCE 7-10 ASCE 7-10 ASCE 7-10 ASCE 7-10 Urral panels rate	Table 11.6-1 Table 11.6-2 11.6 11.6 ed for shear r Table 12.8-1 (12.8-7)	esistance o
flexible, the distance between vertical el system does not exceed 40 ft. Seismic Design Category (SDC) Seismic Design Category for 0.1 sec Seismic Design Category for 1.0 sec S1 < .75g Seismic Design Category (SDC) Seismic Force-Resisting System Footnotes Footnotes ASCE 7 Section Where Detailing Requirements Are Specified Building ht. h <sub>n</sub> C <sub>t</sub> C <sub>u</sub> Approximate Fundamental Period, T <sub>a</sub>	- D D A. BEARIN 15. Light- steel shee	G WALL SYS frame (wood) v ets - - - 14.5 ft x for SD1 of sec sec	TEMS valls sheathed v Limited Build 0.75 0.552g	ing Height (ft) :	ASCE 7-10 ASCE 7-10 ASCE 7-10 ASCE 7-10 Cural panels rate Cural panels rate ASCE 7-10 ASCE 7-10 ASCE 7-10	Table 11.6-1 Table 11.6-2 11.6 11.6 ed for shear r Table 12.8-1 (12.8-7) 11.4.5	esistance o
flexible, the distance between vertical el system does not exceed 40 ft. Seismic Design Category (SDC) Seismic Design Category for 0.1 sec Seismic Design Category for 1.0 sec S1 < .75g Seismic Design Category (SDC) Seismic Force-Resisting System Footnotes ASCE 7 Section Where Detailing Requirements Are Specified Building ht. h <sub>n</sub> C <sub>t</sub> C <sub>u</sub> Approximate Fundamental Period, T <sub>a</sub> T <sub>L</sub>	- D D A. BEARIN 15. Light- steel sher	G WALL SYS frame (wood) v ets - - 14.5 ft x for SD1 of sec sec sec sec	TEMS valls sheathed v Limited Build 0.75 0.552g C <sub>t</sub> .(h <sub>n</sub> ) <sup>x</sup> S <sub>D1</sub> /S <sub>DS</sub>	ing Height (ft) :	ASCE 7-10 ASCE 7-10 ASCE 7-10 ASCE 7-10 Urral panels rate	Table 11.6-1 Table 11.6-2 11.6 11.6 ed for shear r Table 12.8-1 (12.8-7) 11.4.5	esistance o
flexible, the distance between vertical el system does not exceed 40 ft. Seismic Design Category (SDC) Seismic Design Category for 0.1 sec Seismic Design Category for 1.0 sec S1 < .75g Seismic Design Category (SDC) Seismic Force-Resisting System Footnotes Footnotes ASCE 7 Section Where Detailing Requirements Are Specified Building ht. h <sub>n</sub> C <sub>t</sub> C <sub>u</sub> Approximate Fundamental Period, T <sub>a</sub> T <sub>L</sub> Period for Computing Drift	- D D A. BEARIN 15. Light- steel shee  - 14.1 and 30.09 0.020 1.400 0.257 0.597 6.00 0.360	G WALL SYS frame (wood) v ets - - 14.5 ft x for SD1 of sec sec sec sec sec	TEMS valls sheathed v Limited Build 0.75 0.552g C <sub>t</sub> .(h <sub>n</sub> ) <sup>x</sup>	ing Height (ft) :	ASCE 7-10 ASCE 7-10 ASCE 7-10 ASCE 7-10 Cural panels rate Cural panels rate ASCE 7-10 ASCE 7-10 ASCE 7-10	Table 11.6-1 Table 11.6-2 11.6 11.6 ed for shear r Table 12.8-1 (12.8-7) 11.4.5	esistance o
flexible, the distance between vertical el system does not exceed 40 ft. Seismic Design Category (SDC) Seismic Design Category for 0.1 sec Seismic Design Category for 1.0 sec S1 < .75g Seismic Design Category (SDC) Seismic Force-Resisting System Footnotes Footnotes ASCE 7 Section Where Detailing Requirements Are Specified Building ht. h <sub>n</sub> C <sub>t</sub> C <sub>u</sub> Approximate Fundamental Period, T <sub>a</sub> T <sub>L</sub> Period for Computing Drift Fundamental Period, T	D D A. BEARIN 15. Light steel she	G WALL SYS frame (wood) v ets - - - 14.5 ft x for SD1 of sec sec sec sec sec sec	TEMS valls sheathed v Limited Build 0.75 0.552g C <sub>t</sub> .(h <sub>n</sub> ) <sup>x</sup> S <sub>D1</sub> /S <sub>DS</sub> C <sub>u</sub> .T <sub>a</sub>	ing Height (ft) :	ASCE 7-10 ASCE 7-10 ASCE 7-10 ASCE 7-10 ASCE 7-10 Cural panels rate asce 7-10 ASCE 7-10 ASCE 7-10 ASCE 7-10	Table 11.6-1 Table 11.6-2 11.6 11.6 ed for shear r Table 12.8-1 (12.8-7) 11.4.5 11.4.5	
flexible, the distance between vertical el system does not exceed 40 ft. Seismic Design Category (SDC) Seismic Design Category for 0.1 sec Seismic Design Category for 1.0 sec S1 < .75g Seismic Design Category (SDC) Seismic Force-Resisting System Footnotes Footnotes ASCE 7 Section Where Detailing Requirements Are Specified Building ht. h <sub>n</sub> C <sub>t</sub> C <sub>u</sub> Approximate Fundamental Period, T <sub>a</sub> T <sub>L</sub> Period for Computing Drift	- D D A. BEARIN 15. Light- steel shee  - 14.1 and 30.09 0.020 1.400 0.257 0.597 6.00 0.360	G WALL SYS frame (wood) v ets - - 14.5 ft x for SD1 of sec sec sec sec sec	TEMS valls sheathed v Limited Build 0.75 0.552g C <sub>t</sub> .(h <sub>n</sub> ) <sup>x</sup> S <sub>D1</sub> /S <sub>DS</sub>	ing Height (ft) :	ASCE 7-10 ASCE 7-10 ASCE 7-10 ASCE 7-10 ASCE 7-10 Cural panels rate and panels rate ASCE 7-10 ASCE 7-10 ASCE 7-10 ASCE 7-10	Table 11.6-1 Table 11.6-2 11.6 11.6 ed for shear r Table 12.8-1 (12.8-7) 11.4.5 11.4.5	

Established Basic Permit # C:\Users\dista\Dropbox\PNW Project Fles\2019 Projects\19-002C Red Barn Lane - Duplex\ENGR\19-002c Design Criteria 2018.xlsxSeismic 19-03646 Permit Number: 20.04804

Pacific Northwest Structural Group, Ll	Location Client	Location         NW Hogan Ln & Nels Nelson Rd NW, Breme           Client         Envision Northwest, LLC           2015 IBC Section 1613 Earthquake Loads		Designer Project No. Revised		
Over Strength Factor $\Omega_o$			ASCE 7-10	Table 12.14-	1	
Deflection Amplification Factor, C <sub>db</sub>	4.00			ASCE 7-10	Table 12.14-	1
Importance factor I <sub>E</sub>	1.00			ASCE 7-10 Table 1.5-2, UFC 3-301-01 Table 2-2		
C <sub>s</sub>	0.142	S <sub>DS</sub> /R/I <sub>E</sub>		ASCE 7-10	(12.8-2)	
T<=TL therefore Cs need not to exceed	0.330	$S_{D1}/(T(R/I_E))$	)	ASCE 7-10	(12.8-3)	
T <tl (12.8-4)="" a<="" n="" th="" therefore=""><th>N/A</th><th>S<sub>D1</sub>.T<sub>L</sub>/T<sup>2</sup>(R/</th><th>/I<sub>E</sub>)</th><th>ASCE 7-10</th><th>(12.8-4)</th><th></th></tl>	N/A	S <sub>D1</sub> .T <sub>L</sub> /T <sup>2</sup> (R/	/I <sub>E</sub> )	ASCE 7-10	(12.8-4)	
C <sub>s</sub>	0.041	$0.044S_{DS}.I_{E} \ge 0.01$		ASCE 7-10 (12.8-5)		
S1 < 0.6g (12.8-6) N/A	N/A	0.5S <sub>1</sub> /(R/I <sub>E</sub> )		ASCE 7-10 (12.8-6)		
Use C <sub>s</sub>	0.142					
Design Base Shear V	0.142 W	Control		ASCE 7-10	(12.8-1)	
Design Service Level Base Shear V	0.1 W					

Seismic Load							
Level	W <sub>x</sub> (lbs)	h <sub>x</sub> (ft)	W <sub>x</sub> .h <sub>x</sub>	C <sub>vx</sub>	F <sub>x</sub> (lbs)		
1st Level Plate	31,398	9.1	285,098	0.374	3,218		
2nd Level Plate	31,398	9.1	285,098	0.374	3,218		
3rd Level Plate	23,799	8.1	192,298	0.252	2,171		
	86,596	$\Sigma W_x h_x$	762,494				

Design Service Level Base Shear V	8,608	lbs		
	Trar	sverse	Longit	udinal
Diaphragm Width	37.00	ft	37.00	ft
1st Level Plate	87.0	plf	87.0	plf
2nd Level Plate	87.0	plf	87.0	plf
3rd Level Plate	58.7	plf	58.7	plf

Established Basic Permit # C:\Users\dlsta\Dropbox\PNW Project F 19-03646 Permit Number: 20.04804



## **Pacific Northwest** Structural Group, LLC

Project	Red Barn Lane - Duplex 1400	Designer	DLS
Location	NW Hogan Ln & Nels Nelson Rd NW, Breme	Project No.	19-002c
Client	Client Envision Northwest, LLC		10.14 10
	ASCE 7-10 Snow Loads	Revised	18-May-18

ASCE 7-10 7.3 FLAT ROOF SNOW LOAD							
Ground Snow Load, p <sub>g</sub>	30.0	PSF	ASCE 7-10 7.2				
Exposure Category	В	-	ASCE 7-10 26.7.3 Exposure Categories				
Exposure of Roof	Partially Exposed		ASCE 7-10 Table 7-2 Exposure Factor				
Thermal Condition	All structures except as	indicated below					
Risk Category	II		ASCE 7-10 Table 1.5-1, UFC 3-301-01 Table 2-2				
Snow load importance factor, I <sub>s</sub>	1.0		ASCE 7-10 Table 1.5-2, UFC 3-301-01 Table 2-2				
Snow exposure factor, C <sub>e</sub>	1.00		ASCE 7-10 Table 7-2 Exposure Factor				
Thermal factor, C <sub>t</sub>	1.00		ASCE 7-10 Table 7-3 Thermal Factor				
Flat-roof snow load, p <sub>f</sub>	21.0	PSF	ASCE 7-10 (7.3-1) 0.7C <sub>e</sub> C <sub>t</sub> I <sub>s</sub> p <sub>g</sub>				
Min. Design Flat Roof Snow Load, p <sub>m</sub>	20.0	PSF	ASCE 7-10 74 $p_g \le 20 \text{ PSF } I_s p_g, p_g > 20 \text{ PSF } 20I_s$				
Design Flat Roof Snow Load, p <sub>f</sub>	21.0	PSF					

ASCE 7-10 7.4 SLOPE ROOF SNOW LOAD								
Roof Pitch	5	:12						
Roof Slope, Θ	22.62	0						
Roof Surface	All Other Surfaces							
Warm Roof Slope Factor, C <sub>s</sub>	1.00		ASCE 7-10 Section 7.4.1, 7.4.2, 7.4.3 Figure(s)					
Slope Roof Design Snow Load, p <sub>s</sub>	21.0	PSF	ASCE-7-10 (74-1) C <sub>s*</sub> p <sub>f</sub>					

Established Basic Permit # C:Users\dlsta\Dropbox\PNW Project Files\2019 Projects\19-002C Red Barn Lane - Duplex\ENGR\19-002c Design Criteria 2018.xlsxSnow Load 19-03646

Location: WALL-3RD-1 Wall [2015 International Building Code(2015 NDS)] 1.5 IN x 5.5 IN x 8.08 FT @ 16 O.C. #2 - Douglas-Fir-Larch - Dry Use Section Adequate By: 87.0% Controlling Factor: Combined Stress Factor

Location: RFB1 Roof Beam [2015 International Building Code(2015 NDS)] ( 2 ) 1.5 IN x 5.5 IN x 3.33 FT #2 - Douglas-Fir-Larch - Dry Use Section Adequate By: 71.1% Controlling Factor: Moment

Location: RFB2 Roof Beam [2015 International Building Code(2015 NDS)] ( 2 ) 1.5 IN x 5.5 IN x 5.33 FT #2 - Douglas-Fir-Larch - Dry Use Section Adequate By: 219.2% Controlling Factor: Moment

Location: WALL-3RD-2 Wall [2015 International Building Code(2015 NDS)] 1.5 IN x 5.5 IN x 8.08 FT @ 16 O.C. #2 - Douglas-Fir-Larch - Dry Use Section Adequate By: 87.5% Controlling Factor: Combined Stress Factor

Location: WALL-3RD-3 Wall [2015 International Building Code(2015 NDS)] 1.5 IN x 5.5 IN x 8.08 FT @ 16 O.C. #2 - Douglas-Fir-Larch - Dry Use Section Adequate By: 87.5% Controlling Factor: Combined Stress Factor

Location: MLB3-1 Multi-Loaded Multi-Span Beam [2015 International Building Code(2015 NDS)] 1.75 IN x 11.875 IN x 6.83 FT LSL 2360 Fb-1.55E - Louisiana Pacific Section Adequate By: 86.2% Controlling Factor: Moment

Location: JST3-1 Floor Joist [2015 International Building Code(2015 NDS)] SERIES 18 / 11.875 - Louisiana Pacific x 10.83 FT @ 16 O.C. Section Adequate By: 123.4% Controlling Factor: End Reaction

### Location: JST3-2 Floor Joist

[2015 International Building Code(2015 NDS)] SERIES 56 / 11.875 - Louisiana Pacific x 17.83 FT @ 16 O.C. Statel ISO BASIC, Permit # Controlling Factor: End Reaction



David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346

StruCalc Version 10.0.1.6

Location: JST3-3 Floor Joist [2015 International Building Code(2015 NDS)] SERIES 56 / 11.875 - Louisiana Pacific x 19.83 FT (17.8 + 2) @ 16 O.C. Section Adequate By: 34.9% Controlling Factor: End Reaction

7/26/2019 3:54:47 PM

Location: JST3-4 Floor Joist [2015 International Building Code(2015 NDS)] SERIES 56 / 11.875 - Louisiana Pacific x 19.83 FT @ 16 O.C. Section Adequate By: 52.2% Controlling Factor: Deflection

Location: JST3-5 Floor Joist [2015 International Building Code(2015 NDS)] SERIES 56 / 11.875 - Louisiana Pacific x 15.67 FT @ 16 O.C. Section Adequate By: 105.7% Controlling Factor: End Reaction

Location: JST3-6 Floor Joist [2015 International Building Code(2015 NDS)] SERIES 56 / 11.875 - Louisiana Pacific x 14.17 FT @ 16 O.C. Section Adequate By: 127.5% Controlling Factor: End Reaction

Location: MLB3-2 Multi-Loaded Multi-Span Beam [2015 International Building Code(2015 NDS)] 3.5 IN x 6.0 IN x 5.33 FT 24F-V4 - Visually Graded Western Species - Dry Use Section Adequate By: 59.5% Controlling Factor: Moment

Location: WALL-2ND-1 Wall [2015 International Building Code(2015 NDS)] 1.5 IN x 5.5 IN x 8.08 FT @ 16 O.C. #2 - Douglas-Fir-Larch - Dry Use Section Adequate By: 87.5% Controlling Factor: Combined Stress Factor

Location: WALL-2ND-2 Wall [2015 International Building Code(2015 NDS)] 1.5 IN x 5.5 IN x 8.08 FT @ 16 O.C. #2 - Douglas-Fir-Larch - Dry Use Section Adequate By: 95.1% Controlling Factor: Combined Stress Factor

Location: WALL-2ND-3 Wall [2015 International Building Code(2015 NDS)] 1.5 IN x 5.5 IN x 8.08 FT @ 16 O.C. #2 - Douglas-Fir-Larch - Dry Use Section Adequate By: 95.1% Controlling Factor: Combined Stress Factor

Location: JST3-7 Floor Joist [2015 International Building Code(2015 NDS)] SERIES 18 / 11.875 - Louisiana Pacific x 10.75 FT @ 16 O.C. Section Adequate By: 125.0% Controlling Factor: End Reaction

Location: MLB3-3 Multi-Loaded Multi-Span Beam [2015 International Building Code(2015 NDS)] 1.75 IN x 11.25 IN x 6.5 FT (4.8 + 1.8) LSL 1730 Fb-1.35E - Louisiana Pacific Section Adequate By: 330.4% Controlling Factor: Moment

Location: JST3-8 Floor Joist [2015 International Building Code(2015 NDS)] SERIES 56 / 11.875 - Louisiana Pacific x 6.33 FT (4.6 + 1.8 ) @ 16 O.C. Section Adequate By: 13.7% Controlling Factor: End Reaction

Location: MLB3-4 Multi-Loaded Multi-Span Beam [2015 International Building Code(2015 NDS)] 3.5 IN x 11.875 IN x 17.83 FT LSL 2360 Fb-1.55E - Louisiana Pacific Section Adequate By: 48.1% Controlling Factor: Deflection

Location: WALL-2ND-4 Wall [2015 International Building Code(2015 NDS)] 1.5 IN x 5.5 IN x 8.08 FT @ 16 O.C. #2 - Douglas-Fir-Larch - Dry Use Section Adequate By: 87.5% Controlling Factor: Combined Stress Factor

Location: MLB3-5 Multi-Loaded Multi-Span Beam [2015 International Building Code(2015 NDS)] 3.5 IN x 6.0 IN x 5.33 FT 24F-V4 - Visually Graded Western Species - Dry Use Section Adequate By: 42.7% Controlling Factor: Moment

Location: WALL-2ND-5 Wall [2015 International Building Code(2015 NDS)] 1.5 IN x 5.5 IN x 8.08 FT @ 16 O.C. #2 - Douglas-Fir-Larch - Dry Use Section Adequate By: 87.5% Controlling Factor: Combined Stress Factor

Location: JST2-2 Floor Joist [2015 International Building Code(2015 NDS)] SERIES 56 / 11.875 - Louisiana Pacific x 12.75 FT (11 + 1.8) @ 16 O.C.

Established Basic Permit #

19-03646



David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346

7/26/2019 3:54:47 PM

StruCalc Version 10.0.1.6

Location: JST2-1 Floor Joist [2015 International Building Code(2015 NDS)] SERIES 18 / 11.875 - Louisiana Pacific x 10.83 FT @ 16 O.C. Section Adequate By: 153.3% Controlling Factor: End Reaction

Location: JST2-3 Floor Joist [2015 International Building Code(2015 NDS)] SERIES 18 / 11.875 - Louisiana Pacific x 6.92 FT @ 16 O.C. Section Adequate By: 296.5% Controlling Factor: End Reaction

Location: JST2-4 Floor Joist [2015 International Building Code(2015 NDS)] SERIES 18 / 11.875 - Louisiana Pacific x 3.33 FT @ 16 O.C. Section Adequate By: 723.9% Controlling Factor: End Reaction

Location: MLB2-1 GLB Multi-Loaded Multi-Span Beam [2015 International Building Code(2015 NDS)] 3.5 IN x 11.875 IN x 25.09 FT (12.4 + 12.7) 24F-V4 - Visually Graded Western Species - Dry Use Section Adequate By: 45.0% Controlling Factor: Moment

Location: MLB2-1 LSL Multi-Loaded Multi-Span Beam [2015 International Building Code(2015 NDS)] 3.5 IN x 11.875 IN x 25.09 FT (12.4 + 12.7) LSL 2360 Fb-1.55E - Louisiana Pacific Section Adequate By: 75.7% Controlling Factor: Moment

Location: FTG-PST-MLB2-1B Footing [2015 International Building Code(2015 NDS)] Footing Size: 2.0 FT x 2.0 FT x 10.00 IN Reinforcement: #4 Bars @ 8.00 IN. O.C. E/W / (3) min. Section Footing Design Adequate

Location: PST-MLB2-1A Column [2015 International Building Code(2015 NDS)] 1.5 IN x 3.5 IN x 9.08 FT #2 - Douglas-Fir-Larch - Dry Use Section Adequate By: 16.4%

Location: FTG-PST-MLB2-1A Footing [2015 International Building Code(2015 NDS)] Footing Size: 1.0 FT x 1.0 FT x 10.00 IN Reinforcement in Long Direction: #4 Bars @ 5.50 IN. O.C. / (2) min. Reinforcement in Short Direction-center band (Equal to width of short side): #4 Bars @ 5.50 IN. O.C. / (2) min. Reinforcement in Short Direction-outside bands: #4 Bars @ 0.00 IN. O.C. / () Each band. Section Footing Design Adequate

Location: WALL-1ST-1 Wall [2015 International Building Code(2015 NDS)] 1.5 IN x 5.5 IN x 8.08 FT @ 16 O.C. #2 - Douglas-Fir-Larch - Dry Use Section Adequate By: 87.5% Controlling Factor: Combined Stress Factor

Location: PST-MLB2-1B Column [2015 International Building Code(2015 NDS)] 5.5 IN x 5.5 IN x 9.08 FT #2 - Douglas-Fir-Larch - Dry Use Section Adequate By: 60.5%

Location: FTG-WALL-1ST-1 Footing [2015 International Building Code(2015 NDS)] Footing Size: 18.0 IN Wide x 8.0 IN Deep Continuous Footing With 8.0 IN Thick x 12.0 IN Tall Stemwall LongitudinalReinforcement: (2) Continuous #4 Bars TransverseReinforcement: #4 Bars @ 13.00 IN. O.C. (unnecessary) Section Footing Design Adequate

Location: WALL-2ND-6 Wall [2015 International Building Code(2015 NDS)] 1.5 IN x 5.5 IN x 8.08 FT @ 16 O.C. #2 - Douglas-Fir-Larch - Dry Use Section Adequate By: 87.5% Controlling Factor: Combined Stress Factor

Location: MLB2-2 Multi-Loaded Multi-Span Beam [2015 International Building Code(2015 NDS)] 1.75 IN x 11.875 IN x 6.5 FT LSL 2360 Fb-1.55E - Louisiana Pacific Section Adequate By: 226.3% Controlling Factor: Moment

Location: RFB3 Roof Beam [2015 International Building Code(2015 NDS)]





David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346

StruCalc Version 10.0.1.6

7/26/2019 3:54:48 PM

Location: RFB4 Roof Beam [2015 International Building Code(2015 NDS)] 5.5 IN x 7.5 IN x 6.83 FT #2 - Douglas-Fir-Larch - Dry Use Section Adequate By: 242.3% Controlling Factor: Moment

Location: MLB2-3 Multi-Loaded Multi-Span Beam [2015 International Building Code(2015 NDS)] 5.5 IN x 11.875 IN x 17.84 FT (10.9 + 6.9) / 30F - 30F-E DF2 - Dry Use Section Adequate By: 5.9% Controlling Factor: Shear

Location: PST-MLB2-3A Column [2015 International Building Code(2015 NDS)] 5.5 IN x 5.5 IN x 9.58 FT #2 - Douglas-Fir-Larch - Dry Use Section Adequate By: 36.2%

Location: PST-MLB2-3B Column [2015 International Building Code(2015 NDS)] 5.5 IN x 7.5 IN x 9.58 FT #1 - Douglas-Fir-Larch - Dry Use Section Adequate By: 11.0%

Location: PST-MLB2-3C Column [2015 International Building Code(2015 NDS)] 5.5 IN x 5.5 IN x 9.58 FT #2 - Douglas-Fir-Larch - Dry Use Section Adequate By: 67.0%

Location: FTG-PST-MLB2-3A Footing [2015 International Building Code(2015 NDS)] Footing Size: 2.5 FT x 2.5 FT x 10.00 IN Reinforcement: #4 Bars @ 11.00 IN. O.C. E/W / (3) min. Section Footing Design Adequate

Location: FTG-PST-MLB2-3C Footing [2015 International Building Code(2015 NDS)] Footing Size: 2.5 FT x 2.5 FT x 12.00 IN Reinforcement: #4 Bars @ 7.00 IN. O.C. E/W / (4) min. Section Footing Design Adequate



David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346

StruCalc Version 10.0.1.6

7/26/2019 3:54:48 PM

Location: FTG-PST-MLB2-3B Footing [2015 International Building Code(2015 NDS)] Footing Size: 3.5 FT x 3.5 FT x 10.00 IN Reinforcement: #4 Bars @ 11.00 IN. O.C. E/W / (4) min. Section Footing Design Adequate

Established Basic Permit #

Location: WALL-3RD-1 Wall [2015 International Building Code(2015 NDS)] 1.5 IN x 5.5 IN x 8.08 FT @ 16 O.C. #2 - Douglas-Fir-Larch - Dry Use Section Adequate By: 87.0% Controlling Factor: Combined Stress Factor



David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346

StruCalc Version 10.0.1.6

7/26/2019 3:54:49 PM

Controlling Factor: Combined Stress Factor					
DEFLECTIONS		LOADING DIAGRAM			
Deflection due to lateral loads only: Defl = 0.06 IN = L/163	8				
Live Load Deflection Criteria: L/180	)				
VERTICAL REACTIONS					
	5 lb		↓		
	4 lb		B		
Total Load: Vert-TL-Rxn = 103	9 lb				
HORIZONTAL REACTIONS					
	3 lb				
	3 lb				
WALL DATA					
Total Stud Length: 8.08 ft					
Wall Dead Weight: 11 psf					
Unbraced Length (X-Axis) Lx: 8.08 ft					
Unbraced Length (Y-Axis) Ly: 0 ft					
Stud End Condition-K (e): 1			8.08 ft w		
Axial Load Duration Factor 1.15					
Lateral Load Duration Factor (Wind/Seismic) 1.60					
STUD PROPERTIES					
#2 - Douglas-Fir-Larch					
Base Values Adjusted					
Compressive Stress: Fc = 1350 psi Fc' = 1254 ps	i				
Cd=1.60 Cf=1.10 Cp=0.53					
Bending Stress (X-X Axis): Fbx = 900 psi Fbx' = 2153 ps					
Cd=1.60 CF=1.30 Cr=1.15 Cl=1.00					
Bending Stress (Y-Y Axis): Fby = 900 psi Fby' = 2153 ps	i				
Cd=1.60 CF=1.30 Cr=1.15			A		
Modulus of Elasticity: E = 1600 ksi E' = 1600 ks	i				
		WALL LOAD CALCUL	ATOR		
Stud Section (X-X Axis): $dx = 5.5$	5 in		Live Load	Dead Load	Tributary Width
Stud Section (Y-Y Axis): dy = 1.5	5 in	Load Tracker:	LL = 0 plf		5
	5 in2	Roof:	LL = 25  psf		TA = 17.3 ft
	in3	Upper Floor:		DL = 15  psf	TA = 0 ft
	in3	Upper Floor Height:	0 ft	io poi	
Slenderness Ratio: $Lex/dx = 17.63$		Middle Floor:		DL = 15 psf	TA = 0 ft
Ley/dy = 0		Middle Floor Height:	0 ft	DE - 10 p31	
		Calculated Load:	LL =431.3 plf	DI = 347.6  plf	
Stud Calculations (Controlling Case Only):			LL -401.0 pli	DE -347.0 pli	
Controlling Load Case: Axial Dead Load and Lateral loads (D +	W or E)	AXIAL LOADING			
•	b psi	Live Load:	PL = 431 plf		
•	psi psi	Dead Load:			
•	) ft-lb				
	) ft-lb	Total Axial Load:	PT = 779 plf		
	3 ft-lb ) ft-lb	LATERAL LOADING	(Dy Face)		
$VOUTED UDE TO T ATELATED ADS (Y-YAXIS)^{-1} VIV = (1)$		Uniform Lateral Load:	wL-Lat = 15 psf		
	1 1151				
Bending Stress Lateral Loads Only (X-X Axis): Fbx = 266	•				
Bending Stress Lateral Loads Only (X-X Axis): Fbx =266Allowable Bending Stress (X-X Axis):Fbx' =2153	3 psi				
Bending Stress Lateral Loads Only (X-X Axis): Fbx =266Allowable Bending Stress (X-X Axis):Fbx' =Bending Stress Lateral Loads Only (Y-Y Axis): Fby =0	3 psi ) psi				
Bending Stress Lateral Loads Only (X-X Axis): Fbx =266Allowable Bending Stress (X-X Axis):Fbx' =Bending Stress Lateral Loads Only (Y-Y Axis): Fby =2153	3 psi ) psi 3 psi				

NOTES

Established Basic Permit #



Project: 19-002c Framing Location: RFB1 Roof Beam [2015 International Building Code(2015 NDS)] ( 2 ) 1.5 IN x 5.5 IN x 3.33 FT #2 - Douglas-Fir-Larch - Dry Use Section Adequate By: 71.1% Controlling Factor: Moment	David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346 StruCalc Version 10.0.1.6 7/26/2019 3:54:49 PM
DEFLECTIONS       Center         Live Load       0.02       IN L/2229         Dead Load       0.01       in         Total Load       0.03       IN L/1344         Live Load Deflection Criteria: L/240       Total Load Deflection Criteria: L/180         REACTIONS       A       B         Live Load       718       Ib       718       Ib         Dead Load       473       Ib       473       Ib         Total Load       1191       Ib       1191       Ib         Bearing Length       0.64       in       0.64       in	
BEAM DATA         Span Length       3.3 ft         Unbraced Length-Top       0 ft         Unbraced Length-Bottom       0 ft         Roof Pitch       5 :12         Roof Duration Factor       1.15	A 3.33 ft B
MATERIAL PROPERTIES#2 - Douglas-Fir-LarchBending Stress: $Fb = 900 \text{ psi}$ $Cd=1.15 CF=1.30$ Shear Stress: $Fv = 180 \text{ psi}$ $Fv' = 207 \text{ psi}$	ROOF LOADING         Side One:         Roof Live Load:       LL =         25       psf         Roof Dead Load:       DL =         15       psf         Tributary Width:       TW =         17.3       ft         Side Two:       Roof Live Load:         Roof Live Load:       LL =       0         psf       D
$Cd=1.15$ Modulus of Elasticity: $E = 1600$ ksi $E' = 1600$ ksiComp. $\perp$ to Grain: $Fc - \perp = 625$ psi $Fc - \perp' = 625$ psiControlling Moment:991 ft-lb	Roof Dead Load:       DL =       0       psf         Tributary Width:       TW =       0       ft         Wall Load:       WALL =       0       plf
1.665 ft from left support         Created by combining all dead and live loads.         Controlling Shear:       -881 lb         At a distance d from support.         Created by combining all dead and live loads.	SLOPE/PITCH ADJUSTED LENGTHS AND LOADSAdjusted Beam Length:Ladj =3.33ftBeam Self Weight:BSW =4plfBeam Uniform Live Load:wL =431plfBeam Uniform Dead Load:wD_adj =284plfTotal Uniform Load:wT =715plf
Comparisons with required sections:Req'dProvidedSection Modulus:8.84 in315.13 in3Area (Shear):6.38 in216.5 in2Moment of Inertia (deflection):5.57 in441.59 in4Moment:991 ft-lb1696 ft-lbShear:-881 lb2277 lbNOTES	

<u>NOTES</u>

Established Basic Permit #

19-03646

Project: 19-002c Framing Location: RFB2 Roof Beam [2015 International Building Code(2015 NDS)] ( 2 ) 1.5 IN x 5.5 IN x 5.33 FT #2 - Douglas-Fir-Larch - Dry Use Section Adequate By: 219.2% Controlling Factor: Moment	David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346 StruCalc Version 10.0.1.6 7/26/2019 3:54:49 PM
DEFLECTIONS       Center         Live Load       0.01       IN L/4689         Dead Load       0.03       in         Total Load       0.04       IN L/1567         Live Load Deflection Criteria: L/240       Total Load Deflection Criteria: L/180         REACTIONS       A       B         Live Load       133       Ib       133       Ib         Dead Load       266       Ib       266       Ib         Total Load       399       Ib       399       Ib	
Bearing Length       0.21 in       0.21 in         BEAM DATA       Span Length       5.3 ft         Unbraced Length-Top       0 ft         Unbraced Length-Bottom       0 ft         Roof Pitch       8 :12	w A 5.33 ft B
Roof Duration Factor       1.15         MATERIAL PROPERTIES         #2 - Douglas-Fir-Larch         Base Values       Adjusted	ROOF LOADING         Side One:         Roof Live Load:       LL =         25       psf         Roof Dead Load:       DL =         15       psf
Bending Stress: Fb = 900 psi Fb' = 1346 psi Cd=1.15 CF=1.30	Tributary Width: TW = 2 ft Side Two:
Shear Stress: $Fv =$ 180 psi $Fv' =$ 207 psi $Cd=1.15$ Modulus of Elasticity:Comp. $\perp$ to Grain: $Fc - \perp =$ $625$ psi $Fc - \perp =$ $625$ psi $Fc - \perp ' =$ $625$ psi	Roof Live Load:       LL =       0       psf         Roof Dead Load:       DL =       0       psf         Tributary Width:       TW =       0       ft         Wall Load:       WALL =       60       plf
Controlling Moment:531 ft-lb2.665 ft from left support531 ft-lbCreated by combining all dead and live loads335 lbAt a distance d from support335 lbCreated by combining all dead and live loads.	SLOPE/PITCH ADJUSTED LENGTHS AND LOADS         Adjusted Beam Length:       Ladj =       5.33 ft         Beam Self Weight:       BSW =       4 plf         Beam Uniform Live Load:       wL =       50 plf         Beam Uniform Dead Load:       wD_adj =       100 plf         Total Uniform Load:       wT =       150 plf
Comparisons with required sections:Req'dProvidedSection Modulus:4.74 in315.13 in3Area (Shear):2.43 in216.5 in2Moment of Inertia (deflection):4.78 in441.59 in4Moment:531 ft-lb1696 ft-lbShear:-335 lb2277 lb	

<u>NOTES</u>

Established Basic Permit #

19-03646

Location: WALL-3RD-2 Wall [2015 International Building Code(2015 NDS)] 1.5 IN x 5.5 IN x 8.08 FT @ 16 O.C. #2 - Douglas-Fir-Larch - Dry Use Section Adequate By: 87.5% Controlling Factor: Combined Stress Factor



David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346

StruCalc Version 10.0.1.6

7/26/2019 3:54:50 PM

Controlling Factor: Combined Stress Factor	
DEFLECTIONS	LOADING DIAGRAM
Deflection due to lateral loads only: Defl = 0.06 IN = L/1638	
Live Load Deflection Criteria: L/180	
VERTICAL REACTIONS	
Live Load: Vert-LL-Rxn = 73 lb	
Dead Load: Vert-DL-Rxn = 163 lb	B
Total Load: Vert-TL-Rxn = 236 lb	
HORIZONTAL REACTIONS	
Total Reaction at Top of Column: TL-Rxn-Top = 83 lb	
Total Reaction at Bottom of Column: TL-Rxn-Bottom = 83 lb	
WALL DATA	
Total Stud Length: 8.08 ft	
Wall Dead Weight: 11 psf	
Unbraced Length (X-Axis) Lx: 8.08 ft	
Unbraced Length (Y-Axis) Ly: 0 ft	
Stud End Condition-K (e):	8.08 ft w
Axial Load Duration Factor 1.15	
Lateral Load Duration Factor (Wind/Seismic) 1.60	
<u>STUD PROPERTIES</u> #2 - Douglas-Fir-Larch	
Base Values Adjusted	
Compressive Stress: Fc = 1350 psi Fc' = 1254 psi	
Cd=1.60 Cf=1.10 Cp=0.53	
Bending Stress (X-X Axis): Fbx = 900 psi Fbx' = 2153 psi	
Cd=1.60 CF=1.30 Cr=1.15 Cl=1.00	
Bending Stress (Y-Y Axis): Fby = 900 psi Fby' = 2153 psi	
Cd=1.60 CF=1.30 Cr=1.15	Ā
Modulus of Elasticity: E = 1600 ksi E' = 1600 ksi	
	WALL LOAD CALCULATOR
Stud Section (X-X Axis): dx = 5.5 in	Live Load Dead Load Tributary Width
Stud Section (Y-Y Axis): dy = 1.5 in	Load Tracker: LL = 0 plf DL = 0 plf
Area: A = 8.25 in2	Roof: LL = 25 psf DL = 15 psf TA = 2.2 ft
Section Modulus (X-X Axis): Sx = 7.56 in3	Upper Floor: LL = 40 psf DL = 15 psf TA = 0 ft
Section Modulus (Y-Y Axis): Sy = 2.06 in3	Upper Floor Height: 0 ft
Slenderness Ratio: Lex/dx = 17.63	Middle Floor: LL = 40 psf DL = 15 psf TA = 0 ft
Ley/dy = 0	Middle Floor Height: 0 ft
	Calculated Load: LL = 55 plf DL =121.9 plf
Stud Calculations (Controlling Case Only):	
Controlling Load Case: Axial Dead Load and Lateral loads (D + W or E) Actual Compressive Stress: Fc = 20 psi	AXIAL LOADING
Actual Compressive Stress:Fc =20psiAllowable Compressive Stress:Fc' =1254psi	Live Load: PL = 55 plf
Eccentricity Moment (X-X Axis): Mx-ex = 0 ft-lb	Dead Load: PD = 122 plf
Eccentricity Moment (Y-Y Axis): My-ey = 0 ft-lb	Total Axial Load: PT = 177 plf
Moment Due to Lateral Loads (X-X Axis): Mx = 168 ft-lb	LATERAL LOADING (Dy Face)
Moment Due to Lateral Loads (Y-Y Axis): $My = 0$ ft-lb	Uniform Lateral Load: wL-Lat = 15 psf
Bending Stress Lateral Loads Only (X-X Axis): Fbx = 266 psi	
Allowable Bending Stress (X-X Axis): Fbx' = 2153 psi	
Bending Stress Lateral Loads Only (Y-Y Axis): Fby = 0 psi	
Allowable Bending Stress (Y-Y Axis): Fby' = 2153 psi	
Combined Stress Factor: CSF = 0.13	

**NOTES** 

Established Basic Permit #



Location: WALL-3RD-3 Wall [2015 International Building Code(2015 NDS)] 1.5 IN x 5.5 IN x 8.08 FT @ 16 O.C. #2 - Douglas-Fir-Larch - Dry Use Section Adequate By: 87.5% Controlling Factor: Combined Stress Factor



David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346

StruCalc Version 10.0.1.6

7/26/2019 3:54:50 PM

Controlling Factor: Combined Stress Factor								
DEFLECTIONS			LOADING DIAGRAM					
Deflection due to lateral loads only: Defl =								
Live Load Deflection Criteria:	L/18	30		- E.				
VERTICAL REACTIONS								
Live Load: Vert-LL	-Rxn = 7	3 lb		<u> </u>				
Dead Load: Vert-DI	Rxn = 16	3 lb		В	_			
Total Load: Vert-TL	-Rxn = 23	6 lb						
HORIZONTAL REACTIONS	Top - 0	2 lb						
Total Reaction at Top of Column: TL-Rxr Total Reaction at Bottom of Column: TL-Rxr	•	3 lb 3 lb						
WALL DATA								
Total Stud Length:	8.08 ft							
Wall Dead Weight:	11 psf							
Unbraced Length (X-Axis) Lx:	8.08 ft							
Unbraced Length (Y-Axis) Ly:	0 ft							
Stud End Condition-K (e):	1			8.08 ft	w			
Axial Load Duration Factor	1.15							
Lateral Load Duration Factor (Wind/Seismic)	1.60							
STUD PROPERTIES								
#2 - Douglas-Fir-Larch								
Base Values	Adjusted							
Compressive Stress: Fc = 1350 psi		si						
Cd=1.60 Cf=1.10								
Bending Stress (X-X Axis): Fbx = 900 psi		si						
Cd=1.60 CF=1.30								
Bending Stress (Y-Y Axis): Fby = 900 psi								
Cd=1.60 CF=1.30				A	-			
Modulus of Elasticity: E = 1600 ksi	E'= 1600 k	si						
·			WALL LOAD CALCUL	ATOR				
Stud Section (X-X Axis):	dx = 5	.5 in			e Load	Dead Load	Tributar	y Width
Stud Section (Y-Y Axis):	dy = 1	.5 in	Load Tracker:	LL =	0 plf	DL = 0 plf		
Area:	A = 8.2	25 in2	Roof:	LL =	25 psf		TA =	2.2 ft
Section Modulus (X-X Axis):	Sx = 7.5	56 in3	Upper Floor:		40 psf		TA =	0 ft
Section Modulus (Y-Y Axis):	Sy = 2.0	)6 in3	Upper Floor Height:		0 ft			
Slenderness Ratio:	Lex/dx = 17.6	63	Middle Floor:	LL =	40 psf	DL = 15 psf	TA =	0 ft
	Ley/dy =	0	Middle Floor Height:		0 ft			
			Calculated Load:	LL =		DL =121.9 plf		
Stud Calculations (Controlling Case Only):					•			
Controlling Load Case: Axial Dead Load and L	ateral loads (D	+ W or E)	AXIAL LOADING					
Actual Compressive Stress:		20 psi	Live Load:	PL =	55 plf			
Allowable Compressive Stress:	Fc' = 125	54 psi	Dead Load:	PD =	122 plf			
Eccentricity Moment (X-X Axis):	Mx-ex =	0 ft-lb	Total Axial Load:	PT =	177 plf			
Eccentricity Moment (Y-Y Axis):	My-ey =	0 ft-lb						
Moment Due to Lateral Loads (X-X Axis):	Mx = 16	68 ft-lb	LATERAL LOADING	(Dy Face	)			
Moment Due to Lateral Loads (Y-Y Axis):	My =	0 ft-lb	Uniform Lateral Load:	wL-Lat =	<i>,</i>			
Bending Stress Lateral Loads Only (X-X Axis)	Fbx = 26	6 psi	L					
Allowable Bending Stress (X-X Axis):		53 psi						
Bending Stress Lateral Loads Only (Y-Y Axis):		0 psi						
Allowable Bending Stress (Y-Y Axis):	•	53 psi						
Combined Stress Factor:	CSF = 0.4							

**NOTES** 

Established Basic Permit #

<del>19-03646</del>

Project: 19-002c Framing Location: MLB3-1 Multi-Loaded Multi-Span Beam [2015 International Building Code(2015 NDS)] 1.75 IN x 11.875 IN x 6.83 FT LSL 2360 Fb-1.55E - Louisiana Pacific Section Adequate By: 86.2% Controlling Factor: Moment	David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346 StruCalc Version 10.0.1.6 7/26/2019 3:54:51 PM
DEFLECTIONS       Center         Live Load       0.06       IN L/1309         Dead Load       0.05       in         Total Load       0.11       IN L/739         Live Load Deflection Criteria: L/360       Total Load Deflection Criteria: L/240         REACTIONS       A       B         Live Load       1653       Ib         Dead Load       1277       Ib         Total Load       2930       Ib         Bearing Length       1.91       in	
BEAM DATA     Center       Span Length     6.83     ft       Unbraced Length-Top     0     ft       Unbraced Length-Bottom     6.83     ft       Live Load Duration Factor     1.15       Notch Depth     0.00	A 6.83 ft B
MATERIAL PROPERTIESLSL 2360 Fb-1.55E - Louisiana PacificBending Stress: $Fb = 2360 \text{ psi}$ Fb = 2360 psi $Fb' = 2718 \text{ psi}$ $Cd=1.15 CF=1.00$ Shear Stress: $Fv = 410 \text{ psi}$ $Cd=1.15$	Uniform Live Load 484 plf Uniform Dead Load 368 plf Beam Self Weight 6 plf Total Uniform Load 858 plf * Load obtained from Load Tracker. See Summary Report for details.
Modulus of Elasticity: $E =$ 1550 ksi $E' =$ 1550 ksiComp. $\perp$ to Grain: $Fc - \perp =$ 875 psi $Fc - \perp ' =$ 875 psiControlling Moment:5003 ft-lb3.41 Ft from left support of span 2 (Center Span)Created by combining all dead loads and live loads on span(s) 2	
Controlling Shear:2110 lbAt a distance d from left support of span 2 (Center Span) Created by combining all dead loads and live loads on span(s) 2Comparisons with required sections:Req'dProvidedSection Modulus:22.09 in341.13 in3Area (Shear):6.71 in220.78 in2Moment of Inertia (deflection):79.36 in4244.21 in4Moment:5003 ft-lb9316 ft-lbShear:2110 lb6532 lb	

NOTES

Established Basic Permit #

19-03646

#### Project: 19-002c Framing David L. Starkel Location: JST3-1 Pacific Northwest Structural Group, Inc. Floor Joist 6193 NE Malbon Ct. [2015 International Building Code(2015 NDS)] Kingston, WA 98346 SERIES 18 / 11.875 - Louisiana Pacific x 10.83 FT @ 16 O.C. StruCalc Version 10.0.1.6 7/26/2019 3:54:51 PM Section Adequate By: 123.4% Controlling Factor: End Reaction LOADING DIAGRAM DEFLECTIONS <u>Center</u> Live Load 0.08 IN L/1606 Dead Load 0.03 in Total Load 0.11 IN L/1168 Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360 REACTIONS В <u>A</u> 289 lb Live Load 289 lb Dead Load 108 lb 108 lb Total Load 397 lb 397 lb Bearing Length 1.75 in 3.50 in Web Stiffeners No No SUPPORT LOADS В <u>A</u> 10.83 ft Live Load 217 plf 217 plf Á Ŕ Dead Load 81 plf 81 plf 298 plf 298 plf Total Load **I-JOIST PROPERTIES** JOIST DATA Center SERIES 18 / 11.875 - Louisiana Pacific Span Length 10.83 ft **Base Values Adjusted** Unbraced Length-Top 0 ft Moment Cap: Mcap = 3100 ft-lb Mcap' = 3100 ft-lb Unbraced Length-Bottom 0 ft Floor sheathing applied to top of joists-top of joists fully braced. Cd = 1.00Shear Stress: Vcap = 1335 lb Vcap' = 1335 lb Floor Duration Factor 1.00 Cd = 1.00JOIST LOADING Reaction A: Rcap = 887 lb Rcap' = 887 lb Uniform Floor Loading <u>Center</u> Reaction B: Rcap = 1006 lb Rcap' = 1006 lb Live Load LL = 40 psf E.I.: EI = 248 lb-in2 FI' = 248 lb-in2 DL = Dead Load 15 psf Total Load TL = 55 psf Controlling Moment: 1075 ft-lb TL Adj. For Joist Spacing wT = 73.3 plf 5.41 Ft from left support of span 3 (Right Span) Created by combining all dead and live loads. Controlling Shear: 397 lb 0.0 Ft from left support of span 2 (Center Span) Created by combining all dead and live loads. Comparisons with required sections: Req'd **Provided** FI. 76 in2-lb E6 248 in2-lb xE6 Moment: 1075 ft-lb 3100 ft-lb 397 lb 1335 lb

Shear: NOTES

Established Basic Permit #

19-03646

#### Project: 19-002c Framing David L. Starkel Location: JST3-2 Pacific Northwest Structural Group, Inc. Floor Joist 6193 NE Malbon Ct. [2015 International Building Code(2015 NDS)] Kingston, WA 98346 SERIES 56 / 11.875 - Louisiana Pacific x 17.83 FT @ 16 O.C. StruCalc Version 10.0.1.6 7/26/2019 3:54:52 PM Section Adequate By: 80.8% Controlling Factor: End Reaction LOADING DIAGRAM DEFLECTIONS <u>Center</u> Live Load 0.21 IN L/1007 Dead Load 0.08 in Total Load 0.29 IN L/733 Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360 REACTIONS В <u>A</u> 475 lb 475 lb Live Load Dead Load 178 lb 178 lb Total Load 653 lb 653 lb Bearing Length 1.75 in 1.75 in Web Stiffeners No No SUPPORT LOADS В <u>A</u> 17.83 ft Live Load 356 plf 356 plf Á Ŕ Dead Load 134 plf 134 plf 490 plf 490 plf Total Load **I-JOIST PROPERTIES** JOIST DATA Center SERIES 56 / 11.875 - Louisiana Pacific Span Length 17.83 ft **Base Values** Unbraced Length-Top 0 ft Adjusted Moment Cap: Mcap = 10170 ft-lb Mcap' = 10170 ft-lb Unbraced Length-Bottom 0 ft Floor sheathing applied to top of joists-top of joists fully braced. Cd = 1.00Vcap = 2055 lb Shear Stress: Vcap' = 2055 lb Floor Duration Factor 1.00 Cd = 1.00JOIST LOADING Reaction A: Rcap = 1182 lbRcap' = 1182 lb Uniform Floor Loading <u>Center</u> Reaction B: 1182 lb Rcap' = 1182 lb Rcap = Live Load LL = 40 psf E.I.: EI = 668 lb-in2 EI' = 668 lb-in2 DL = Dead Load 15 psf Total Load TL = 55 psf Controlling Moment: 2914 ft-lb TL Adj. For Joist Spacing wT = 73.3 plf 8.91 Ft from left support of span 3 (Right Span) Created by combining all dead and live loads. Controlling Shear: 654 lb 0.0 Ft from left support of span 2 (Center Span) Created by combining all dead and live loads. Comparisons with required sections: Req'd **Provided** FI 328 in2-lb E6 668 in2-lb xE6 Moment: 2914 ft-lb 10170 ft-lb 654 lb Shear: 2055 lb

NOTES

Established Basic Permit #

19-03646

Location: JST3-3 Floor Joist [2015 International Building Code(2015 NDS)] SERIES 56 / 11.875 - Louisiana Pacific x 19.83 FT (17.8 + 2 ) @ 16 O.C. Section Adequate By: 34.9% Controlling Factor: End Reaction



Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct.

StruCalc Version 10.0.1.6

7/26/2019 3:54:52 PM

Controlling Factor: End Reaction	
DEFLECTIONS         Center         Right           Live Load         0.21         IN L/1007         -0.07         IN 2L/736           Dead Load         0.06         in         -0.01         in           Total Load         0.27         IN L/784         -0.08         IN 2L/610           Live Load Deflection Criteria: L/480         Total Load Deflection Criteria: L/360	LOADING DIAGRAM
Live Load         475         lb         669         lb           Dead Load         160         lb         399         lb           Total Load         635         lb         1068         lb           Bearing Length         3.50         in         3.50         in           Web Stiffeners         No         No         No         No	1
SUPPORT LOADSABLive Load356plf502plfDead Load120plf299plfTotal Load476plf801plf	A 17.83 ft B 2 ft
I-JOIST PROPERTIES         SERIES 56 / 11.875 - Louisiana Pacific         Base Values       Adjusted	JOIST DATACenterRightSpan Length17.83ft2ftUnbraced Length-Top0ft0ft
Moment Cap:         Mcap = 10170 ft-lb         Mcap' = 10170 ft-lb           Cd = 1.00         Shear Stress:         Vcap = 2055 lb         Vcap' = 2055 lb           Cd = 1.00         Cd = 1.00         Vcap' = 2055 lb         Vcap' = 2055 lb	Unbraced Length-Bottom 0 ft 0 ft Floor sheathing applied to top of joists-top of joists fully braced. Floor Duration Factor 1.00
Reaction A:         Rcap =         1441 lb         Rcap' =         1441 lb           Reaction B:         Rcap =         1441 lb         Rcap' =         1441 lb           E.I.:         EI =         668 lb-in2         EI' =         668 lb-in2	JOIST LOADINGUniform Floor LoadingCenterRightLive LoadLL =40psf40psfDead LoadDL =15psf15psf
Controlling Moment: 2754 ft-lb 8.74 Ft from left support of span 3 (Right Span) Created by combining all dead and live loads. Controlling Shear: -685 lb 18.0 Ft from left support of span 2 (Center Span) Created by combining all dead and live loads.	Total LoadTL =55psf55psfTL Adj. For Joist Spacing wT =73.3plf73.3plfWall LoadingWall OneLive Load ( $^{\perp}$ to Joists): L1 =0plf55plfDead Load ( $^{\perp}$ to Joists)D1 =0plf122plfLoad LocationX1 =0ft1.75ft
Comparisons with required sections:         Req'd         Provided           E.I.:         435 in2-lb E6         668 in2-lb xE6           Moment:         2754 ft-lb         10170 ft-lb           Shear:         -685 lb         2055 lb	

**NOTES** 

Established Basic Permit #

19-03646

#### Project: 19-002c Framing David L. Starkel Location: JST3-4 Pacific Northwest Structural Group, Inc. Floor Joist 6193 NE Malbon Ct. [2015 International Building Code(2015 NDS)] Kingston, WA 98346 SERIES 56 / 11.875 - Louisiana Pacific x 19.83 FT @ 16 O.C. StruCalc Version 10.0.1.6 7/26/2019 3:54:52 PM Section Adequate By: 52.2% Controlling Factor: Deflection DEFLECTIONS LOADING DIAGRAM Center Live Load 0.32 IN L/753 Dead Load 0.12 in Total Load 0.43 IN L/548 Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360 REACTIONS В <u>A</u> 529 lb Live Load 529 lb Dead Load 198 lb 198 lb Total Load 727 lb 727 lb Bearing Length 1.75 in 1.75 in Web Stiffeners No No SUPPORT LOADS В <u>A</u> 19.83 ft Live Load 397 plf 397 plf Á Ŕ Dead Load 149 plf 149 plf Total Load 545 plf 545 plf **I-JOIST PROPERTIES** JOIST DATA Center SERIES 56 / 11.875 - Louisiana Pacific Span Length 19.83 ft **Base Values** Unbraced Length-Top 0 ft Adjusted Moment Cap: Mcap = 10170 ft-lb Mcap' = 10170 ft-lb Unbraced Length-Bottom 0 ft Floor sheathing applied to top of joists-top of joists fully braced. Cd = 1.00Vcap = 2055 lb Shear Stress: Vcap' = 2055 lb Floor Duration Factor 1.00 Cd = 1.00JOIST LOADING Reaction A: Rcap = 1182 lbRcap' = 1182 lb Uniform Floor Loading <u>Center</u> Reaction B: 1182 lb Rcap' = 1182 lb Rcap = Live Load LL = 40 psf E.I.: EI = 668 lb-in2 EI' = 668 lb-in2 DL = Dead Load 15 psf Total Load TL = 55 psf Controlling Moment: 3605 ft-lb TL Adj. For Joist Spacing wT = 73.3 plf 9.91 Ft from left support of span 3 (Right Span) Created by combining all dead and live loads. Controlling Shear: 727 lb 0.0 Ft from left support of span 2 (Center Span) Created by combining all dead and live loads. Comparisons with required sections: Req'd **Provided** FI 439 in2-lb E6 668 in2-lb xE6 Moment: 3605 ft-lb 10170 ft-lb Shear: 727 lb 2055 lb **NOTES**

Established Basic Permit #

#### Project: 19-002c Framing David L. Starkel Location: JST3-5 Pacific Northwest Structural Group, Inc. Floor Joist 6193 NE Malbon Ct. [2015 International Building Code(2015 NDS)] Kingston, WA 98346 SERIES 56 / 11.875 - Louisiana Pacific x 15.67 FT @ 16 O.C. StruCalc Version 10.0.1.6 7/26/2019 3:54:53 PM Section Adequate By: 105.7% Controlling Factor: End Reaction LOADING DIAGRAM DEFLECTIONS <u>Center</u> Live Load 0.13 IN L/1423 Dead Load 0.05 in Total Load 0.18 IN L/1035 Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360 REACTIONS В <u>A</u> 418 lb Live Load 418 lb Dead Load 157 lb 157 lb Total Load 575 lb 575 lb Bearing Length 1.75 in 1.75 in Web Stiffeners No No SUPPORT LOADS В <u>A</u> 15.67 ft Live Load 314 plf 314 plf Á Ŕ Dead Load 118 plf 118 plf Total Load 431 plf 431 plf **I-JOIST PROPERTIES** JOIST DATA Center SERIES 56 / 11.875 - Louisiana Pacific Span Length 15.67 ft **Base Values** Unbraced Length-Top 0 ft Adjusted Moment Cap: Mcap = 10170 ft-lb Mcap' = 10170 ft-lb Unbraced Length-Bottom 0 ft Floor sheathing applied to top of joists-top of joists fully braced. Cd = 1.00Vcap = 2055 lb Shear Stress: Vcap' = 2055 lb Floor Duration Factor 1.00 Cd = 1.00JOIST LOADING Reaction A: Rcap = 1182 lbRcap' = 1182 lb Uniform Floor Loading <u>Center</u> Reaction B: 1182 lb Rcap' = 1182 lb Rcap = Live Load LL = 40 psf E.I.: EI = 668 lb-in2 EI' = 668 lb-in2 DL = Dead Load 15 psf Total Load TL = 55 psf Controlling Moment: 2251 ft-lb TL Adj. For Joist Spacing wT = 73.3 plf 7.84 Ft from left support of span 3 (Right Span) Created by combining all dead and live loads. Controlling Shear: -575 lb 16.0 Ft from left support of span 2 (Center Span) Created by combining all dead and live loads. Comparisons with required sections: Req'd **Provided** FI 232 in2-lb E6 668 in2-lb xE6 Moment: 2251 ft-lb 10170 ft-lb -575 lb Shear: 2055 lb

**NOTES** 

Established Basic Permit #

#### Project: 19-002c Framing David L. Starkel Location: JST3-6 Pacific Northwest Structural Group, Inc. Floor Joist 6193 NE Malbon Ct. [2015 International Building Code(2015 NDS)] Kingston, WA 98346 SERIES 56 / 11.875 - Louisiana Pacific x 14.17 FT @ 16 O.C. StruCalc Version 10.0.1.6 7/26/2019 3:54:53 PM Section Adequate By: 127.5% Controlling Factor: End Reaction LOADING DIAGRAM DEFLECTIONS <u>Center</u> Live Load 0.09 IN L/1850 Dead Load 0.03 in Total Load 0.13 IN L/1345 Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360 REACTIONS В <u>A</u> 378 lb 378 lb Live Load Dead Load 142 lb 142 lb Total Load 520 lb 520 lb Bearing Length 1.75 in 1.75 in Web Stiffeners No No SUPPORT LOADS В <u>A</u> 14.17 ft Live Load 284 plf 284 plf Á Ŕ Dead Load 107 plf 107 plf Total Load 390 plf 390 plf **I-JOIST PROPERTIES** JOIST DATA Center SERIES 56 / 11.875 - Louisiana Pacific Span Length 14.17 ft **Base Values** Unbraced Length-Top 0 ft Adjusted Moment Cap: Mcap = 10170 ft-lb Mcap' = 10170 ft-lb Unbraced Length-Bottom 0 ft Floor sheathing applied to top of joists-top of joists fully braced. Cd = 1.00Vcap = 2055 lb Shear Stress: Vcap' = 2055 lb Floor Duration Factor 1.00 Cd = 1.00JOIST LOADING Reaction A: Rcap = 1182 lbRcap' = 1182 lb Uniform Floor Loading <u>Center</u> Reaction B: 1182 lb Rcap' = 1182 lb Rcap = Live Load LL = 40 psf E.I.: EI = 668 lb-in2 EI' = 668 lb-in2 DL = Dead Load 15 psf Total Load TL = 55 psf Controlling Moment: 1841 ft-lb TL Adj. For Joist Spacing wT = 73.3 plf 7.09 Ft from left support of span 3 (Right Span) Created by combining all dead and live loads. Controlling Shear: 520 lb 0.0 Ft from left support of span 2 (Center Span) Created by combining all dead and live loads. Comparisons with required sections: Req'd **Provided** FI 179 in2-lb E6 668 in2-lb xE6 Moment: 1841 ft-lb 10170 ft-lb 520 lb 2055 lb Shear: **NOTES**

Established Basic Permit #

19-03646

Location: MLB3-2 Multi-Loaded Multi-Span Beam [2015 International Building Code(2015 NDS)] 3.5 IN x 6.0 IN x 5.33 FT 24F-V4 - Visually Graded Western Species - Dry Use Section Adequate By: 59.5% Controlling Factor: Moment



David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346

StruCalc Version 10.0.1.6

7/26/2019 3:54:54 PM

Controlling Factor: Moment			
DEFLECTIONS Center			LOADING DIAGRAM
Live Load 0.07 IN L/982			
Dead Load 0.05 in			
Total Load 0.12 IN L/549			
Live Load Deflection Criteria: L/360	Total Load Defle	ction Criteria: L/240	
REACTIONS A B			
Live Load 1062 lb 1038 lb			1
Dead Load 809 lb 760 lb			
Total Load 1871 lb 1798 lt			
Bearing Length 0.82 in 0.79 in	n		w
BEAM DATA Center	er		"
Span Length 5.33 ft	t		
Unbraced Length-Top 0 ft			5.33 ftB
Unbraced Length-Bottom 5.33 ft	t		
Live Load Duration Factor 1.00			
Camber Adj. Factor 1.5			UNIFORM LOADS Center*
Camber Required 0.08			Uniform Live Load 369 plf
Notch Depth 0.00			Uniform Dead Load 240 plf
MATERIAL PROPERTIES			Beam Self Weight 5 plf
24F-V4 - Visually Graded Western S	Species		Total Uniform Load 614 plf
	Base Values	<u>Adjusted</u>	* Load obtained from Load Tracker. See Summary Report for details.
Bending Stress: Fb =	= 2400 psi	Controlled by:	POINT LOADS - CENTER SPAN
Fb_0	cmpr = 1850 psi	Fb' = 2400 psi	Load Number One *
Cd=	=1.00		Live Load 133 lb
Shear Stress: Fv =		Fv' = 265 psi	Dead Load 266 lb
	=1.00		Location 2.17 ft
Modulus of Elasticity: E =		E' = 1800 ksi	* Load obtained from Load Tracker. See Summary Report for details.
Comp. ⊥ to Grain: Fc -	⊥= 650 psi	Fc - ⊥' = 650 psi	,,
Controlling Moment: 2633	3 ft-lb		
2.4 Ft from left support of span 2 (			
Created by combining all dead load		snan(s) 2	
Controlling Shear: 1577		1 3pdil(3) 2	
At a distance d from left support of span 2 (Center Span)			
Created by combining all dead load			
, ,		1 ()	
Comparisons with required section	ons: <u>Req'd</u>	Provided	
Section Modulus:	13.17 in3	21 in3	
Area (Shear):	8.93 in2	21 in2	
Moment of Inertia (deflection):	27.54 in4	63 in4	
Moment: 2633 ft-lb 4200 ft-lb			
Shear:	1577 lb	3710 lb	
NOTES			

## Established Basic Permit #

Location: WALL-2ND-1 Wall [2015 International Building Code(2015 NDS)] 1.5 IN x 5.5 IN x 8.08 FT @ 16 O.C. #2 - Douglas-Fir-Larch - Dry Use Section Adequate By: 87.5% Controlling Factor: Combined Stress Factor



David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346

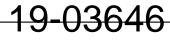
StruCalc Version 10.0.1.6

7/26/2019 3:54:54 PM

Controlling Factor: Combined Stress Factor		
DEFLECTIONS		LOADING DIAGRAM
Deflection due to lateral loads only: Defl =	0.06 IN = L/1638	
Live Load Deflection Criteria:	L/180	
VERTICAL REACTIONS		
Live Load: Vert-L	L-Rxn = 0 lb	
Dead Load: Vert-D	)L-Rxn = 119 lb	В
Total Load: Vert-T	L-Rxn = 119 lb	
HORIZONTAL REACTIONS Total Reaction at Top of Column: TL-Rx	m-Top = 83 lb	
	n-Bottom = 83 lb	
WALL DATA Total Stud Length:	8.08 ft	
ũ		
Wall Dead Weight:	11 psf	
Unbraced Length (X-Axis) Lx:	8.08 ft	
Unbraced Length (Y-Axis) Ly:	0 ft	8.08 ft w
Stud End Condition-K (e):	1	
Axial Load Duration Factor	1.00	
Lateral Load Duration Factor (Wind/Seismic)	1.60	
STUD PROPERTIES		
#2 - Douglas-Fir-Larch		
Base Values	Adjusted	
	Fc' = 1254 psi	
Cd=1.60 Cf=1.10		
Bending Stress (X-X Axis): Fbx = 900 psi		
	0 Cr=1.15 Cl=1.00	
Bending Stress (Y-Y Axis): Fby = 900 psi Cd=1.60 CF=1.3		
	E' = 1600 ksi	A
Modulus of Elasticity. E - 1000 KSI		WALL LOAD CALCULATOR
Stud Section (X-X Axis):	dx = 5.5 in	Live Load Dead Load Tributary Width
Stud Section (Y-Y Axis):	dy = 1.5 in	Load Tracker: LL = 0 plf DL = 0 plf
Area:	A = 8.25  in  2	Roof: $LL = 25 \text{ psf}  DL = 15 \text{ psf}  TA = 0 \text{ ft}$
Section Modulus (X-X Axis):	Sx = 7.56 in 3	Upper Floor: $LL = 40 \text{ psf}$ $DL = 15 \text{ psf}$ $TA = 0 \text{ ft}$
Section Modulus (Y-Y Axis):	Sy = 2.06 in 3	Upper Floor Height: 0 ft
Slenderness Ratio:	Lex/dx = 17.63	Middle Floor: $LL = 40 \text{ psf} DL = 15 \text{ psf} TA = 0 \text{ ft}$
	Ley/dy = 0	Middle Floor Height: 0 ft
		Calculated Load: LL = 0 plf DL = 88.9 plf
Stud Calculations (Controlling Case Only)		
Controlling Load Case: Axial Dead Load and	Lateral loads (D + W or E)	AXIAL LOADING
Actual Compressive Stress:	Fc = 14 psi	Live Load: PL = 0 plf *
Allowable Compressive Stress:	Fc' = 1254 psi	Dead Load: PD = 89 plf *
Eccentricity Moment (X-X Axis):	Mx-ex = 0 ft-lb	Total Axial Load: PT = 89 plf
Eccentricity Moment (Y-Y Axis):	My-ey = 0 ft-lb	* Load obtained from Load Tracker. See Summary Report for details.
Moment Due to Lateral Loads (X-X Axis):	Mx = 168 ft-lb	
Moment Due to Lateral Loads (Y-Y Axis):	My = 0 ft-lb	LATERAL LOADING (Dy Face)
Bending Stress Lateral Loads Only (X-X Axis	): Fbx = 266 psi	Uniform Lateral Load: wL-Lat = 15 psf
Allowable Bending Stress (X-X Axis):	Fbx' = 2153 psi	· · · · · · · · · · · · · · · · · · ·
Bending Stress Lateral Loads Only (Y-Y Axis)	): Fby = 0 psi	
Allowable Bending Stress (Y-Y Axis):	Fby' = 2153 psi	
Combined Stress Factor:	CSF = 0.12	

**NOTES** 

Established Basic Permit #



Location: WALL-2ND-2 Wall [2015 International Building Code(2015 NDS)] 1.5 IN x 5.5 IN x 8.08 FT @ 16 O.C. #2 - Douglas-Fir-Larch - Dry Use Section Adequate By: 95.1% Controlling Factor: Combined Stress Factor



David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346

StruCalc Version 10.0.1.6

7/26/2019 3:54:55 PM

Controlling Factor: Combined Stress Factor		
DEFLECTIONS		LOADING DIAGRAM
Deflection due to lateral loads only: Defl =		
Live Load Deflection Criteria:	L/180	
VERTICAL REACTIONS		
Live Load: Vert-L	L-Rxn = 0 lb	<u>⊻</u>
Dead Load: Vert-D	L-Rxn = 119 lb	В
Total Load: Vert-T	L-Rxn = 119 lb	
HORIZONTAL REACTIONS		
Total Reaction at Top of Column: TL-Rx	n-Top = 27 lb	
Total Reaction at Bottom of Column: TL-Rx	n-Bottom = 27 lb	
WALL DATA		
Total Stud Length:	8.08 ft	
Wall Dead Weight:	11 psf	
Unbraced Length (X-Axis) Lx:	8.08 ft	
Unbraced Length (Y-Axis) Ly:	0 ft	
Stud End Condition-K (e):	1	8.08 ft w
Axial Load Duration Factor	1.00	
Lateral Load Duration Factor (Wind/Seismic)	1.33	
	1.00	
STUD PROPERTIES		
#2 - Douglas-Fir-Larch		
Base Values	Adjusted	
	Fc' = 1182 psi	
Cd=1.33 Cf=1.10		
Bending Stress (X-X Axis): Fbx = 900 psi		
	0 Cr=1.15 Cl=1.00	
Bending Stress (Y-Y Axis): Fby = 900 psi Cd=1.33 CF=1.3	-	
	E' = 1600 ksi	A
Modulus of Elasticity. E = 1000 Ksi	E = 1000 KSI	WALL LOAD CALCULATOR
Stud Section (X-X Axis):	dx = 5.5 in	Live Load Dead Load Tributary Width
Stud Section (Y-Y Axis):	dy = 1.5 in	· · · · · · · · · · · · · · · · · · ·
Area:	A = 8.25  in  2	
Section Modulus (X-X Axis):	Sx = 7.56  in  3	Roof:         LL =         25 psf         DL =         15 psf         TA =         0 ft           Upper Floor:         LL =         40 psf         DL =         15 psf         TA =         0 ft
Section Modulus (Y-Y Axis):	$S_{V} = 2.06$ in 3	Upper Floor Height: 0 ft
Slenderness Ratio:	Lex/dx = 17.63	Middle Floor: $LL = 40 \text{ psf}$ $DL = 15 \text{ psf}$ $TA = 0 \text{ ft}$
	Ley/dy = 0	Middle Floor Height: 0 ft
		Calculated Load: LL = 0 plf DL = 88.9 plf
Stud Calculations (Controlling Case Only)	:	
Controlling Load Case: Axial Dead Load and		AXIAL LOADING
Actual Compressive Stress:	Fc = 14 psi	Live Load: PL = 0 plf *
Allowable Compressive Stress:	Fc' = 1182 psi	Dead Load: $PD = 89 \text{ plf}^*$
Eccentricity Moment (X-X Axis):	Mx-ex = 0 ft-lb	Total Axial Load: PT = 89 plf
Eccentricity Moment (Y-Y Axis):	My-ey = 0 ft-lb	* Load obtained from Load Tracker. See Summary Report for details.
Moment Due to Lateral Loads (X-X Axis):	Mx = 54 ft-lb	,, _,, _
Moment Due to Lateral Loads (Y-Y Axis):	My = 0 ft-lb	LATERAL LOADING (Dy Face)
Bending Stress Lateral Loads Only (X-X Axis)		Uniform Lateral Load: wL-Lat = 5 psf
Allowable Bending Stress (X-X Axis):		· · · ·
Bending Stress Lateral Loads Only (Y-Y Axis)	•	
Allowable Bending Stress (Y-Y Axis):	Fby' = 1790 psi	
Combined Stress Factor:	CSF = 0.05	

**NOTES** 

Established Basic Permit #

<del>19-03646</del>

Location: WALL-2ND-3 Wall [2015 International Building Code(2015 NDS)] 1.5 IN x 5.5 IN x 8.08 FT @ 16 O.C. #2 - Douglas-Fir-Larch - Dry Use Section Adequate By: 95.1% Controlling Factor: Combined Stress Factor



David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346

StruCalc Version 10.0.1.6

7/26/2019 3:54:55 PM

Controlling Factor: Combined Stress Factor DEFLECTIONS			LOADING DIAGRAM						
Deflection due to lateral loads only: Defl =	0.02 IN - 1/504		LOADING DIAGRAM						
Live Load Deflection Criteria:	L/180								
	L/100			- E					
VERTICAL REACTIONS									
Live Load: Vert-L	L-Rxn = 0	lb		<b>*</b>					
Dead Load: Vert-D	L-Rxn = 108	lb		B	_				
Total Load: Vert-T	L-Rxn = 108	lb			1				
HORIZONTAL REACTIONS Total Reaction at Top of Column: TL-Rx	n-Top = 27	lla							
Total Reaction at Bottom of Column: TL-Rx									
	II-DOLLOIII - 21	u							
WALL DATA									
Total Stud Length:	8.08 ft								
Wall Dead Weight:	10 psf								
Unbraced Length (X-Axis) Lx:	8.08 ft								
Unbraced Length (Y-Axis) Ly:	0 ft								
Stud End Condition-K (e):	1			8.08 ft	w				
Axial Load Duration Factor	1.00								
Lateral Load Duration Factor (Wind/Seismic)	1.33								
STUD PROPERTIES									
#2 - Douglas-Fir-Larch									
Base Values	Adjusted								
	Fc' = 1182 psi								
Cd=1.33 Cf=1.10									
Bending Stress (X-X Axis): Fbx = 900 psi									
	0 Cr=1.15 Cl=1.00								
Bending Stress (Y-Y Axis): Fby = 900 psi									
Cd=1.33 CF=1.3					_				
	E' = 1600 ksi			A					
Modulus of Elasticity. E = 1000 Ksi	L = 1000 K31		WALL LOAD CALCUL	ATOD					
Stud Section (X-X Axis):	dx = 5.5	in	VVALL LUAD CALCUL		e Load	Dee	ad Load	Tributar	v Width
Stud Section (Y-Y Axis):		in	Lood Trooker		0 plf			mpula	y width
Area:	A = 8.25		Load Tracker:	LL =			0 plf	TA _	0.#
Section Modulus (X-X Axis):	x = 0.25 Sx = 7.56		Roof:		25 psf				0 ft
Section Modulus (X-X Axis):	Sy = 2.06		Upper Floor:	LL =	40 psf	DL =	15 psf	TA =	0 ft
Slenderness Ratio:	Lex/dx = 17.63	115	Upper Floor Height:		0 ft		45 5	<b>T</b> •	0.5
	Ley/dy = 0		Middle Floor:	LL =	•	DL =	15 psf	TA =	0 ft
	Ley/dy = 0		Middle Floor Height:		0 ft				
Stud Calculations (Controlling Case Only)			Calculated Load:	LL =	0 plf	DL =	80.8 plf		
Stud Calculations (Controlling Case Only) Controlling Load Case: Axial Dead Load and		Wor E)							
Actual Compressive Stress:			AXIAL LOADING		0				
•		psi	Live Load:	PL =	0 plf *				
Allowable Compressive Stress:	Fc' = 1182		Dead Load:	PD =					
Eccentricity Moment (X-X Axis):		ft-lb	Total Axial Load:	PT =	81 plf		_		
Eccentricity Moment (Y-Y Axis): Moment Due to Lateral Loads (X-X Axis):		ft-lb	* Load obtained from L	oad Tracke	er. See S	Summar	ry Report	tor details	5.
		ft-lb		· <b>-</b> -					
( )	My = 0	ft-lb	LATERAL LOADING						
Moment Due to Lateral Loads (Y-Y Axis):					5 pof				
Moment Due to Lateral Loads (Y-Y Axis): Bending Stress Lateral Loads Only (X-X Axis)	): Fbx = 86	•	Uniform Lateral Load:	wL-Lat =	5 psi				
Moment Due to Lateral Loads (Y-Y Axis): Bending Stress Lateral Loads Only (X-X Axis) Allowable Bending Stress (X-X Axis):	): Fbx = 86 Fbx' = 1790	psi	Uniform Lateral Load:	wL-Lat =	5 psi				
Moment Due to Lateral Loads (Y-Y Axis): Bending Stress Lateral Loads Only (X-X Axis Allowable Bending Stress (X-X Axis): Bending Stress Lateral Loads Only (Y-Y Axis)	): Fbx = 86 Fbx' = 1790 ): Fby = 0	psi psi	Uniform Lateral Load:	wL-Lat =	5 psi				
Moment Due to Lateral Loads (Y-Y Axis): Bending Stress Lateral Loads Only (X-X Axis) Allowable Bending Stress (X-X Axis):	): Fbx = 86 Fbx' = 1790	psi psi psi	Uniform Lateral Load:	wL-Lat =	<u>5 psi</u>				

**NOTES** 

Established Basic Permit #

<del>19-03646</del>

#### Project: 19-002c Framing David L. Starkel Location: JST3-7 Pacific Northwest Structural Group, Inc. Floor Joist 6193 NE Malbon Ct. [2015 International Building Code(2015 NDS)] Kingston, WA 98346 SERIES 18 / 11.875 - Louisiana Pacific x 10.75 FT @ 16 O.C. StruCalc Version 10.0.1.6 7/26/2019 3:54:55 PM Section Adequate By: 125.0% Controlling Factor: End Reaction LOADING DIAGRAM DEFLECTIONS <u>Center</u> Live Load 0.08 IN L/1638 Dead Load 0.03 in Total Load 0.11 IN L/1191 Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360 REACTIONS В <u>A</u> 287 lb 287 lb Live Load Dead Load 108 lb 108 lb Total Load 395 lb 395 lb Bearing Length 1.75 in 1.75 in Web Stiffeners No No SUPPORT LOADS В Α 10.75 ft Live Load 215 plf 215 plf Á Ŕ Dead Load 81 plf 81 plf Total Load 296 plf 296 plf **I-JOIST PROPERTIES** JOIST DATA Center SERIES 18 / 11.875 - Louisiana Pacific Span Length 10.75 ft **Base Values Adjusted** Unbraced Length-Top 0 ft Moment Cap: Mcap = 3100 ft-lb Mcap' = 3100 ft-lb Unbraced Length-Bottom 0 ft Floor sheathing applied to top of joists-top of joists fully braced. Cd = 1.00Shear Stress: Vcap = 1335 lb Vcap' = 1335 lb Floor Duration Factor 1.00 Cd = 1.00JOIST LOADING Reaction A: Rcap = 887 lb Rcap' = 887 lb Uniform Floor Loading <u>Center</u> Reaction B: 887 lb Rcap' = 887 lb Rcap = Live Load LL = 40 psf E.I.: EI = 248 lb-in2 FI' = 248 lb-in2 DL = Dead Load 15 psf Total Load TL = 55 psf Controlling Moment: 1059 ft-lb TL Adj. For Joist Spacing wT = 73.3 plf 5.38 Ft from left support of span 3 (Right Span) Created by combining all dead and live loads. Controlling Shear: 394 lb 0.0 Ft from left support of span 2 (Center Span) Created by combining all dead and live loads. Comparisons with required sections: Req'd **Provided** FI 75 in2-lb E6 248 in2-lb xE6 Moment: 1059 ft-lb 3100 ft-lb 394 lb 1335 lb Shear: **NOTES**

Established Basic Permit #

Location: MLB3-3 Multi-Loaded Multi-Span Beam [2015 International Building Code(2015 NDS)] 1.75 IN x 11.25 IN x 6.5 FT (4.8 + 1.8) LSL 1730 Fb-1.35E - Louisiana Pacific Section Adequate By: 330.4% Controlling Factor: Moment



David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346 page

StruCalc Version 10.0.1.6

7/26/2019 3:54:56 PM

DEFLECTIONS Center Right	LOADING DIAGRAM
Live Load 0.01 IN L/5695 0.01 IN 2L/3430	
Dead Load 0.00 in 0.01 in	
Total Load 0.01 IN L/6066 0.02 IN 2L/2132	
Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240	
REACTIONS A B	
Live Load 582 lb 1036 lb	
Dead Load 118 lb 739 lb	
Total Load 700 lb 1775 lb	1
Uplift (1.5 F.S) -33 lb 0 lb	
Bearing Length 0.53 in 1.35 in	w 🗸
BEAM DATA Center Right	
Span Length 4.75 ft 1.75 ft	4.75 ft 1.75 ft
Unbraced Length-Top 0 ft 0 ft	<b>B</b>
Unbraced Length-Bottom 4.75 ft 1.75 ft	
Live Load Duration Factor 1.00	
Notch Depth 0.00	UNIFORM LOADS Center* Right
	Uniform Live Load 245 plf 30 plf
MATERIAL PROPERTIES	Uniform Dead Load 91 plf 90 plf
LSL 1730 Fb-1.35E - Louisiana Pacific	Beam Self Weight 6 plf 6 plf
Base Values Adjusted	Total Uniform Load 342 plf 126 plf
Bending Stress: Fb = 1730 psi Fb' = 1485 psi	* Load obtained from Load Tracker. See Summary Report for details.
Cd=1.00 Cl=0.85 CF=1.01	POINT LOADS - RIGHT SPAN
Shear Stress: $Fv = 410 \text{ psi}$ $Fv' = 410 \text{ psi}$	Load Number <u>One</u>
Cd=1.00	Live Load 290 lb
Modulus of Elasticity: E = 1350 ksi E' = 1350 ksi	Dead Load 230 lb
Comp. $\perp$ to Grain: Fc - $\perp$ = 750 psi Fc - $\perp$ = 750 psi	Location 1.67 ft
Controlling Moment: -1061 ft-lb	
Over right support of span 2 (Center Span)	
Created by combining all dead loads and live loads on span(s) 3	
Controlling Shear: -727 lb	
At a distance d from right support of span 2 (Center Span)	
Created by combining all dead loads and live loads on span(s) 2, 3	
Comparisons with required sections: <u>Req'd</u> <u>Provided</u>	
Section Modulus: 8.58 in 3 36.91 in 3	
Area (Shear): 2.66 in2 19.69 in2	
Moment of Inertia (deflection): 23.38 in4 207.64 in4	
Moment: -1061 ft-lb 4567 ft-lb	
Shear: -727 lb 5381 lb	
NOTES	

## Established Basic Permit #

Location: JST3-8 Floor Joist [2015 International Building Code(2015 NDS)] SERIES 56 / 11.875 - Louisiana Pacific x 6.33 FT (4.6 + 1.8 ) @ 16 O.C. Section Adequate By: 13.7% Controlling Factor: End Reaction

-1847 ft-lb

1167 lb

10170 ft-lb

2055 lb



Pacific Northwest Structural Group, Inc.

StruCalc Version 10.0.1.6

7/26/2019 3:54:56 PM

Controlling Factor: End Reaction	
DEFLECTIONSCenterRightLive Load-0.02IN L/3593-0.01IN 2L/2810Dead Load-0.01in-0.01inTotal Load-0.03IN L/2040-0.03IN 2L/1584Live Load Deflection Criteria:L/480Total Load Deflection Criteria:L/360REACTIONSAB	LOADING DIAGRAM
Live Load         122         Ib         1018         Ib           Dead Load         -130         Ib         721         Ib           Total Load         -8         Ib         1739         Ib           Uplift (1.5 F.S)         -357         Ib         0         Ib           Bearing Length         3.50         in         3.50         in           Web Stiffeners         Yes         Yes         Yes	
SUPPORT LOADS     A     B       Live Load     92 plf     764 plf       Dead Load     -98 plf     541 plf       Total Load     -6 plf     1304 plf	4.58 ft B
I-JOIST PROPERTIESSERIES 56 / 11.875 - Louisiana PacificBase ValuesAdjustedMoment Cap:Mcap = 10170 ft-lb $Cd = 1.00$	JOIST DATA       Center       Right         Span Length       4.58       ft       1.75       ft         Unbraced Length-Top       0       ft       0       ft         Unbraced Length-Bottom       0       ft       0       ft         Floor sheathing applied to top of joists-top of joists fully braced.       Floor Duration Factor       1.00
Shear Stress: $Vcap = 2055$ lb $Vcap' = 2055$ lb $Cd = 1.00$ $Cd = 1.00$ Rcap' = 1976 lb         Reaction A:       Rcap = 1976 lb       Rcap' = 1976 lb         Reaction B:       Rcap = 1976 lb       Rcap' = 1976 lb         E.I.:       EI = 668 lb-in2       EI' = 668 lb-in2	JOIST LOADINGUniform Floor LoadingCenterRightLive LoadLL =40psfDead LoadDL =15psfTotal LoadTL =55psfThe diagram is the construction of the constructi
Controlling Moment:-1847 ft-lb4.58 Ft from left support of span 3 (Right Span)Created by combining all dead and live loads.Controlling Shear:1167 lb0.0 Ft from left support of span 3 (Right Span)Created by combining all dead and live loads.	TL Adj. For Joist Spacing wT = 73.3 plf 73.3 plf <b>Wall Loading</b> Wall One Live Load ( $\perp$ to Joists): L1 = 0 plf 431 plf Dead Load ( $\perp$ to Joists)D1 = 0 plf 348 plf Load Location X1 = 0 ft 1.67 ft
Comparisons with required sections:Req'dProvidedE.I.:152 in2-lb E6668 in2-lb xE	6

Shear: NOTES

Moment:

Established Basic Permit #

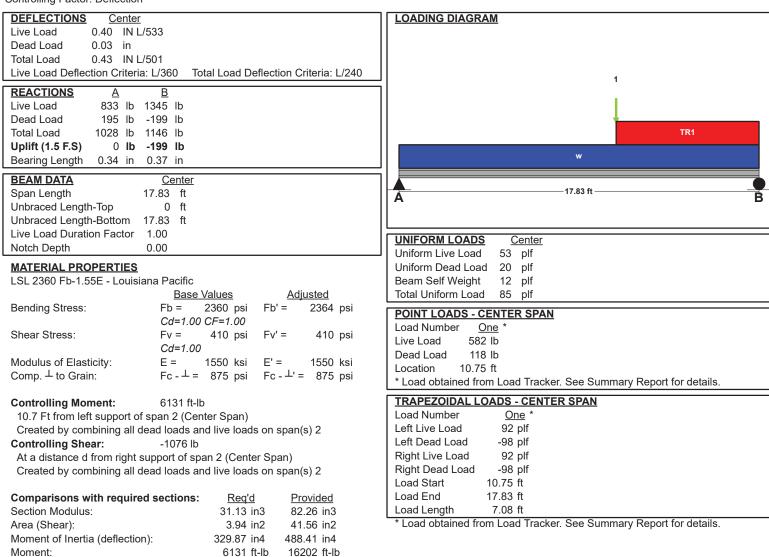
Location: MLB3-4 Multi-Loaded Multi-Span Beam [2015 International Building Code(2015 NDS)] 3.5 IN x 11.875 IN x 17.83 FT LSL 2360 Fb-1.55E - Louisiana Pacific Section Adequate By: 48.1% Controlling Factor: Deflection



David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346

StruCalc Version 10.0.1.6

7/26/2019 3:54:57 PM



Shear: NOTES

Established Basic Permit #

-1076 lb

11360 lb

19-03646

Location: WALL-2ND-4 Wall [2015 International Building Code(2015 NDS)] 1.5 IN x 5.5 IN x 8.08 FT @ 16 O.C. #2 - Douglas-Fir-Larch - Dry Use Section Adequate By: 87.5% Controlling Factor: Combined Stress Factor



David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346

StruCalc Version 10.0.1.6

7/26/2019 3:54:57 PM

DEFLECTIONS		LOADING DIAGRAM
Deflection due to lateral loads only: Defl =	0.06 IN = 1/1638	
Live Load Deflection Criteria:	L/180	
-	2,100	
VERTICAL REACTIONS		
	Rxn = 0 lb	B
Dead Load: Vert-D	L-Rxn = 119 lb	
Total Load: Vert-TI	Rxn = 119 lb	
HORIZONTAL REACTIONS		
•	n-Top = 83 lb	
Total Reaction at Bottom of Column: TL-Rxi	n-Bottom = 83 lb	
WALL DATA		
Total Stud Length:	8.08 ft	
Wall Dead Weight:	11 psf	
Unbraced Length (X-Axis) Lx:	8.08 ft	
Unbraced Length (Y-Axis) Ly:	0 ft	
Stud End Condition-K (e):	1	8.08 ft w
Axial Load Duration Factor	1.00	
Lateral Load Duration Factor (Wind/Seismic)	1.60	
STUD PROPERTIES		
#2 - Douglas-Fir-Larch		
Base Values	Adjusted	
	Fc' = 1254 psi	
Cd=1.60 Cf=1.10		
Bending Stress (X-X Axis): Fbx = 900 psi		
	) Cr=1.15 Cl=1.00	
Bending Stress (Y-Y Axis): Fby = 900 psi		
Cd=1.60 CF=1.30		A
	E' = 1600 ksi	
		WALL LOAD CALCULATOR
Stud Section (X-X Axis):	dx = 5.5 in	Live Load Dead Load Tributary Width
Stud Section (Y-Y Axis):	dy = 1.5 in	Load Tracker: LL = 0 plf DL = 0 plf
Area:	A = 8.25 in2	Roof: $LL = 25 \text{ psf} DL = 15 \text{ psf} TA = 0 \text{ ft}$
Section Modulus (X-X Axis):	Sx = 7.56 in 3	Upper Floor: $LL = 40 \text{ psf}$ $DL = 15 \text{ psf}$ $TA = 0 \text{ ft}$
Section Modulus (Y-Y Axis):	Sy = 2.06 in 3	Upper Floor Height: 0 ft
Slenderness Ratio:	Lex/dx = 17.63	Middle Floor: $LL = 40 \text{ psf} DL = 15 \text{ psf} TA = 0 \text{ ft}$
	Ley/dy = 0	Middle Floor Height: 0 ft
	3. 3	Calculated Load: LL = 0 plf DL = 88.9 plf
Stud Calculations (Controlling Case Only):		
Controlling Load Case: Axial Dead Load and L		AXIAL LOADING
Actual Compressive Stress:	Fc = 14 psi	Live Load: PL = 0 plf *
Allowable Compressive Stress:	Fc' = 1254 psi	Dead Load: PD = 89 plf *
Eccentricity Moment (X-X Axis):	Mx-ex = 0 ft-lb	Total Axial Load: PT = 89 plf
Eccentricity Moment (Y-Y Axis):	My-ey = 0 ft-lb	* Load obtained from Load Tracker. See Summary Report for details.
Moment Due to Lateral Loads (X-X Axis):	Mx = 168 ft-lb	
Moment Due to Lateral Loads (Y-Y Axis):	My = 0 ft-lb	LATERAL LOADING (Dy Face)
	: Fbx = 266 psi	Uniform Lateral Load: wL-Lat = 15 psf
Bending Stress Lateral Loads Only (X-X Axis)	. i bx = 200 p3i	
Bending Stress Lateral Loads Only (X-X Axis) Allowable Bending Stress (X-X Axis):	Fbx' = 2153 psi	
Allowable Bending Stress (X-X Axis):	Fbx' = 2153 psi	
Bending Stress Lateral Loads Only (X-X Axis) Allowable Bending Stress (X-X Axis): Bending Stress Lateral Loads Only (Y-Y Axis) Allowable Bending Stress (Y-Y Axis): Combined Stress Factor:	Fbx' = 2153 psi	

**NOTES** 

Established Basic Permit #

<del>19-03646</del>

Location: MLB3-5 Multi-Loaded Multi-Span Beam [2015 International Building Code(2015 NDS)] 3.5 IN x 6.0 IN x 5.33 FT 24F-V4 - Visually Graded Western Species - Dry Use Section Adequate By: 42.7% Controlling Factor: Moment



David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346

StruCalc Version 10.0.1.6

7/26/2019 3:54:58 PM

Controlling Factor: Moment	
DEFLECTIONS         Center           Live Load         0.09         IN L/748           Dead Load         0.04         in           Total Load         0.13         IN L/493           Live Load Deflection Criteria: L/360         Total Load Deflection Criteria: L/240	LOADING DIAGRAM
REACTIONS     A     B       Live Load     1362     lb     1157     lb       Dead Load     715     lb     679     lb       Total Load     2077     lb     1836     lb       Bearing Length     0.91     in     0.81     in	TR1 TR2
BEAM DATA     Center       Span Length     5.33     ft       Unbraced Length-Top     0     ft       Unbraced Length-Bottom     5.33     ft       Live Load Duration Factor     1.00	A 5.33 ft B
Camber Adj. Factor1.5Camber Required0.07Notch Depth0.00	UNIFORM LOADSCenter*Uniform Live Load55Driform Dead Load122plf
MATERIAL PROPERTIES         24F-V4 - Visually Graded Western Species         Base Values       Adjusted	Beam Self Weight 5 plf Total Uniform Load 182 plf * Load obtained from Load Tracker. See Summary Report for details.
Bending Stress:         Fb =         2400 psi         Controlled by:           Fb_cmpr =         1850 psi         Fb' =         2400 psi           Cd=1.00         Cd=1.00         Cd=1.00         Cd=1.00	POINT LOADS - CENTER SPAN Load Number One * Live Load 833 lb
Shear Stress: $Fv =$ 265 psi $Fv' =$ 265 psi $Cd=1.00$ Modulus of Elasticity: $E =$ 1800 ksi $E' =$ 1800 ksi	Dead Load 195 lb Location 1.75 ft
Modulus of Elasticity:E =1800 ksiE' =1800 ksiComp. $\perp$ to Grain:Fc - $\perp$ =650 psiFc - $\perp$ ' =650 psi	* Load obtained from Load Tracker. See Summary Report for details. <b>TRAPEZOIDAL LOADS - CENTER SPAN</b>
Controlling Moment:2944 ft-lb2.13 Ft from left support of span 2 (Center Span)Created by combining all dead loads and live loads on span(s) 2Controlling Shear:1848 lbAt a distance d from left support of span 2 (Center Span)Created by combining all dead loads and live loads on span(s) 2	Load NumberOne *TwoLeft Live Load215 plf284 plfLeft Dead Load81 plf107 plfRight Live Load215 plf284 plfRight Dead Load81 plf107 plfLoad Start0 ft1.75 ftLoad End1.75 ft5.33 ft
Comparisons with required sections:Req'dProvidedSection Modulus:14.72 in321 in3Area (Shear):10.46 in221 in2Moment of Inertia (deflection):30.68 in463 in4Moment of Lection (deflection):60414 fttt4000 ftttt	Load Length 1.75 ft 3.58 ft * Load obtained from Load Tracker. See Summary Report for details.

Shear: NOTES

Moment:

## Established Basic Permit #

19-03646

2944 ft-lb 4200 ft-lb

3710 lb

1848 lb

Location: WALL-2ND-5 Wall [2015 International Building Code(2015 NDS)] 1.5 IN x 5.5 IN x 8.08 FT @ 16 O.C. #2 - Douglas-Fir-Larch - Dry Use Section Adequate By: 87.5% Controlling Factor: Combined Stress Factor



David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346

StruCalc Version 10.0.1.6

7/26/2019 3:54:58 PM

DEFLECTIONS	]	LOADING DIAGRAM
Deflection due to lateral loads only: Defl =	0.06 IN = L/1638	
Live Load Deflection Criteria:	L/180	
VERTICAL REACTIONS		
	Rxn = 0 lb	
	L-Rxn = 119  lb	В
	$_{-}$ Rxn = 119 lb	
	-1001 - 119 10	
HORIZONTAL REACTIONS		
Total Reaction at Top of Column: TL-Rxr	n-Top = 83 lb	
	h-Bottom = 83 lb	
-		
WALL DATA		
Total Stud Length:	8.08 ft	
Wall Dead Weight:	11 psf	
Unbraced Length (X-Axis) Lx:	8.08 ft	
Unbraced Length (Y-Axis) Ly:	0 ft	
Stud End Condition-K (e):	1	8.08 ft
Axial Load Duration Factor	1.00	
Lateral Load Duration Factor (Wind/Seismic)	1.60	
STUD PROPERTIES		
#2 - Douglas-Fir-Larch		
Base Values	Adjusted	
Compressive Stress: $Fc = 1350$ psi		
Cd=1.60 Cf=1.10		
Bending Stress (X-X Axis): Fbx = 900 psi		
	) Cr=1.15 Cl=1.00	
Bending Stress (Y-Y Axis): Fby = 900 psi		
Cd=1.60 CF=1.30		Ā
Modulus of Elasticity: E = 1600 ksi	E' = 1600 ksi	
		WALL LOAD CALCULATOR
Stud Section (X-X Axis):	dx = 5.5 in	Live Load Dead Load Tributary Width
Stud Section (Y-Y Axis):	dy = 1.5 in	Load Tracker: LL = 0 plf DL = 0 plf
Area:	A = 8.25 in2	Roof: $LL = 25 \text{ psf} DL = 15 \text{ psf} TA = 0 \text{ ft}$
Section Modulus (X-X Axis):	Sx = 7.56 in3	Upper Floor: $LL = 40 \text{ psf} DL = 15 \text{ psf} TA = 0 \text{ ft}$
Section Modulus (Y-Y Axis):	Sy = 2.06 in3	Upper Floor Height: 0 ft
Slenderness Ratio:	Lex/dx = 17.63	Middle Floor: $LL = 40 \text{ psf} DL = 15 \text{ psf} TA = 0 \text{ ft}$
	Ley/dy = 0	Middle Floor Height: 0 ft
		Calculated Load: LL = 0 plf DL = 88.9 plf
Stud Calculations (Controlling Case Only):		
Controlling Load Case: Axial Dead Load and L	ateral loads (D + W or E)	AXIAL LOADING
Actual Compressive Stress:	Fc = 14 psi	Live Load: PL = 0 plf *
Allowable Compressive Stress:	Fc' = 1254 psi	Dead Load: PD = 89 plf *
Eccentricity Moment (X-X Axis):	Mx-ex = 0 ft-lb	Total Axial Load: PT = 89 plf
Eccentricity Moment (Y-Y Axis):	My-ey = 0 ft-lb	* Load obtained from Load Tracker. See Summary Report for details.
Moment Due to Lateral Loads (X-X Axis):	Mx = 168 ft-lb	
Moment Due to Lateral Loads (Y-Y Axis):	My = 0 ft-lb	LATERAL LOADING (Dy Face)
Bending Stress Lateral Loads Only (X-X Axis)	: Fbx = 266 psi	Uniform Lateral Load: wL-Lat = 15 psf
Allowable Bending Stress (X-X Axis):	Fbx' = 2153 psi	
Bending Stress Lateral Loads Only (Y-Y Axis):	Fby = 0 psi	
Allowable Bending Stress (Y-Y Axis): Combined Stress Factor:	Fby' = 2153 psi	

**NOTES** 

Established Basic Permit #

<del>19-03646</del>

Location: JST2-2 Floor Joist [2015 International Building Code(2015 NDS)] SERIES 56 / 11.875 - Louisiana Pacific x 12.75 FT (11 + 1.8 ) @ 16 O.C. Section Adequate By: 22.4% Controlling Factor: End Reaction

1059 lb

2055 lb



Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct.

StruCalc Version 10.0.1.6

7/26/2019 3:54:58 PM

Controlling Factor: End Reaction	
DEFLECTIONS Center Right	LOADING DIAGRAM
Live Load 0.04 IN L/3469 0.02 IN 2L/2432	
Dead Load -0.01 in -0.01 in	
Total Load -0.04 IN L/3621 0.03 IN 2L/1564	
Live Load Deflection Criteria: L/480 Total Load Deflection Criteria:	L/360
REACTIONS A B	
Live Load 293 lb 961 lb	
Dead Load 41 lb 653 lb	
Total Load 334 lb 1614 lb	1
Uplift (1.5 F.S) -55 lb 0 lb	
Bearing Length 1.75 in 3.50 in	
Web Stiffeners Yes Yes	
SUPPORT LOADS A B	11 ft B 1.75 ft →
Live Load 220 plf 721 plf	
Dead Load 31 plf 490 plf	
Total Load 251 plf 1211 plf	JOIST DATA Center Right
I-JOIST PROPERTIES	Span Length 11 ft 1.75 ft
SERIES 56 / 11.875 - Louisiana Pacific	Unbraced Length-Top 0 ft 0 ft
Base Values Adjusted	Unbraced Length-Bottom 0 ft 0 ft
Moment Cap: Mcap = 10170 ft-lb Mcap' = 10170 ft-	U U U U U U U U U U U U U U U U U U U
Cd = 1.00	Floor Duration Factor 1.00
Shear Stress: Vcap = 2055 lb Vcap' = 2055 lb	
Cd = 1.00	JOIST LOADING
Reaction A: Rcap = 1700 lb Rcap' = 1700 lb	Uniform Floor Loading <u>Center</u> Right
Reaction B: Rcap = 1976 lb Rcap' = 1976 lb	Live Load LL = 40 psr 40 psr
E.I.: $EI = 668 \text{ lb-in} 2 \text{ EI}' = 668 \text{ lb}$	Dead Load DL = 15 pst 15 pst
	lotal Load IL = 55 pst 55 pst
Controlling Moment: -1667 ft-lb	TL Adj. For Joist Spacing wT = 73.3 plf 73.3 plf
11.0 Ft from left support of span 3 (Right Span)	Wall Loading
Created by combining all dead and live loads.	Wall One
Controlling Shear: 1059 lb	Live Load ( $\perp$ to Joists): L1 = 0 plf 369 plf
0.0 Ft from left support of span 3 (Right Span)	Dead Load ( $\perp$ to Joists)D1 = 0 plf 329 plf
Created by combining all dead and live loads.	Load Location X1 = 0 ft 1.67 ft
oreated by combining an dead and ive loads.	
Comparisons with required sections: Regid Pro	ovided
• • • – –	in2-lb xE6
Moment: -1667 ft-lb 10170	ft-Ib

Shear: NOTES

Established Basic Permit #

#### Project: 19-002c Framing David L. Starkel Location: JST2-1 Pacific Northwest Structural Group, Inc. Floor Joist 6193 NE Malbon Ct. [2015 International Building Code(2015 NDS)] Kingston, WA 98346 SERIES 18 / 11.875 - Louisiana Pacific x 10.83 FT @ 16 O.C. StruCalc Version 10.0.1.6 7/26/2019 3:54:59 PM Section Adequate By: 153.3% Controlling Factor: End Reaction LOADING DIAGRAM DEFLECTIONS <u>Center</u> Live Load 0.08 IN L/1606 Dead Load 0.03 in Total Load 0.11 IN L/1168 Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360 REACTIONS В <u>A</u> 289 lb Live Load 289 lb Dead Load 108 lb 108 lb Total Load 397 lb 397 lb Bearing Length 1.75 in 3.50 in Web Stiffeners Yes No SUPPORT LOADS В <u>A</u> 10.83 ft Live Load 217 plf 217 plf Á Ŕ Dead Load 81 plf 81 plf 298 plf 298 plf Total Load **I-JOIST PROPERTIES** JOIST DATA Center SERIES 18 / 11.875 - Louisiana Pacific Span Length 10.83 ft **Base Values Adjusted** Unbraced Length-Top 0 ft Moment Cap: Mcap = 3100 ft-lb Mcap' = 3100 ft-lb Unbraced Length-Bottom 0 ft Floor sheathing applied to top of joists-top of joists fully braced. Cd = 1.00Shear Stress: Vcap = 1335 lb Vcap' = 1335 lb Floor Duration Factor 1.00 Cd = 1.00JOIST LOADING Rcap = 1164 lb Rcap' = 1164 lb Reaction A: Uniform Floor Loading <u>Center</u> Reaction B: Rcap = 1006 lb Rcap' = 1006 lb Live Load LL = 40 psf E.I.: EI = 248 lb-in2 FI' = 248 lb-in2 DL = Dead Load 15 psf Total Load TL = 55 psf Controlling Moment: 1075 ft-lb TL Adj. For Joist Spacing wT = 73.3 plf 5.41 Ft from left support of span 3 (Right Span) Created by combining all dead and live loads. Controlling Shear: 397 lb 0.0 Ft from left support of span 2 (Center Span) Created by combining all dead and live loads. Comparisons with required sections: Req'd **Provided** FI 76 in2-lb E6 248 in2-lb xE6 Moment: 1075 ft-lb 3100 ft-lb 397 lb 1335 lb

Shear: NOTES

Established Basic Permit #

19-03646

Project: 19-002c Framing Location: JST2-3 Floor Joist [2015 International Building Code(2015 NDS)] SERIES 18 / 11.875 - Louisiana Pacific x 6.92 FT @ 16 O.C. Section Adequate By: 296.5% Controlling Factor: End Reaction	David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346 StruCalc Version 10.0.1.6 7/26/2019 3:54:59 PM
DEFLECTIONSCenterLive Load0.02IN L/4895Dead Load0.01inTotal Load0.02IN L/3560Live Load Deflection Criteria: L/480Total Load Deflection Criteria: L/360REACTIONSABLive Load185IbDead Load69IbTotal Load254IbDead Load254IbBearing Length1.75inWeb StiffenersYesNo	
SUPPORT LOADSABLive Load139plf139plfDead Load52plf52plfTotal Load191plf191plf	A 6.92 ft B
I-JOIST PROPERTIESSERIES 18 / 11.875 - Louisiana PacificBase ValuesAdjustedMoment Cap:Mcap = 3100 ft-lb $Cd = 1.00$ Mcap' = 3100 ft-lbShear Stress:Vcap = 1335 lbVcap' = 1335 lbVcap' = 1335 lb	JOIST DATA         Center           Span Length         6.92         ft           Unbraced Length-Top         0         ft           Unbraced Length-Bottom         0         ft           Floor sheathing applied to top of joists-top of joists fully braced.         Floor Duration Factor         1.00
Cd = 1.00Reaction A:Rcap = 1164 lbRcap' = 1164 lbReaction B:Rcap = 1006 lbRcap' = 1006 lbE.I.:EI = 248 lb-in2EI' = 248 lb-in2	JOIST LOADING         Uniform Floor Loading       Center         Live Load       LL =       40 psf         Dead Load       DL =       15 psf         Total Load       TL =       55 psf
Controlling Moment:439 ft-lb3.46 Ft from left support of span 3 (Right Span)Created by combining all dead and live loads.Controlling Shear:254 lb0.0 Ft from left support of span 2 (Center Span)Created by combining all dead and live loads.	TL Adj. For Joist Spacing wT = 73.3 plf
Comparisons with required sections:         Req'd         Provided           E.I.:         25 in2-lb E6         248 in2-lb xE6           Moment:         439 ft-lb         3100 ft-lb           Shear:         254 lb         1335 lb	

Established Basic Permit #

19-03646

#### Project: 19-002c Framing David L. Starkel Location: JST2-4 Pacific Northwest Structural Group, Inc. Floor Joist 6193 NE Malbon Ct. [2015 International Building Code(2015 NDS)] Kingston, WA 98346 SERIES 18 / 11.875 - Louisiana Pacific x 3.33 FT @ 16 O.C. StruCalc Version 10.0.1.6 7/26/2019 3:55:00 PM Section Adequate By: 723.9% Controlling Factor: End Reaction LOADING DIAGRAM DEFLECTIONS <u>Center</u> Live Load 0.00 IN L/MAX Dead Load 0.00 in Total Load 0.00 IN L/MAX Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360 REACTIONS В <u>A</u> 89 lb 89 lb Live Load Dead Load 33 lb 33 lb Total Load 122 lb 122 lb Bearing Length 1.75 in 3.50 in Web Stiffeners Yes No SUPPORT LOADS В <u>A</u> 3.33 ft Live Load 67 plf 67 plf Á Ŕ Dead Load 25 plf 25 plf Total Load 92 plf 92 plf **I-JOIST PROPERTIES** JOIST DATA Center SERIES 18 / 11.875 - Louisiana Pacific Span Length 3.33 ft **Base Values Adjusted** Unbraced Length-Top 0 ft Moment Cap: Mcap = 3100 ft-lb Mcap' = 3100 ft-lb Unbraced Length-Bottom 0 ft Floor sheathing applied to top of joists-top of joists fully braced. Cd = 1.00Shear Stress: Vcap = 1335 lb Vcap' = 1335 lb Floor Duration Factor 1.00 Cd = 1.00JOIST LOADING Rcap = 1164 lbRcap' = 1164 lb Reaction A: Uniform Floor Loading Center Reaction B: Rcap = 1006 lb Rcap' = 1006 lb Live Load LL = 40 psf E.I.: EI = 248 lb-in2 FI' = 248 lb-in2 DL = Dead Load 15 psf Total Load TL = 55 psf Controlling Moment: 102 ft-lb TL Adj. For Joist Spacing wT = 73.3 plf 1.66 Ft from left support of span 3 (Right Span) Created by combining all dead and live loads. Controlling Shear: -122 lb 3.0 Ft from left support of span 2 (Center Span) Created by combining all dead and live loads. Comparisons with required sections: Req'd Provided FI. 6 in2-lb E6 248 in2-lb xE6 Moment: 102 ft-lb 3100 ft-lb -122 lb 1335 lb Shear: NOTES

Established Basic Permit #

19-03646

Location: MLB2-1 GLB Multi-Loaded Multi-Span Beam [2015 International Building Code(2015 NDS)] 3.5 IN x 11.875 IN x 25.09 FT (12.4 + 12.7) 24F-V4 - Visually Graded Western Species - Dry Use Section Adequate By: 45.0% Controlling Factor: Moment



David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346 e of

StruCalc Version 10.0.1.6

7/26/2019 3:55:00 PM

Controlling Factor: Moment	
DEFLECTIONSCenterRightLive Load0.12IN L/12140.16IN L/925Dead Load0.01in0.05inTotal Load0.13IN L/11110.21IN L/717Live Load Deflection Criteria: L/360Total Load Deflection Criteria: L/240	
REACTIONS         A         B         C           Live Load         1551         lb         5055         lb         1971         lb           Dead Load         433         lb         1533         lb         711         lb           Total Load         1984         lb         6588         lb         2682         lb           Uplift (1.5 F.S)         -2         lb         0         lb         0         lb           Bearing Length         0.87         in         2.90         in         1.18         in	TR1 TR2 w
BEAM DATACenterRightSpan Length12.42 ft12.67 ftUnbraced Length-Top0 ft0 ftUnbraced Length-Bottom12.42 ft12.67 ftLive Load Duration Factor1.00	A         12.42 ft         B         12.67 ft         C           UNIFORM LOADS         Center*         Right*
Notch Depth     0.00	Uniform Live Load 67 plf 139 plf Uniform Dead Load 25 plf 52 plf
24F-V4 - Visually Graded Western Species         Base Values       Adjusted         Bending Stress:       Fb =       2400 psi       Controlled by:	Beam Self Weight 9 plf 9 plf Total Uniform Load 101 plf 200 plf * Load obtained from Load Tracker. See Summary Report for details.
Fb_cmpr = 1850 psi Connoned by. Fb_cmpr = 1850 psi Fb_cmpr' = 1783 psi Cd=1.00 Cl=0.96	
Shear Stress:         Fv =         265 psi         Fv' =         265 psi           Cd=1.00         Cd=	Left Live Load 217 plf 220 plf
Modulus of Elasticity: $E =$ 1800 ksi $E' =$ 1800 ksiComp. $\perp$ to Grain: $Fc - \perp =$ 650 psi $Fc - \perp' =$ 650 psi	Right Live Load217 plf220 plfRight Dead Load81 plf31 plf
Controlling Moment:-8428 ft-lbOver left support of span 3 (Right Span)Created by combining all dead loads and live loads on span(s) 2, 3Controlling Shear:3278 lb	Load Start0 ft4.92 ftLoad End4.92 ft12.42 ftLoad Length4.92 ft7.5 ftRIGHT SPANLoad NumberOne *
At a distance d from left support of span 3 (Right Span) Created by combining all dead loads and live loads on span(s) 2, 3	Left Live Load 220 plf 217 plf Left Dead Load 31 plf 81 plf
Comparisons with required sections:Req'dProvidedSection Modulus:56.73 in382.26 in3Area (Shear):18.56 in241.56 in2Moment of Inertia (deflection):190.18 in4488.41 in4Moment:-8428 ft-lb12221 ft-lb	Right Live Load       220 plf       217 plf         Right Dead Load       31 plf       81 plf         Load Start       0 ft       3.5 ft         Load End       3.5 ft       12.67 ft         Load Length       3.5 ft       9.17 ft         * Load obtained from Load Tracker. See Summary Report for details.
Shear:         3278 lb         7343 lb	

NOTES

# Established Basic Permit #

19-03646

Location: MLB2-1 LSL Multi-Loaded Multi-Span Beam [2015 International Building Code(2015 NDS)] 3.5 IN x 11.875 IN x 25.09 FT (12.4 + 12.7) LSL 2360 Fb-1.55E - Louisiana Pacific Section Adequate By: 75.7% Controlling Factor: Moment



David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346

StruCalc Version 10.0.1.6

7/26/2019 3:55:01 PM

Controlling Factor: Moment	
Dead Load 0.02 in 0.06 in	
Total Load 0.16 IN L/951 0.25 IN L/615	
Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240	
REACTIONS A B C	
Live Load 1551 lb 5055 lb 1971 lb	
Dead Load 448 lb 1582 lb 726 lb	
Total Load 1999 lb 6637 lb 2697 lb	TR1 TR2
Bearing Length 0.65 in 2.17 in 0.88 in	TR1 TR2
	w
BEAM DATA Center Right	
Span Length 12.42 ft 12.67 ft	
Unbraced Length-Top 0 ft 0 ft	A 12.42 ft B 12.67 ft C
Unbraced Length-Bottom 12.42 ft 12.67 ft	
Live Load Duration Factor 1.00	
Notch Depth 0.00	UNIFORM LOADS Center* Right*
MATERIAL PROPERTIES	Uniform Live Load 67 plf 139 plf
LSL 2360 Fb-1.55E - Louisiana Pacific	Uniform Dead Load 25 plf 52 plf
Base Values <u>Adjusted</u> Bonding Stross: Eb = 2360 psi Eb' = 2176 psi	
Bending Stress: Fb = 2360 psi Fb' = 2176 psi	
Cd=1.00 Cl=0.92 CF=1.00	* Load obtained from Load Tracker. See Summary Report for details.
Shear Stress: $Fv = 410 \text{ psi}$ $Fv' = 410 \text{ psi}$	TRAPEZOIDAL LOADS - CENTER SPAN
Cd=1.00	Load Number <u>One</u> * <u>Two</u> *
Modulus of Elasticity: E = 1550 ksi E' = 1550 ksi	Left Live Load 217 plf 220 plf
Comp. $\perp$ to Grain: Fc - $\perp$ = 875 psi Fc - $\perp$ = 875 psi	Left Dead Load 81 plf 31 plf
	Right Live Load 217 plf 220 plf
Controlling Moment: -8490 ft-lb	Right Dead Load 81 plf 31 plf
Over left support of span 3 (Right Span)	Load Start 0 ft 4.92 ft
Created by combining all dead loads and live loads on span(s) 2, 3	Load End 4.92 ft 12.42 ft
Controlling Shear: 3300 lb	Load Length 4.92 ft 7.5 ft
At a distance d from left support of span 3 (Right Span)	RIGHT SPAN
Created by combining all dead loads and live loads on span(s) 2, 3	Load Number <u>One</u> * <u>Two</u> *
	Left Live Load 220 plf 217 plf
Comparisons with required sections: <u>Req'd</u> <u>Provided</u>	Left Dead Load 31 plf 81 plf
Section Modulus: 46.83 in3 82.26 in3	Right Live Load 220 plf 217 plf
Area (Shear): 12.07 in2 41.56 in2	Right Dead Load 31 plf 81 plf
Moment of Inertia (deflection): 220.86 in4 488.41 in4	Load Start 0 ft 3.5 ft
Moment: -8490 ft-lb 14914 ft-lb	
Shear: 3300 lb 11360 lb	
	Load Length 3.5 ft 9.17 ft
NOTES	* Load obtained from Load Tracker. See Summary Report for details.
stablished Basic Permit #	
40.00040	
19-03646	
Permit Number	or: 20.04904

Location: FTG-PST-MLB2-1B Footing [2015 International Building Code(2015 NDS)] Footing Size: 2.0 FT x 2.0 FT x 10.00 IN Reinforcement: #4 Bars @ 8.00 IN. O.C. E/W / (3) min. Section Footing Design Adequate



David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346

StruCalc Version 10.0.1.6

7/26/2019 3:55:01 PM

Section Fooling Design Adequate			
FOOTING PROPERTIESAllowable Soil Bearing Pressure:Qs = 2500Qs = 2500Qs = 2500			LOADING DIAGRAM
Concrete Compressive Strength: F'c = 2500	•		
Reinforcing Steel Yield Strength: Fy = 60000	psi		
Concrete Reinforcement Cover: c = 3	in		
FOOTING SIZE			
	2 ft		
	2 ft		
5	0 in		
	5 in		
COLUMN AND BASEPLATE SIZE			
Column Type: Wood			
Column Width: $m = 3.5$ in			
Column Depth: $n = 3.5$ in			
FOOTING CALCULATIONS			⊢3.5 in —
Bearing Calculations:			
Ultimate Bearing Pressure:	Qu =	1652 psf	
Effective Allowable Soil Bearing Pressure:	Qe =	2375 psf	
Required Footing Area:	Areq =	2.78 sf	
Area Provided:	A = .	4.00 sf	
Baseplate Bearing:			10 in
Bearing Required:	Bear =	9953 lb	
Allowable Bearing:	Bear-A =	33841 lb	
Beam Shear Calculations (One Way Shear):			3 in
Beam Shear:	Vu1 =	2385 lb	
Allowable Beam Shear:	Vc1 =	11250 lb	
Punching Shear Calculations (Two Way Shear):			2 ft
Critical Perimeter:	Bo =	39 in	
Punching Shear:	Vu2 =	8310 lb	FOOTING LOADING
Allowable Punching Shear (ACI 11-35):	vc2-a =	54844 lb	Live Load: PL = 5055 lb *
Allowable Punching Shear (ACI 11-36):	vc2-b =	76875 lb	Dead Load: PD = 1554 lb *
Allowable Punching Shear (ACI 11-37):	vc2-c =	36563 lb	Total Load: PT = 6609 lb *
Controlling Allowable Punching Shear:	vc2 =	36563 lb	Ultimate Factored Load: Pu = 9953 lb
Bending Calculations:			Footing plus soil above footing weight: Wt = 322 lb
Factored Moment:	Mu =	29858 in-lb	* Load obtained from Load Tracker. See Summary Report for details.
Nominal Moment Strength:	Mn =	187693 in-lb	
Reinforcement Calculations:			
Concrete Compressive Block Depth:	a =	0.69 in	
Steel Required Based on Moment:	As(1) =	0.09 in2	
Min. Code Req'd Reinf. Shrink./Temp. (ACI-10.5.4	( )	0.43 in2	
Controlling Reinforcing Steel:	As-reqd =	0.43 in2	
	.0 in. o.c. e/\	w (3) Min.	
Reinforcement Area Provided:	As =	0.59 in2	
Development Length Calculations:			
Development Length Required:	Ld =	15 in	
Development Length Supplied:	Ld-sup =	9 in	
Note: Plain concrete adequate for bending,			
therefore adequate development length not require	ed.		

NOTES

Established Basic Permit #

<del>19-03646</del>

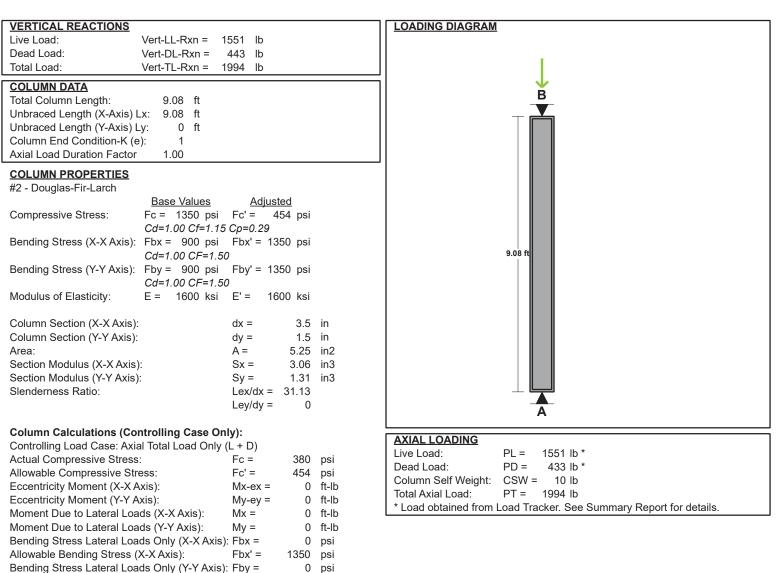
Location: PST-MLB2-1A Column [2015 International Building Code(2015 NDS)] 1.5 IN x 3.5 IN x 9.08 FT #2 - Douglas-Fir-Larch - Dry Use Section Adequate By: 16.4%



David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346

StruCalc Version 10.0.1.6

7/26/2019 3:55:02 PM



NOTES

Established Basic Permit #

Allowable Bending Stress (Y-Y Axis):

**Combined Stress Factor:** 

<u> 136</u>

0 psi

1350 psi

0.84

Fby' =

CSF =

Location: FTG-PST-MLB2-1A Footing

[2015 International Building Code(2015 NDS)] Footing Size: 1.0 FT x 1.0 FT x 10.00 IN

Reinforcement in Long Direction: #4 Bars @ 5.50 IN. O.C. / (2) min.

Reinforcement in Short Direction-center band (Equal to width of short side): #4 Bars @ 5.50 IN. O.C. / (2) min.

Reinforcement in Short Direction-outside bands: #4 Bars @ 0.00 IN. O.C. / ()

Each band. Section Footing Design Adequate



David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346

StruCalc Version 10.0.1.6

7/26/2019 3:55:02 PM

FOOTING PROPERTIES			LOADING DIAGRAM
ů – Č	)0 psf		
Concrete Compressive Strength: $F'c = 250$			
Reinforcing Steel Yield Strength: Fy = 6000			
Concrete Reinforcement Cover: c =	3 in		4 in
FOOTING SIZE			
Width: W =	1 ft		
Length: L =	1 ft		
Depth: Depth =	10 in		
Effective Depth to Top Layer of Steel: d = 6	.25 in		
COLUMN AND BASEPLATE SIZE			
Column Type: Other			
Column Width: m = 4 in			
Column Depth: n = 4 in			
FOOTING CALCULATIONS			
FOOTING CALCULATIONS			
Bearing Calculations:			10 in
Ultimate Bearing Pressure:	Qu =	1994 psf	
Effective Allowable Soil Bearing Pressure:	Qe =	2375 psf	
Required Footing Area:	Areg =	0.84 sf	
Area Provided:	A =	1.00 sf	
Baseplate Bearing:	7.	1.00 01	
Bearing Required:	Bear =	3013 lb	
Allowable Bearing:	Bear-A =	44200 lb	3 in
Beam Shear Calculations (One Way Shear):	Deal / (	44200 15	
Beam Shear:	Vu1 =	0 lb	
Allowable Beam Shear:	Vc1 =	5625 lb	
Punching Shear Calculations (Two Way Shear)		0020 10	1 ft
Critical Perimeter:	Bo =	41 in	
Punching Shear:	Vu2 =	815 lb	FOOTING LOADING
Allowable Punching Shear (ACI 11-35):	vc2-a =	57656 lb	Live Load: PL = 1551 lb *
Allowable Punching Shear (ACI 11-36):	vc2-b =	77813 lb	Dead Load: $PD = 443 \text{ lb}^*$
Allowable Punching Shear (ACI 11-37):	vc2-c =	38438 lb	Total Load: $PD = 443$ lb *
Controlling Allowable Punching Shear:	vc2-c =	38438 lb	Ultimate Factored Load: P1 = 1994 lb
Controlling Allowable Functing Sheat.	V02 -	00+00	
			5 5 5
			* Load obtained from Load Tracker. See Summary Report for details.

Short Direction:		
Bending Calculations:		
Factored Moment:	Mu =	4520 in-lb
Nominal Moment Strength:	Mn =	122682 in-lb
Reinforcement Calculations:		
Concrete Compressive Block Depth:	a =	0.92 in
Steel Required Based on Moment:	As(1) =	0.01 in2
Min. Code Req'd Reinf. Shrink./Temp. (ACI-10.5.4	): As(2) =	0.22 in2
Controlling Reinforcing Steel:	As-reqd =	0.22 in2
Selected Reinforcement: Short Dir: #4's	@ 5.5 in. o.	c.(2) Min.
Reinforcement Area Provided:	As =	0.39 in2
Development Length Calculations:		
Development Length Required:	Ld =	15 in
Development Length Supplied:	Ld-sup =	3 in
Established Basic Reprint #9.		
therefore adequate development length not require	be	

therefore adequate development length not required.



Long Direction: Bending Calculations:			
Factored Moment:	Mu =	4520	in-lb
Nominal Moment Strength:	Mn =	122739	in-lb
Reinforcement Calculations:			
Concrete Compressive Block Depth:	a =	0.92	in
Steel Required Based on Moment:	As(1) =	0.01	in2
Min. Code Req'd Reinf. Shrink./Temp. (ACI-10.5.4):	As(2) =	0.22	in2
Controlling Reinforcing Steel:	As-reqd =	0.22	in2
Selected Reinforcement: Long Dir: #4's @	5.5 in. o.c.(2	2) Min.	
Reinforcement Area Provided:	As =	0.39	in2
Development Length Calculations:			
Development Length Required:	Ld =	15	in
Development Length Supplied:	Ld-sup =	3	in



Location: WALL-1ST-1 Wall [2015 International Building Code(2015 NDS)] 1.5 IN x 5.5 IN x 8.08 FT @ 16 O.C. #2 - Douglas-Fir-Larch - Dry Use Section Adequate By: 87.5% Controlling Factor: Combined Stress Factor



David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346

StruCalc Version 10.0.1.6

7/26/2019 3:55:02 PM

DEFLECTIONS Deflection due to lateral loads only: Defl = 0.06 IN = U1633 Live Load Deflection Criteria: U180 Live Load: Vert.UL-Ron = 0 lb Dead Load: Vert.DL-Ron = 119 lb HORIZONTAL REACTIONS Total Load: Vert.DL-Ron = 119 lb HORIZONTAL REACTIONS Total Reaction at Bottom of Column: TL-Ron-Top = 83 lb Total Reaction at Bottom of Column: TL-Ron-Bottom = 83 lb Total Reaction at Bottom of Column: TL-Ron-Bottom = 83 lb Total Reaction at Bottom of Column: TL-Ron-Bottom = 83 lb Total Reaction at Bottom of Column: TL-Ron-Bottom = 83 lb Total Reaction at Bottom of Column: TL-Ron-Bottom = 83 lb Total Reaction at Bottom of Column: TL-Ron-Bottom = 83 lb Total Reaction at Bottom of Column: TL-Ron-Bottom = 83 lb Total Reaction at Bottom of Column: TL-Ron-Bottom = 83 lb Total Reaction at Bottom of Column: TL-Ron-Bottom = 83 lb Total Reaction at Bottom of Column: TL-Ron-Bottom = 83 lb Total Reaction at Bottom of Column: TL-Ron-Bottom = 83 lb Total Reaction at Bottom of Column: TL-Ron-Bottom = 83 lb Total Reaction at Bottom of Column: TL-Ron-Bottom = 83 lb Total Reaction at Bottom of Column: TL-Ron-Bottom = 83 lb Total Reaction at Bottom of Column: TL-Ron-Bottom = 83 lb Total Reaction at Bottom of Column: TL-Ron-Bottom = 83 lb Total Reaction at Bottom of Column: TL-Ron-Bottom = 83 lb Total Reaction at Bottom of Column: TL-Ron-Bottom = 83 lb Total Reaction Ator (MindSeismic) 1.60 TurberGoreristies Stress: Frie = 1254 ppi I Code Info Offer J Code -11 J Code Offer J Code -11 J Code J Code Info Offer J Code -11 J Code J Code Info Offer J J Code J Sode Stress Stud Section (V-X Axis): Sy = 2.06 in 3 Section Modulus (V-X Axis): Moves = 14 pi Allowable Compressive Stress: Frie = 14 pi Allowable Compressive Stress: Frie = 14 pi Allowable Compressive Stress: Frie = 14 pi Allowable Compre	Controlling Factor: Combined Stress Factor		
Lue Load Deflection Ciritaria: L180 <b>VERICAL REACTIONS</b> Live Load: Vert-LL-Ron = 0 b Dead Load: Vert-DL-Ron = 119 b <b>HORIZONTAL REACTIONS</b> Total Reaction at Top of Column: TL-Ron-Top = 83 b Total Reaction at Top of Column: TL-Ron-Roboton = 83 b <b>Total Reaction at Top of Column: TL-Ron-Roboton = 83 b</b> <b>Total Stude Indepth:</b> 8.08 ft Unbraced Length (V-Akis) Ly: 0 ft Axial Load Duration Factor 1.00 Laterat Load Duration Factor 1.00 Laterat Load Duration Factor 1.00 Estensive Stress: $Fc = 1380$ psi $Fc' = 1254$ psi $Cd' = 1252$ psi $Cd' = 1252$ psi $Cd' = 1252$ psi $Cd' = 150$ psi $Fd' = 0$ pti $Cd' = 0$ pti $Cd' = 0$ pti $Cd' = 0$ pti $Cd' = 100$ pc $Fd' = 0$ pti $Cd' = 100$ pti $Cd' = 0$ pti $Cd' = 100$ pti $Cd' = 100$ pti $Cd' = 0$ pti $Cd' = 100$		LOADING DIAGRAM	
WITICAL REACTIONS Live Load: Wert-UL-Rom = 119 ib Dead Load: Wert-UL-Rom = 119 ib HORIZONTAL REACTIONS Total Load: Wert-UL-Rom = 119 ib HORIZONTAL REACTIONS Total Reaction at Fop of Column: TL-Rom-Top = 83 ib Total Reaction at Fop of Column: TL-Rom-Top = 83 ib Total Reaction at Bottom of Column: TL-Rom-Top = 83 ib TL-Rom-Top = 1240 pail Columnation FactorTotal Stud Length: Unbraced Length (X-Aksi): Columnation Factor Columnation Factor (Wind/Seismic) 1.00 Lateral Load Cole F-1.30 cm 1.15 cm Cole f-1.60 Cf=1.30 cm 1.15 cm Cole f-1.60			
$ \frac{  v \in Load:}{  v \in Vert LL-Ron = 10 b}{  v \in Vert LL-Ron = 119 b} $ $ \frac{  v \in Load:}{  v \in Vert LL-Ron = 119 b} $ $ \frac{  v \in Load:}{  v \in Vert LL-Ron = 119 b} $ $ \frac{  v \in Load:}{  v \in Vert LL-Ron = 119 b} $ $ \frac{  v \in Load:}{  v \in Vert LL-Ron = 109 b} $ $ \frac{  v \in Load:}{  v \in Vert LL-Ron = 109 b} $ $ \frac{  v \in Load:}{  v \in Vert LL-Ron = 100 b} $ $ \frac{  v \in Load:}{  v \in Vert LL-Ron = 100 b} $ $ \frac{  v \in Load:}{  v \in Vert LL-Ron = 100 b} $ $ \frac{  v \in Load:}{  v \in Vert LL-Ron = 100 b} $ $ \frac{  v \in Load:}{  v \in Vert LL-Ron = 100 b} $ $ \frac{  v \in Load:}{  v \in Vert LL-Ron = 100 b} $ $ \frac{  v \in Load:}{  v \in Vert LL-Ron = 100 b} $ $ \frac{  v \in Load:}{  v \in Vert LL-Ron = 100 b} $ $ \frac{  v \in Load:}{  v \in Vert LL-Ron = 100 b} $ $ \frac{  v \in Load:}{  v \in Vert Hold = 100 b} $ $ \frac{  v \in Load:}{  v \in Vert Hold = 100 b} $ $ \frac{  v \in Load:}{  v \in Vert Hold = 100 b} $ $ \frac{  v \in Load:}{  v \in Vahis } $ $ \frac{  v \in Load:}{  v \in Vahis } $ $ \frac{  v \in Load:}{  v \in Vahis } $ $ \frac{  v \in Load:}{  v \in Vahis } $ $ \frac{  v \in Load:}{  v \in Vahis } $ $ \frac{  v \in Load:}{  v \in Vahis } $ $ \frac{  v \in Load:}{  v \in Vahis } $ $ \frac{  v \in Load:}{  v \in Vahis } $ $ \frac{  v = Load:}{  v \in Vahis } $ $ \frac{  v = Load:}{  v \in Vahis } $ $ \frac{  v = Load:}{  v = Load:} $ $ \frac{  v \in Load:}{  v = Load:} $ $ \frac{  v \in Load:}{  v = Load:} $ $ \frac{  v \in Load:}{  v = Load:} $ $ \frac{  v = Load:}{  v = Load:} $ $ \frac$	Live Load Deflection Criteria: L/180		
$ \frac{  v \in Load:}{  v \in Vert LL-Ron = 10 b}{  v \in Vert LL-Ron = 119 b} $ $ \frac{  v \in Load:}{  v \in Vert LL-Ron = 119 b} $ $ \frac{  v \in Load:}{  v \in Vert LL-Ron = 119 b} $ $ \frac{  v \in Load:}{  v \in Vert LL-Ron = 119 b} $ $ \frac{  v \in Load:}{  v \in Vert LL-Ron = 109 b} $ $ \frac{  v \in Load:}{  v \in Vert LL-Ron = 109 b} $ $ \frac{  v \in Load:}{  v \in Vert LL-Ron = 100 b} $ $ \frac{  v \in Load:}{  v \in Vert LL-Ron = 100 b} $ $ \frac{  v \in Load:}{  v \in Vert LL-Ron = 100 b} $ $ \frac{  v \in Load:}{  v \in Vert LL-Ron = 100 b} $ $ \frac{  v \in Load:}{  v \in Vert LL-Ron = 100 b} $ $ \frac{  v \in Load:}{  v \in Vert LL-Ron = 100 b} $ $ \frac{  v \in Load:}{  v \in Vert LL-Ron = 100 b} $ $ \frac{  v \in Load:}{  v \in Vert LL-Ron = 100 b} $ $ \frac{  v \in Load:}{  v \in Vert LL-Ron = 100 b} $ $ \frac{  v \in Load:}{  v \in Vert Hold = 100 b} $ $ \frac{  v \in Load:}{  v \in Vert Hold = 100 b} $ $ \frac{  v \in Load:}{  v \in Vert Hold = 100 b} $ $ \frac{  v \in Load:}{  v \in Vahis } $ $ \frac{  v \in Load:}{  v \in Vahis } $ $ \frac{  v \in Load:}{  v \in Vahis } $ $ \frac{  v \in Load:}{  v \in Vahis } $ $ \frac{  v \in Load:}{  v \in Vahis } $ $ \frac{  v \in Load:}{  v \in Vahis } $ $ \frac{  v \in Load:}{  v \in Vahis } $ $ \frac{  v \in Load:}{  v \in Vahis } $ $ \frac{  v = Load:}{  v \in Vahis } $ $ \frac{  v = Load:}{  v \in Vahis } $ $ \frac{  v = Load:}{  v = Load:} $ $ \frac{  v \in Load:}{  v = Load:} $ $ \frac{  v \in Load:}{  v = Load:} $ $ \frac{  v \in Load:}{  v = Load:} $ $ \frac{  v = Load:}{  v = Load:} $ $ \frac$	VERTICAL REACTIONS		
Dead Load: VertU-Rxn = 119 ib HORIZONTAL REACTIONS Total Reaction at Top of Column: TL-Rxn-Top = 83 ib Total Reaction at Top of Column: TL-Rxn-Top = 83 ib Total Reaction at Top of Column: TL-Rxn-Top = 83 ib Total Reaction at Top of Column: TL-Rxn-Top = 83 ib Total Reaction at Dottom of Column: TL-Rxn-Top = 83 ib Total Reaction at Dottom of Column: TL-Rxn-Top = 83 ib Total Reaction at Dottom of Column: TL-Rxn-Top = 83 ib Total Reaction (Y-Axis) Lx: 8.08 ft Unbraced Length (Y-Axis) Ly: 0 of t Stud I Cand Duration Factor (Wind/Seismic) 1.00 Lateral Load Duration Factor (Wind/Seismic) 1.00 Lateral Load Duration Factor (Wind/Seismic) 1.00 Lateral Load Duration Factor (Wind/Seismic) 1.00 Eating Stress (Y-Y Axis): $Fx = 900$ pai $Fx^2 = 1254$ pai Cd = 1.60 $Ch = 1.00$ $ch = 1.5$ jn Stud Section (X-X Axis): $Cd = 1.60$ $ch = 1.5$ jn Stud Section Modulus (X-XAxis): $dx = 5.5$ in Stud Section Modulus (X-XAxis): $dx = 5.5$ in Stud Section Modulus (X-XAxis): $dx = 5.5$ in Stud Section Modulus (X-XAxis): $dx = 5.5$ in Stenderness Ratio: Lex/dx = 17.63 Ley/dy = 0 Stud Calculations (Controlling Case Only): Controlling Load Case: Axial Dacad Load and Lateral loads (D + W or E): Allowable Compressive Stress: $Fc^{-1} = 1254$ pai Controlling Load Case: Axial Dacad Load and Lateral loads (D + W or E): Actual Compressive Stress: $Fc^{-1} = 1254$ pai Controlling Load Case: Axial Dacad Load and Lateral loads (D + W or E): Allowable Compressive Stress: $Fc^{-1} = 1254$ pai Eccentricity Moment (Y-Y Axis): $Mx = 0$ ft Hub Bending Stress (X-XAxis): $Fx^{-2} = 266$ pai Allowable Compressive Stress: $Fc^{-1} = 1254$ pai Eccentricity Moment (Y-Y Axis): $Mx = 0$ ft Hub Bending Stress (X-XAxis): $Fx^{-2} = 266$ pai Allowable Bord Data Loads nuclear Active: $Ee$ Summary Report for details. LTERAL LOADING (Dy Face) Unform Lateral Load: W-Lat = 15 paf Hord Middle Floor Hub Right Loads (D) (Y-XAxis): $Fx^{-2} = 266$ pai Bending Stress (X-XAxis): $Fx^{-2} = 266$ pai Bending Stress (X-XAxis): $Fx^{-2} = $			
Total Load: Vert-TL-Ron = 119 lb HORZONTAL REACTIONS Total Reaction at Bottom of Column: TL-Ron-Top = 83 lb Total Reaction at Bottom of Column: TL-Ron-Top = 83 lb Total Reaction at Bottom of Column: TL-Ron-Bottom = 83 lb WALL DATA Total Stud Length: 6.08 ft Wall Dead Weight: 111 psf Unbraced Length (X-Avis) Ly: 0 ft Axial Load Duration Factor (Wind/Selismic) 1.60 Lateral Load Duration Factor (Wind/Selismic) 1.60 Lateral Load Duration Factor (Mind/Selismic) 1.60 Estud Fact Condition-K (e): 1 Axial Load Duration Factor (Wind/Selismic) 1.60 Estud Fact Condition-K (e): 6.7 + 1254 psi Cd-1.60 CF+1.10 C=1.15 Cd-1.51 Spi Cd-1.60 CF+1.01 C=1.15 Spi Cd-1.60 CF+1.01 C=1.15 Spi Cd-1.60 CF+1.01 C=1.15 Spi Actual Compressive Stress: Fc = 1600 ksi Stud Section (X-X Avis): bx = 900 pai Fby' = 2153 psi Cd-1.60 CF+1.01 C=1.15 Spi Stud Section (X-X Avis): bx = 800 pai Fby' = 2153 psi Cd-1.60 CF+1.01 C=1.15 Spi Acra: A = 8.25 in 2 Section Modulus (X-X Avis): bx = 4.82 Spi in 2 Area: A = 8.25 in 2 Section Modulus (X-X Avis): bx = 7.56 in 3 Section Modulus (X-X Avis): bx = 7.56 in 3 Levidy = 0 Stud Calculations (Controlling Case Only): Controlling Load Case: Avial Dead Load and Lateral loads (0 + W or E); Alcular Compressive Stress: Fc = 114 psi Alcular Compressive Stress: Fc = 11254 psi Caenticidy Moment (X-X Avis): Mx = 0 ft-40 Dead Load: D1 = 15 psf TA = 0 ft Middle Floor Height: 0 ft Calculated Load: LL = 0 plf t DL = 15 psf TA = 0 ft Middle Floor Height: 0 ft Calculated Load: LL = 0 plf t DL = 88.9 plf Total Avial Load Tracker: See Summary Report for details. Lateral Load in (D2 Face) Line Load Tracker: PD = 89 plf * Total Avial Load (ST Avis); Mx = 266 psi Allowable Borning Stress (X-X Avis); Mx = 266 psi Allowable Compressive Stress: Fc = 1254 psi Bending Stress (X-X Avis); Mx = 266 psi Allowable Compressive Stress: Fc = 1254 psi Bending Stress (X-X Avis); Mx = 266 psi Bending Stress (X-X Avis); Mx = 266 psi Bending Stress (X-X Avis); Mx = 266 psi Bending Stress (X-X Avis);	Dead Load: Vert-DL-Rxn = 119 lb	В	
UNIX CONTAL REACTIONSTotal Reaction at Top of Column:TL-Rxn-Top =83 ibTotal Reaction at Bottom of Column:TL-Rxn-Bottom =83 ibMALL DATTotal Stud Length:8.08 ftTotal Reaction at Bottom of Column:TL-Rxn-Bottom =83 ibWall Dead Weight:11 psfUnbraced Length (X-Axis) Lx:8.08 ftUnbraced Length (X-Axis) Ly:0 ftStud End Condition-K (e):1Axial Load Duration Factor (Wind/Seismic)1.60Lateral Load Duration Factor (Wind/Seismic)1.60STUP POPERTIES $R^2$ - Douglas-FirLanchCompressive Stress:Fc =Caf-160 CF=1.30 Cr=1.75 Gr=1.05Modulus of Elasticity:E =Ease Value:A =Caf-160 CF=1.30 Cr=1.75 Gr=1.75Modulus of Elasticity:E =Stud Section (Y-X Axis):Sx =Area:A =Stud Section (Y-X Axis):Sx =Area:Levdx =Controlling Load Case: Axial Dead Load and Lateral loads (D + W or E)Area:Levdx =Area:Levdx =Controlling Load Case: Axial Dead Load and Lateral loads (D + W or E)Activad Compressive Stress:Fc =Controlling Load Case: Axial Dead Load and Lateral loads (D + W or E)Activad Load Compressive Stress:Fc =Controlling Load Case: Axial Dead Load and Lateral loads (D + W or E)Atlawable Compressive Stress:Fc =Controlling Load Case: Axial Dead Load and Lateral loads (D + W or E)Atlawable Controlling Stres			
Total Reaction at Top of Column: TL-Rxn-Top = 83 ib Total Reaction at Top of Column: TL-Rxn-Bottom = 83 ib MALL DATA Total Stud Length: 6.08 ft Unbraced Length (X-Axis) L: 8.08 ft Linear al Load Duration Factor 1.00 Lateral Laad Duration Factor (Wind/Seismic) 1.60 STUD PROPERTIES #2 - Douglas-Fir-Larch Compressive Stress: $Fc = 1350$ pis $Fbx' = 2153$ pis $Cd = 160 \ Cf = 1.00 \ Cf = 1.02 \ Cf = 1.02 \ Cf = 1.00 \ Ksi$ Stud Section (X-X Axis): $bx = 800 \ pis \ Fby' = 2153 \ pis \ Cd = 1.60 \ Cf = 1.00 \ Ksi$ Stud Section (X-X Axis): $bx = 8.25 \ in 3 Stud Section (X-X Axis): bx = 7.56 \ in 3 Section Modulus (X-X Axis): bx = 7.56 \ in 3 Section Modulus (X-X Axis): bx = 7.56 \ in 3 Section Modulus (X-X Axis): bx = 7.66 \ in 3 Section Modulus (X-X Axis): bx = 7.66 \ in 3 Section Modulus (Y-Y Axis): by = 2.06 \ in 3 Section Modulus (Y-Y Axis): by = 2.06 \ in 3 Section Modulus (Y-Y Axis): bx = 7.66 \ in 3 Section Modu$			
Total Reaction at Bottom of Column: TL-Rxn-Bottom = 83 lbWALL DATATotal Stud Length: $0.8$ ftWall Length: $1.1$ psfWall Length: $1.1$ psfUnbraced Length (X-Axis) Ly: $0.0$ ftStud End Condition-K (e): $1$ Axial Load Duration Factor (Wind/Seismic)Compressive Stress: $Fc = 1350$ paiControl CP-1.10 CP=0.53Bending Stress (X-X Axis):Cd=1.60 CF=1.30 Cr=1.15 C I=1.00Cd=1.60 CF=1.30 Cr=1.15 C I=1.00Bending Stress (X-X Axis):Cd=1.60 CF=1.30 Cr=1.15 C I=1.00Stud Section (X-X Axis):X = 2.56 InCd=1.60 CF=1.30 Cr=1.15 C I=1.00Stud Section (X-X Axis):X = 2.56 InCd=1.60 CF=1.30 Cr=1.15 C I=1.00Stud Section (X-X Axis):X = 2.56 InCd=1.60 CF=1.30 Cr=1.15 C I=1.00Stud Section (X-X Axis):X = 2.56 InCd=1.60 CF=1.30 Cr=1.16 C IECd=1.60 Cks:Stud Section Modulus (Y-X Axis):X = 2.56 InStud Section Modulus (Y-X Axis): <td c<="" td=""><td>HORIZONTAL REACTIONS</td><td></td></td>	<td>HORIZONTAL REACTIONS</td> <td></td>	HORIZONTAL REACTIONS	
WALL DATA Total Stud Length:3.08 ftTotal Stud Length:3.08 ftWall Dead Weight:11 psfUnbraced Length (Y-Axis) Lx:8.08 ftUnbraced Length (Y-Axis) Ly:0 ftStud End Condition-K (e):1Axial Load Duration Factor1.00Lateral Load Duration Factor1.00Lateral Load Duration Factor (Wind/Seismic)1.60STUD PROPERTIES $Cd=1.60 CF=1.30 Cr=1.15 Cl=1.00$ Bending Stress (X-X Axis):Fbx = 900 psiCd=1.60 CF=1.30 Cr=1.15 Cl=1.00Bending Stress (Y-Y Axis):bfx = 155 psi Cd=1.60 CF=1.30 Cr=1.15 Cl=1.00Stud Section (X-X Axis):Cd=1.60 CF=1.30 Cr=1.15 cl=1.00Stud Section Modulus (X-X Axis):dx = 5.5 in Secton Modulus (X-X Axis):Stud Section Modulus (X-X Axis):dx = 5.5 in Lex/dx = 17.63 Ley/dy = 0Stud Gaction (Y-Y Axis):dx = 5.5 in Secton Modulus (X-X Axis):Stud Section Modulus (X-X Axis):dx = 5.5 in Secton Modulus (X-X Axis):Stud Gacton Modulus (X-X Axis):dx = 5.5 in Ley/dy = 0Stud Gacton Modulus (X-X Axis):dx = 5.5 in Ley/dy = 0Stud Gacton Modulus (X-X Axis):ft = 1600 ftDead Load Tributary WidthControlling Load Case-Axial Dead Load and Lateral loads (D+W or E) Lateral Load (C+Y Axis):Stud Calculations (Controlling Case Ont):Controlling Load Case-Axial Dead Load (D+W or E) Lateral Load: (C+Y Axis):Mixed Le FloorLive LoadStud Section (X-X Axis):More Load Load (Y-Y Axis):Mixed Le FloorLi	Total Reaction at Top of Column: TL-Rxn-Top = 83 lb		
Total Stud Length: 8.08 ft Wall Dead Weight: 11 per Unbraced Length (X-Axis) Lx: 8.08 ft Unbraced Length (X-Axis) Lx: 8.08 ft Axial Load Duration Factor 1.00 <b>STUD PROPERTIES</b> #2-Douglas-Fir-Larch Compressive Stress: $Fc = 1350 \text{ psi} = fc' = 1254 \text{ psi} = Cd=1.60 \text{ CF}=1.30 \text{ CF}=1.30 \text{ CF}=1.50 \text$	Total Reaction at Bottom of Column: TL-Rxn-Bottom = 83 lb		
Total Stud Length: 8.08 ft Wall Dead Weight: 11 per Unbraced Length (Y-Axis) Lx: 8.08 ft Unbraced Length (Y-Axis) Ly: 0 ft Stud End Conflom-K (e): 1 Axial Load Duration Factor 1.00 <b>STUD PROPERTIES</b> #2 - Douglas-Fir-Larch Compressive Stress: $Fc = 1350$ psi $Fc' = 1254$ psi Cd = 1.60 CF = 1.30 Cr = 1.50 Cr = 1.50 Bending Stress (Y-Y Axis): Fby = 900 psi Fby = 2153 psi Cd = 1.60 CF = 1.30 Cr = 1.50 Cr = 1.50 Bending Stress (Y-Y Axis): $dy = 1.5$ in Stud Section (Y-Y Axis): $dy = 1.5$ in Section Modulus (Y-X Axis): $Sx = 7.56$ in3 Section Modulus (Y-X Axis): $Sx = 7.56$ in3 Section Modulus (Y-X Axis): $Sy = 2.06$ in3 Section Modulus (Y-X Axis): $Sy = 2.06$ in3 Ley/dy = 0 <b>Stud Calculations (Controlling Case Only</b> : Controlling Load Case: Axial Dead Load and Lateral loads (D + W or E) Allowable Bending Stress (Y-X Axis): $Mx = x$ 0 ft-lb Bending Stress: $Fc = 14$ psi Allowable Bending Stress (X-X Axis): $Mx = x$ 0 ft-lb Bending Stress (X-X Axis): $Mx = x$ 168 ft-lb Moment (Ux - Kaxis): $Mx = x$ 168 ft-lb Moment (Ux - Kaxis): $Mx = x$ 266 psi Allowable Bending Stress (X-X Axis): $Fbx' = 2153$ psi Bending Stress (X-X Axis): $Fbx' = 21$			
Wall bead Weight: 11 per Unbraced Length (V-Axis) Lx: 8.08 ft Unbraced Length (V-Axis) Ly: 0 ft Stud End Condition-K (e): 1 Axial Load Duration Factor 1.00 Lateral Load Duration Factor (Wind/Seismic) 1.60 STUP PROPERTIES #2 - Douglas-Fi-Larch Carls 0 CF - 1.30 pF fc' = 1254 psi Cd = 1.60 CF - 1.70 Cp = 0.53 Bending Stress (X-X Axis): Fbx = 900 psi Fbc' = 2153 psi Cd = 1.60 CF - 1.70 Cp = 0.53 CF - 1.70 CF - 1.70 Cp = 0.53 CF - 1.70 CF - 1.70 CF - 1.75 CF - 1.70 CF - 1.75 CF - 1.70 CF - 1.75			
Unbraced Length (X-Axis) Lx: 8.08 ft Unbraced Length (X-Axis) Lx: 0 ft Stud End Condition-K (e): 1 Axial Load Duration Factor 1.00 Lateral Load Duration Factor 1.00 Lateral Load Duration Factor (Wind/Seismic) 1.60 STUD PROPERTIES #2 - Douglas-Fir-Larch Compressive Stress: $Fc = 1350 \text{ psi}$ $Fc^{1} = 1254 \text{ psi}$ $Cd = 1.60 CF = 1.30 Cr = 1.15 CI = 1.00 \text{ psi}$ $Fbx^{2} = 2153 \text{ psi}$ $Cd = 1.60 CF = 1.30 Cr = 1.15 CI = 1.00 \text{ psi}$ $Fbx^{2} = 2153 \text{ psi}$ $Cd = 1.60 CF = 1.30 Cr = 1.15 CI = 1.00 \text{ psi}$ $Fbx^{2} = 2153 \text{ psi}$ $Cd = 1.60 CF = 1.30 Cr = 1.15 CI = 1.00 \text{ psi}$ $Fbx^{2} = 2153 \text{ psi}$ Cd = 1.60 CF = 1.30 Cr = 1.15  psi $Cd = 1.600  ksiStud Section (X-X Axis): X = 8.25 \text{ in 2}Section Modulus (X-X Axis): Sx = 7.56 \text{ in 3}Section Modulus (X-X Axis): Sy = 2.06 \text{ in 3}Section Modulus (X-X Axis): Sy = 2.06 \text{ in 3}Section Modulus (X-X Axis): Sy = 2.06 \text{ in 3}Ley/dy = 0Stud Calculations (Controlling Case Only):Controlling Load Case: Axial Dead Load and Lateral loads (D + W or E)Alcuad Compressive Stress: Fc^{-1} = 1254 \text{ psi}Eccentricity Moment (X-X Axis): Mx = x = 0 ft-lbMiddle Floor Height: 0 ftCalculated Load: LL = 0 pif DL = 15 psf TA = 0 ftMiddle Floor Height: 0 ftCalculated Load: LL = 0 pif DL = 15 psf TA = 0 ftMiddle Floor Height: 0 ftCalculated Load: LL = 0 pif DL = 8.9 pif* Load Obtained from Load Tracker: See Summary Report for details.HartERAL LOADINGLive Load: PL = 0 pif + Dead Load: PL = 0 pif + Dead Load: PL = 0 pif + Dead Load: WL = 15 psf TA = 0 ft the Dead Load: (PL = 0 pif + Dead Load: CI = 10 pif DL = 15 psf TA = 0 ft the Dead Load: (PL = 0 pif + Dead Load: CI = 10 psf DL = 15 psf TA = 0 ft the Dead Load: (PL = 0 pif + Dead Load: PL = 0 pif + Dead Load: (PL = 0 pif + Dead Load: PL = 0 pif + Dead Load: (PL = 0 pif + Dead Load: PL = 0 pif + Dead Load: PL = 0 pif + Dead Load: PL =$	5		
Unbraced Length (Y-Axis) Ly: 0 ft Stud End Condition-K (e): 1 Axial Load Duration Factor (Wind/Seismic) 1.60 <b>STUD PROPERTIES</b> <b>#2</b> - Douglas-Fir-Larch Compressive Stress: Fc = 1350 psi Fc' = 1254 psi Cd=1.60 CF=1.30 Cr=1.15 Cl=1.00 Bending Stress (X-X Axis): Fbx = 900 psi Fby' = 2153 psi Cd=1.60 CF=1.30 Cr=1.15 Cl=1.00 Bending Stress (X-X Axis): $dx = 5.5$ in Stud Section (X-X Axis): $dx = 5.5$ in Stud Section Modulus (Y-X Axis): $dx = 1.5$ in Section Modulus (Y-X Axis): $Sx = 7.56$ in Area: Lev/dx = 17.63 Lev/dy = 0 <b>Stud Calculations (Controlling Case Only):</b> Controlling Load Case: Axial Dead Ladard Lateral loads (D + W or E) Actual Compressive Stress: Fc' = 1254 psi Eccentricity Moment (X-X Axis): Mx-ex = 0 ft-lb Bending Stress (X-X Axis): Mx-ex = 0 ft-lb Middle Floor Height: 0 ft <b>Calculated Load</b> : LL = 0 pif <b>DL</b> = 88.9 pif * Total Axial Load Cmy (X-X Axis): Mx = 86 ft-lb Moment Due to Lateral Loads (NT (X-X Axis): My = 0 ft-lb Bending Stress (X-X Axis): Fby' = 2153 psi Allowable Bending Stress (Y-X Axis): Fby' = 2153 psi Bending Stress (Y-X Axis): Fby' = 2153 psi Ben	, , , , , , , , , , , , , , , , , , ,		
Stud End Condition-K (e):1Axial Load Duration Factor1.00Lateral Load Duration Factor (Wind/Seismic)1.60STUD PROPERTIES#2 - Douglas-Fir-LarchCompressive Stress:Fc = 1350 psi $Cd = 1.60 C+1.10 Cp = 0.53$ Bending Stress (X-X Axis):Fbx = 900 psiFby = 900 psiFby' = 2153 psi $Cd = 1.60 CF = 1.30 Cr = 1.15 Cl = 1.00$ Bending Stress (Y-X Axis):fby = 900 psiStud Section (Y-X Axis):dx = 5.5 inStud Section (Y-X Axis):dx = 5.5 inStud Section (Y-X Axis):fb = 1.5 inArea:A = 8.25 inSecton Modulus (X-X Axis):Sy = 7.56 inSecton Modulus (Y-Y Axis):Sy = 2.06 inSecton Modulus (Y-Y Axis):My = 0Controlling Load Case: Axial Dead Load and Lateral loads (D + W or E)Actual Compressive Stress:Fc = 14 psiControlling Load Case: Axial Dead Load of Lateral loads (D + W or E)Actual Compressive Stress:Fc = 14 psiEccentricity Moment (X-X Axis):My = 0Roment Due to Lateral Loads (Y-Y Axis):My = 0Moment Due to Lateral Loads (Y-Y Axis):My = 0Moment Due to Lateral Loads (Y-Y Axis):My = 0Moment Due to Lateral Loads (Y-Y			
Controlling Conserved Stress:Image: Stress Stress:For a 1350 psi Fc' = 1254 psi Cd=1.60 Cf=1.10 Cp=0.53Stud Section (X-X Axis):Example Compressive Stress:For a 1350 psi Fc' = 1254 psi Cd=1.60 Cf=1.30 Cp=1.75 Cf=1.00Modulus of Elasticity:Example Colspan="2">Example Colspan="2">Stud Section (X-X Axis):For a 14 psi Leydy = 0Stud Section (X-X Axis):Stud Section Modulus (X-Y Axis):Stud Section Modulus (X-Y Axis):Stud Section Modulus (X-Y Axis):Stud Section Modulus (X-Y Axis):Stud Calculations (Controlling Case Only):Controlling Load Case: Axial Dead Load and Lateral loads (D + W or E) Actual Compressive Stress:For a 14 psi Lieydy = 0Allowable Compressive Stress:For a 14 psi Lieydy = 0Modulus (X-X Axis):M× ex = 0 ft/bModulus Compressive Stress:For a 14 psi Lieydy = 0Allowable Compressive Stress:For a 14 psi Lieydy = 0Controlling Load (X-X Axis):M× ex = 0 ft/bModulus (X-X Axis):M× ex = 0 ft/bModulus Compressive Stress:For a 14 psi Live Load:Diff DL = 0 p		8.08 ft	
Lateral Load Duration Factor (Wind/Seismic) 1.60 <b>STUD PROPERTIES</b> #2 - Douglas-Fir-Larch Compressive Stress: $Fc = 1350 \text{ psi} Fc' = 1254 \text{ psi}$ Cd = 1.60 CF = 1.30 Cp = 1.75 Cl = 1.00 Bending Stress (X-X Axis): Fbx = 900 psi Fbx' = 2153 psi Cd = 1.60 CF = 1.30 Cr = 1.15 Cl = 1.00 Bending Stress (Y-Y Axis): $dx = 5.5$ in Stud Section (X-X Axis): $dx = 5.5$ in Stud Section (X-X Axis): $dx = 5.5$ in Stud Section (Y-Y Axis): $dx = 5.5$ in Sector Modulus (X-X Axis): $Sx = 7.56$ in 3 Section Modulus (Y-Y Axis): $Sy = 2.06$ in 3 Section Modulus (Y-Y Axis): $Sy = 2.06$ in 3 Sector Modulus (Y-Y Axis): $Mx = 7.66$ in 4 Hiddle Floor: $LL = 40 \text{ pf}$ DL = 15 psf TA = 0 ft Middle Floor: $LL = 0 \text{ pf}$ DL = 15 psf TA = 0 ft Middle Floor: $LL = 0 \text{ pf}$ DL = 88.9 plf <b>AXIAL LOADING</b> Live Load: $PL = 0 \text{ pf}^+$ Dead Load: $PL = 0 \text{ pf}^+$ Cacluated Loads (Y-Y Axis): $Mx = 168$ ft.b Moment Due to Lateral Loads (Y-Y Axis): $My = 0$ ft.b Moment Due to Lateral Loads (Y-Y Axis): $My = 0$ ft.b Moment Due to Lateral Loads (Y-Y Axis): $My = 0$ ft.b Moment Due to Lateral Loads (Y-Y Axis): $Fby = 2.153$ psi Bending Stress Lateral Loads Only (Y-Y Axis): $Fby = 2.153$ psi Bending Stress (Y-Y Axis): $Fby = 2.153$ psi Bending Stress (Y-Y Axis): $Fby = 2.153$ psi Bending Stress (Y-Y Axis): $Fby = 2.153$ psi			
STUD PROPERTIES#2 - Douglas-Fir-LarchCompressive Stress: $Fc = 1350 \text{ psi}$ $Cd = 1.60 CF = 1.30 \text{ psi}$ $Fc' = 1254 \text{ psi}$ $Cd = 1.60 CF = 1.30 \text{ Cr} = 1.15 \text{ Cl} = 1.00$ Bending Stress (X-X Axis): $Fbx = 900 \text{ psi}$ $Fbx' = 2153 \text{ psi}$ $Cd = 1.60 CF = 1.30 \text{ Cr} = 1.15 \text{ Cl} = 1.00$ Bending Stress (Y-Y Axis): $Fby' = 2153 \text{ psi}$ $Cd = 1.60 CF = 1.30 \text{ Cr} = 1.15 \text{ cl}$ Modulus of Elasticity: $E = 1600 \text{ ksi}$ Stud Section (Y-Y Axis): $dy = 1.5 \text{ in}$ Area: $A = 8.25 \text{ in2}$ Section Modulus (X-X Axis): $Sx = 7.56 \text{ in3}$ Section Modulus (Y-Y Axis): $Sy = 2.06 \text{ in3}$ Ley/dy = 0 $Ley/dy = 0$ Stud Calculations (Controlling Case Only):Controlling Load Case: Axial Dead Load and Lateral loads (D + W or E)Actual Compressive Stress: $Fc = 11254 \text{ psi}$ Eccentricity Moment (Y-X Axis): $Mx = x = 0 \text{ ft-lb}$ Eccentricity Moment (Y-X Axis): $Mx = x = 0 \text{ ft-lb}$ Moment Due to Lateral Loads (X-X Axis): $Mx = 168 \text{ ft-lb}$ Moment Due to Lateral Loads (X-X Axis): $Mx = 168 \text{ ft-lb}$ Moment Due to Lateral Loads (Nt/ X-X Axis): $Mx = 168 \text{ ft-lb}$ Moment Due to Lateral Loads (Nt/ X-X Axis): $Mx = 168 \text{ ft-lb}$ Moment Due to Lateral Loads (Nt/ X-X Axis): $My = 0 \text{ ft-lb}$ Bending Stress Lateral Loads (Nt/ (Y-X Axis): $My = 0 \text{ ft-lb}$ Allowable Bending Stress (X-X Axis): $Fbx' = 2153 \text{ psi}$ Allowable Bending Stress (X-X Axis): $Fbx'$			
#2 - Douglas-Fir-LarchCompressive Stress:Base Values $Cc = 1.350$ psi $Cc = 1.60$ CF-1.10 Cg=0.53Bending Stress (X-X Axis):Fbx = 900 psi $Cd = 1.60$ CF=1.30 Cr=1.15 CI=1.00Bending Stress (Y-Y Axis):Fby = 900 psi $Cd = 1.60$ CF=1.30 Cr=1.15 CI=1.00Bending Stress (Y-Y Axis):Cort = 1.600 CF=1.30 Cr=1.15 CI=1.00Modulus of Elasticity:E = 1600 ksiStud Section (X-X Axis):dx = 5.5 in $Cd = 1.60 CF=1.30$ Cr=1.30			
Base Values Compressive Stress:Adjusted $Cd=1.60 Cf=1.10 Cp=0.53$ Bending Stress (X-X Axis):Fbx = 900 psiFby' = 2153 psi $Cd=1.60 Cf=1.30 Cr=1.15$ Bending Stress (Y-Y Axis):Fby = 900 psiFby' = 2153 psi $Cd=1.60 Cf=1.30 Cr=1.15$ Modulus of Elasticity:E = 1600 ksiStud Section (X-X Axis):dx = 5.5 in $Cd=1.60 Cf=1.30 Cr=1.15$ Stud Section (X-X Axis):dx = 5.5 in $Cd=1.60 Cf=1.30 Cr=1.15$ Stud Section (X-X Axis):dx = 5.5 in $Cd=1.60 Cf=1.30 Cr=1.75$ Section Modulus (X-X Axis):Sx = 7.56 in3 $Ley/dy = 0$ Section Modulus (X-X Axis):Sx = 7.56 in3 $Ley/dy = 0$ Shedemess Ratio:Lex/dx = 17.63 $Ley/dy = 0$ Controlling Case Only):Lex/dx = 17.63 $Ley/dy = 0$ Controlling Case Chrone Laeva and Lateral loads (D + W or E) Allowable Compressive Stress:Fc = 14 psi $Ley/dy = 0$ Allowable Compressive Stress:Fc = 14 psi $Ley/dy = 0$ Allowable Stress Lateral Loads Chr) (X-X Axis):Mx = 168 ft-lb Moment Due to Lateral Loads Chr) (X-X Axis):Moment Due to Lateral Loads Chr) (X-X Axis):My = 0 ft-lb Eccentricity Moment (X-X Axis):Moment Due to Lateral Loads Chr) (Y-X Axis):My = 0 ft-lb Ending Stress Lateral Loads Chr) (Y-X Axis):Moment Due to Lateral Loads Chr) (Y-X Axis):My = 0 ft-lb Ending Stress (X-X Axis):Moment Due to Lateral Loads Chr) (Y-X Axis):Fby' = 2153 psiAllowable Bending Stress (Y-X Axis):Fby' = 2153 psiAllowable Bending Stress (Y-X Axis):Fby' = 2153 psiAllowable Bending Stress (Y-X Axis):Fby' = 2			
Compressive Stress: $Fc = 1350 \text{ psi}$ $Fc' = 1254 \text{ psi}$ Cd = 1.60 CF = 1.10 Cp = 0.53 Bending Stress (X-X Axis): $Fbx = 900 \text{ psi}$ $Fbx' = 2153 \text{ psi}$ Cd = 1.60 CF = 1.30 Cr = 1.15 Cl = 1.00 Bending Stress (Y-Y Axis): $Fbx = 900 \text{ psi}$ $Fby' = 2153 \text{ psi}$ Cd = 1.60 CF = 1.30 Cr = 1.15 Cl = 1.00 Bending Stress (X-X Axis): $Cd = 1.600 \text{ ksi}$ Stud Section (X-X Axis): $Cd = 1.600 \text{ ksi}$ Stud Section (Y-Y Axis): $dy = 1.5 \text{ in}$ Area: $A = 8.25 \text{ in2}$ Section Modulus (X-X Axis): $Sy = 2.06 \text{ in3}$ Section Modulus (Y-Y Axis): $Sy = 2.06 \text{ in3}$ Section Modulus (Controlling Case Only): Controlling Load Case: Axial Dead Load and Lateral loads (D + W or E) Actual Compressive Stress: $Fc' = 14 \text{ psi}$ Allowable Compressive Stress: $Fc' = 1254 \text{ psi}$ Controlling Load Case: Axisi Dead Load (X-X Axis): $Mx - ex = 0$ ft-lb Moment Due to Lateral Loads (N-X Axis): $Mx - ex = 0$ ft-lb Moment Due to Lateral Loads (N-X Axis): $My = 0$ ft-lb Bending Stress Lateral Loads (NY Axis): $Fbx = 266 \text{ psi}$ Allowable Bending Stress (X-X Axis): $Fbx' = 2153 \text{ psi}$ Bending Stress Lateral Loads Only (X-X Axis): $Fbx' = 2153 \text{ psi}$ Allowable Bending Stress (Y-Y Axis): $Fby' = 2153 \text{ psi}$			
$\begin{array}{c} Cd=1.60 \ Cf=1.10 \ Cp=0.53\\ Bending \ Stress (X-X \ Axis): \ Fbx = 900 \ psi \ \ Fbx' = 2153 \ \ psi \ Cd=1.60 \ \ Cf=1.30 \ \ Cr=1.15 \ \ \ Cr=1.15 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$			
Bending Stress (X-X Axis): Fbx = 900 psi Fbx' = 2153 psi Cd=1.60 CF=1.30 Cr=1.15 CL=1.00 Bending Stress (Y-Y Axis): Fby = 900 psi Fby' = 2153 psi Cd=1.60 CF=1.30 Cr=1.15 Modulus of Elasticity: E = 1600 ksi E' = 1600 ksi Stud Section (X-X Axis): dx = 5.5 in Area: A = 8.25 in2 Section Modulus (X-X Axis): Sx = 7.56 in3 Section Modulus (X-X Axis): Sy = 2.06 in3 Section Modulus (Y-Y Axis): Sy = 2.06 in3 Slenderness Ratio: Lex/dx = 17.63 Lex/dx = 17.63 Ley/dy = 0 Stud Calculations (Controlling Case Only): Controlling Load Case: Axial Dead Load and Lateral loads (D + W or E) Actual Compressive Stress: Fc' = 1254 psi Allowable Compressive Stress: Fc' = 1254 psi Eccentricity Moment (Y-Y Axis): MX-ex = 0 ft-lb Moment Due to Lateral Loads (X-X Axis): MX = 168 ft-lb Bending Stress Lateral Loads Only (X-X Axis): Fbx' = 2153 psi Allowable Bending Stress (X-X Axis): Fbx' = 2153 psi Banding Stress Lateral Loads Only (Y-Y Axis): Fbx' = 2153 psi Bending Stress Lateral Loads Only (Y-Y Axis): Fby' = 2153 psi Bending Stress Lateral Loads Only (Y-Y Axis): Fby' = 2153 psi Bending Stress Lateral Loads Only (Y-Y Axis): Fby' = 2153 psi Bending Stress Lateral Loads Only (Y-Y Axis): Fby' = 2153 psi			
$Cd=1.60 \ CF=1.30 \ Cr=1.15 \ Cl=1.00$ Bending Stress (Y-Y Axis): Fby = 900 psi Fby' = 2153 psi $Cd=1.60 \ CF=1.30 \ Cr=1.15$ Modulus of Elasticity: E = 1600 ksi E' = 1600 ksi $Stud Section (X-X Axis): dx = 5.5 \text{ in}  Stud Section (Y-Y Axis): dy = 1.5 \text{ in}  Area: A = 8.25 in2  Section Modulus (X-X Axis): Sx = 7.56 in3  Secton Modulus (X-X Axis): Sy = 2.06 in3  Slenderness Ratio: Lex/dx = 17.63  Ley/dy = 0 Stud Calculations (Controlling Case Only):  Controlling Load Case: Axial Dead Load and Lateral loads (D + W or E)  Actual Compressive Stress: Fc' = 1254 psi  Eccentricity Moment (X-X Axis): Mx-ex = 0 ft-lb  Moment Due to Lateral Loads (Y-X Axis): My = 0 ft-lb  Moment Due to Lateral Loads (Y-X Axis): My = 0 ft-lb  Moment Due to Lateral Loads (Y-X Axis): Fbx = 266 psi  Allowable Bending Stress (X-X Axis): Fbx' = 2153 psi  Allowable Bending Stress (Y-Y Axis): Fby' = 2153 psi  Allowable Bending Stress (Y-Y Axis): Fby' = 2153 psi  Allowable Bending Stress (Y-Y Axis): Fby' = 2153 psi  Allowable Bending Stress (Y-Y Axis): Fby' = 2153 psi  Allowable Bending Stress (Y-Y Axis): Fby' = 2153 psi  Allowable Bending Stress (Y-Y Axis): Fby' = 2153 psi  Allowable Bending Stress (Y-Y Axis): Fby' = 2153 psi  Allowable Bending Stress (Y-Y Axis): Fby' = 2153 psi  Allowable Bending Stress (Y-Y Axis): Fby' = 2153 psi  Allowable Bending Stress (Y-Y Axis): Fby' = 2153 psi  Allowable Bending Stress (Y-Y Axis): Fby' = 2153 psi  Allowable Stress Lateral Loads Only (Y-Y Axis): Fby' = 2153 psi  Allowable Bending Stress (Y-Y Axis): Fby' = 2153 psi  Allowable Bending Stress (Y-Y Axis): Fby' = 2153 psi  Allowable Bending Stress (Y-Y Axis): Fby' = 2153 psi  Allowable Bending Stress (Y-Y Axis): Fby' = 2153 psi  Allowable Bending Stress (Y-Y Axis): Fby' = 2153 psi  Allowable Stress Lateral Loads Only (Y-Y Axis): Fby' = 2153 psi  Allowable Stress Lateral Loads Only (Y-Y Axis): Fby' = 2153 psi  Allowable Stress Lateral Loads Only (Y-Y Axis): Fby' = 2153 psi  Allowable Stress Lateral Loads Only (Y-Y Axis):$			
Bending Stress (Y-Y Axis): Fby = 900 psi Fby' = 2153 psi $Cd=1.60 \ CF=1.30 \ CF=1.30 \ CF=1.30 \ CF=1.75$ Modulus of Elasticity: E = 1600 ksi E' = 1600 ksi Stud Section (X-X Axis): dx = 5.5 in Stud Section (Y-Y Axis): dy = 1.5 in Area: A = 8.25 in 2 Section Modulus (X-X Axis): Sx = 7.56 in 3 Section Modulus (X-X Axis): Sy = 2.06 in 3 Section Modulus (Y-Y Axis): Sy = 2.06 in 3 Ley/dy = 0 Stud Calculations (Controlling Case Only): Controlling Load Case: Axial Dead Load and Lateral loads (D + W or E) Actual Compressive Stress: Fc' = 1254 psi Allowable Compressive Stress: Fc' = 1254 psi Calculated Load: FC = 0 plf * Lead Dead Stress (X-X Axis): Mx = 168 ft-lb Moment Due to Lateral Loads (X-X Axis): Mx = 168 ft-lb Moment Due to Lateral Loads (X-X Axis): Fbx' = 266 psi Allowable Bending Stress Lateral Loads Only (X-X Axis): Fbx' = 2153 psi Bending Stress Lateral Loads Only (Y-Y Axis): Fbx' = 2153 psi Paint Pain			
Cd=1.60 CF=1.30 Cr=1.15Modulus of Elasticity:E = 1600 ksiStud Section (X-X Axis):dx = 5.5 inStud Section (Y-Y Axis):dy = 1.5 inArea:A = 8.25 in2Section Modulus (X-X Axis):Sx = 7.56 in3Section Modulus (Y-Y Axis):Sy = 2.06 in3Section Modulus (Y-Y Axis):Calculateral loads (D + W or E)Attual Compressive Stress:Fc = 14 psiAllowable Compressive Stress:Fc = 14 psiEccentricity Moment (X-X Axis):MX-ex = 0Moment Due to Lateral Loads (X-X Axis):MX-ex = 0Moment Due to Lateral Loads (X-X Axis):MX = 168 ft-lbMoment Due to Lateral Loads Only (X-X Axis):Fbx = 266 psiAllowable Bending Stress Lateral Loads Only (X-X Axis):Fbx = 2153 psiAllowable Bending Stress (Y-Y Axis):Fbx = 2153 psiAllowable Bending Stress (Y-Y Axis):Fby = 2153 psi			
Modulus of Elasticity:E = 1600 ksiE' = 1600 ksiStud Section (X-X Axis): $dx = 5.5$ in Area: $dx = 5.5$ in Area: $dx = 5.5$ in Area:Live LoadDead LoadTributary Width Load Tracker:Area: $A = 8.25$ in2 Section Modulus (X-X Axis): $Sx = 7.56$ in3 Section Modulus (Y-Y Axis): $Sx = 7.56$ in3 Section Modulus (Y-Y Axis): $Sx = 7.56$ in3 Section Modulus (Y-Y Axis): $Sy = 2.06$ in3 Ley/dy = 0Stud Calculations (Controlling Case Only): Controlling Load Case: Axial Dead Load and Lateral loads (D + W or E) Actual Compressive Stress:Fc = 14 psi 1254 psi Eccentricity Moment (X-X Axis):Mx-ex = 0 ft-lb Fc' = 1254 psi 1254 psi Eccentricity Moment (X-X Axis):Mx-ex = 0 ft-lb 16.1b Moment Due to Lateral Loads (Y-Y Axis):Mx = 0 ft-lb 16.1b Moment Due to Lateral Loads (Y-Y Axis):My = 0 ft-lb 16.1b Moment Due to Lateral Loads (Y-Y Axis):My = 0 ft-lb 16.1b Moment Due to Lateral Loads (Y-Y Axis):My = 0 ft-lb 16.1b Moment Due to Lateral Loads (Y-Y Axis):My = 0 ft-lb 16.1b Moment Due to Lateral Loads (Y-Y Axis):My = 0 ft-lb 16.1b 17.1b <br< td=""><td></td><td></td></br<>			
Stud Section (X-X Axis): $dx = 5.5$ in Stud Section (Y-Y Axis): $dy = 1.5$ in Area: $A = 8.25$ in2 Section Modulus (X-X Axis): $Sx = 7.56$ in3 Section Modulus (X-X Axis): $Sx = 7.56$ in3 Section Modulus (Y-Y Axis): $Sy = 2.06$ in3 Ley/dy = 0 $Lu = 40$ psf $DL = 15$ psf $TA = 0$ ft Upper Floor:Stud Calculations (Controlling Case Only):Controlling Case (Y-Y Axis):My = 0ft-lbActual Compressive Stress:Fc = 1254 psi Dead Load:Eccentricity Moment (X-X Axis):My = 0ft-lbMoment Due to Lateral Loads (X-X Axis):My = 0ft-lbMoment Due to Lateral Loads Only (X-X Axis):Fb '= 2153 psiAllowable Bending Stress (X-X Axis):Fb '= 2153 psiAllowable Bending Stress (Y-Y Axis):Fb '= 2153 psiAllowable Bending Stress (Y-Y Axis):Fb '= 2153 psi <td></td> <td>A</td>		A	
Stud Section (X-X Axis):dx =5.5inSud Section (Y-Y Axis):dy =1.5inArea:A =8.25in2Section Modulus (X-X Axis):Sx =7.56in3Section Modulus (Y-Y Axis):Sy =2.06in3Section Modulus (Y-Y Axis):Sy =2.06in3Slenderness Ratio:Lex/dx =17.63Upper Floor:LL =40 psfDL =15 psfTA =0 ftStud Calculations (Controlling Case Only):Lex/dx =17.63Upper Floor:LL =40 psfDL =15 psfTA =0 ftControlling Load Case: Axial Dead Load and Lateral loads (D + W or E)Lex/dx =1254psi0 ftImage: Calculated Load:LL =0 plfDL =88.9 plfAllowable Compressive Stress:Fc' =1254psiDead Load:PL =0 plf *Image: Calculated Load:Image: Calcul			
Stud Section (Y-Y Axis): $dy = 1.5$ in Area: $A = 8.25$ in2 Section Modulus (X-X Axis): $Sx = 7.56$ in3 Section Modulus (Y-Y Axis): $Sx = 7.56$ in3 Section Modulus (Y-Y Axis): $Sy = 2.06$ in3 Lex/dx = 17.63 Ley/dy = 0 $Load Tracker:$ $LL = 40$ psf $DL = 15$ psf $TA = 0$ ft $Dt = 0$ ftStud Calculations (Controlling Case Only:Controlling Case Only: <th< td=""><td>Stud Section (X-X Axis): <math>dx = 55</math> in</td><td></td></th<>	Stud Section (X-X Axis): $dx = 55$ in		
Area: $A =$ $8.25 \text{ in2}$ Section Modulus (X-X Axis): $Sx =$ $7.56 \text{ in3}$ Section Modulus (Y-Y Axis): $Sy =$ $2.06 \text{ in3}$ Section Modulus (Y-Y Axis): $Sy =$ $2.06 \text{ in3}$ Slenderness Ratio:Lex/dx = $17.63$ Ley/dy =0Stud Calculations (Controlling Case Only):Controlling Load Case: Axial Dead Load and Lateral loads (D + W or E)Actual Compressive Stress:Fc =Allowable Compressive Stress:Fc =Fc =14 psiAllowable Compressive Stress:Fc '=Fc '=1254 psiAllowable Compressive Stress:Fc '=Fc '=1254 psiAllowable Stress Lateral Loads (X-X Axis):Mx =Moment Due to Lateral Loads (X-X Axis):Mx =Moment Due to Lateral Loads (Y-Y Axis):My =Moment Due to Lateral Loads Only (X-X Axis):Fbx' =Allowable Bending Stress Lateral Loads Only (Y-Y Axis):Fbx' =Allowable Bending Stress (Y-Y Axis):Fby' =Allowable Bending Stress (Y-Y Axis):Fby' =Stress Lateral Loads Only (Y-Y Axis):psiMowable Bending Stress (Y-Y Axis):Fby' =Stress Lateral Loads Only (Y-Y Axis):psiStore Stress:Fby' =Allowable Bending Stress (Y-Y Axis):Fby' =Stress Lateral Loads Only (Y-Y Axis):psiStress Lateral Loads Only (Y-Y Axis):psiStress Lateral Loads Only (Y-Y Axis):psiStress Lateral Loads Only (Y-Y Axis):psi			
Section Modulus (X-X Axis): Section Modulus (X-X Axis): Section Modulus (Y-Y Axis): Sy = 2.06 in3 Slenderness Ratio: Lex/dx = 17.63 Ley/dy = 0 Stud Calculations (Controlling Case Only): Controlling Load Case: Axial Dead Load and Lateral loads (D + W or E) Actual Compressive Stress: Fc = 14 psi Allowable Compressive Stress: Fc' = 1254 psi Eccentricity Moment (X-X Axis): Mx-ex = 0 ft-lb Eccentricity Moment (Y-Y Axis): My-ey = 0 ft-lb Bending Stress Lateral Loads (Y-Y Axis): HX = 168 ft-lb Bending Stress Lateral Loads Only (Y-Y Axis): Fbx' = 2153 psi Allowable Bending Stress (Y-Y Axis): Fby' = 2153 psi			
Section Modulus (Y-Y Axis):Sy =2.06 in3Slenderness Ratio:Lex/dx =17.63Ley/dy =0Stud Calculations (Controlling Case Only):Controlling Load Case: Axial Dead Load and Lateral loads (D + W or E)Actual Compressive Stress: $Fc =$ Allowable Compressive Stress: $Fc' =$ $1254$ psiEccentricity Moment (X-X Axis):MX-ex =Mx-ex =0ft-lbEccentricity Moment (Y-Y Axis):MY =Moment Due to Lateral Loads (Y-Y Axis):MX =Moment Due to Lateral Loads (Y-Y Axis):MY =Moment Due to Lateral Loads (Y-Y Axis):MY =Moment Due to Lateral Loads (Y-Y Axis):MY =Moment Due to Lateral Loads Only (X-X Axis):Fbx' =2153 psiBending Stress Lateral Loads Only (Y-Y Axis):Fby' =2153 psiAllowable Bending Stress (Y-Y Axis):Fby' =2153 psi			
Slenderness Ratio:Lex/dx = 17.63 Ley/dy = 0Middle Floor:LL = 40 psf DL = 15 psf TA = 0 ftMiddle Floor:LL = 40 psf DL = 15 psf TA = 0 ftMiddle Floor:LL = 40 psf DL = 15 psf TA = 0 ftMiddle Floor:LL = 40 psf DL = 15 psf TA = 0 ftMiddle Floor:LL = 40 psf DL = 15 psf TA = 0 ftMiddle Floor:LL = 40 psf DL = 15 psf TA = 0 ftMiddle Floor:LL = 40 psf DL = 15 psf TA = 0 ftMiddle Floor:LL = 40 psf DL = 15 psf TA = 0 ftMiddle Floor:LL = 40 psf DL = 15 psf TA = 0 ftMiddle Floor:LL = 40 psf DL = 15 psf TA = 0 ftMiddle Floor:LL = 40 psf DL = 88.9 plfCalculated Load:L = 0 plf *Dead Load:P = 89 plf *Total Axial Load:PT = 89 plf* Load obtained from Load Tracker. See Summary Report for details.Maternal Loads (Y-Y Axis):My = 0 ft-lbMoment Due to Lateral Loads (Y-Y Axis):My = 0 ft-lbMoment Due to Lateral Loads (Y-Y Axis):Fby = 2153 psiBending Stress Lateral Loads Only (Y-Y Axis):Fby = 2153 psiAllowable Bending Stress (Y-Y Axis):Fby = 2153 psiAllowable Bending Stress (Y-			
Ley/dy = 0 Stud Calculations (Controlling Case Only): Controlling Load Case: Axial Dead Load and Lateral loads (D + W or E) Actual Compressive Stress: Fc = 14 psi Allowable Compressive Stress: Fc' = 1254 psi Eccentricity Moment (X-X Axis): Mx-ex = 0 ft-lb Eccentricity Moment (Y-Y Axis): My-ey = 0 ft-lb Moment Due to Lateral Loads (X-X Axis): Mx = 168 ft-lb Moment Due to Lateral Loads (Y-Y Axis): My = 0 ft-lb Bending Stress Lateral Loads Only (X-X Axis): Fbx = 266 psi Allowable Bending Stress (X-X Axis): Fby' = 2153 psi Allowable Bending Stress (Y-Y Axis): Fby' = 2153 psi	( ), j	opport local de la contraction	
Stud Calculations (Controlling Case Only):Controlling Load Case: Axial Dead Load and Lateral loads (D + W or E)Actual Compressive Stress:Fc = 14 psiAllowable Compressive Stress:Fc' = 1254 psiEccentricity Moment (X-X Axis):Mx-ex = 0 ft-lbEccentricity Moment (Y-Y Axis):My-ey = 0 ft-lbMoment Due to Lateral Loads (X-X Axis):Mx = 168 ft-lbMoment Due to Lateral Loads (Y-Y Axis):My = 0 ft-lbBending Stress Lateral Loads Only (X-X Axis):Fbx = 266 psiAllowable Bending Stress (X-X Axis):Fbx = 2153 psiBending Stress Lateral Loads Only (Y-Y Axis):Fby = 0 psiAllowable Bending Stress (Y-Y Axis):Fby = 2153 psi			
Stud Calculations (Controlling Case Only):Controlling Load Case: Axial Dead Load and Lateral loads (D + W or E)Actual Compressive Stress:Fc = 14 psiAllowable Compressive Stress:Fc' = 1254 psiEccentricity Moment (X-X Axis):Mx-ex = 0 ft-lbEccentricity Moment (Y-Y Axis):My-ey = 0 ft-lbMoment Due to Lateral Loads (X-X Axis):Mx = 168 ft-lbMoment Due to Lateral Loads (Y-Y Axis):My = 0 ft-lbBending Stress Lateral Loads Only (X-X Axis):Fbx = 266 psiAllowable Bending Stress (X-X Axis):Fbx' = 2153 psiBending Stress (Y-Y Axis):Fby' = 2153 psiAllowable Bending Stress (Y-Y Axis):Fby' = 2153 psi	,,	e e e e e e e e e e e e e e e e e e e	
Controlling Load Case: Axial Dead Load and Lateral loads (D + W or E)Actual Compressive Stress:Fc =14psiAllowable Compressive Stress:Fc' =1254psiEccentricity Moment (X-X Axis):Mx-ex =0ft-lbEccentricity Moment (Y-Y Axis):My-ey =0ft-lbMoment Due to Lateral Loads (X-X Axis):Mx =168ft-lbMoment Due to Lateral Loads (Y-Y Axis):My =0ft-lbBending Stress Lateral Loads Only (X-X Axis):Fbx =266psiAllowable Bending Stress (X-X Axis):Fbx' =2153psiBending Stress (Y-Y Axis):Fby' =0psiAllowable Bending Stress (Y-Y Axis):Fby' =0psiAllowable Bending Stress (Y-Y Axis):Fby' =2153psi	Stud Calculations (Controlling Case Only):		
Actual Compressive Stress:Fc =14psiAllowable Compressive Stress:Fc' =1254psiAllowable Compressive Stress:Fc' =1254psiEccentricity Moment (X-X Axis):Mx-ex =0ft-lbEccentricity Moment (Y-Y Axis):My-ey =0ft-lbMoment Due to Lateral Loads (X-X Axis):Mx =168ft-lbMoment Due to Lateral Loads (Y-Y Axis):My =0ft-lbBending Stress Lateral Loads Only (X-X Axis):Fbx =266psiAllowable Bending Stress (X-X Axis):Fbx' =2153psiAllowable Bending Stress (Y-Y Axis):Fby' =0psiAllowable Bending Stress (Y-Y Axis):Fby' =0psiAllowable Bending Stress (Y-Y Axis):Fby' =2153psi		r E) AXIAL LOADING	
Allowable Compressive Stress:Fc' =1254psiEccentricity Moment (X-X Axis):Mx-ex =0ft-lbEccentricity Moment (Y-Y Axis):My-ey =0ft-lbMoment Due to Lateral Loads (X-X Axis):Mx =168ft-lbMoment Due to Lateral Loads (Y-Y Axis):My =0ft-lbBending Stress Lateral Loads Only (X-X Axis):Fbx =266psiAllowable Bending Stress (X-X Axis):Fbx' =2153psiBending Stress Lateral Loads Only (Y-Y Axis):Fby =0psiAllowable Bending Stress (Y-Y Axis):Fby' =2153psi			
Eccentricity Moment (X-X Axis):Mx-ex =0ft-lbEccentricity Moment (Y-Y Axis):My-ey =0ft-lbMoment Due to Lateral Loads (X-X Axis):Mx =168ft-lbMoment Due to Lateral Loads (Y-Y Axis):My =0ft-lbBending Stress Lateral Loads Only (X-X Axis):Fbx =266psiAllowable Bending Stress (X-X Axis):Fbx' =2153psiBending Stress (Y-Y Axis):Fby' =0psiAllowable Bending Stress (Y-Y Axis):Fby' =0psiAllowable Bending Stress (Y-Y Axis):Fby' =2153psi	Allowable Compressive Stress: Fc' = 1254 ps		
Eccentricity Moment (Y-Y Axis):My-ey =0ft-lbMoment Due to Lateral Loads (X-X Axis):Mx =168ft-lbMoment Due to Lateral Loads (Y-Y Axis):My =0ft-lbBending Stress Lateral Loads Only (X-X Axis):Fbx =266psiAllowable Bending Stress (X-X Axis):Fbx' =2153psiBending Stress (Y-Y Axis):Fby =0psiAllowable Bending Stress (Y-Y Axis):Fby' =2153psi			
Moment Due to Lateral Loads (X-X Axis):Mx =168ft-lbMoment Due to Lateral Loads (Y-Y Axis):My =0ft-lbBending Stress Lateral Loads Only (X-X Axis):Fbx =266psiAllowable Bending Stress (X-X Axis):Fbx' =2153psiBending Stress Lateral Loads Only (Y-Y Axis):Fby =0psiAllowable Bending Stress (Y-Y Axis):Fby =0psiAllowable Bending Stress (Y-Y Axis):Fby' =2153psi			
Bending Stress Lateral Loads Only (X-X Axis): Fbx =       266       psi         Allowable Bending Stress (X-X Axis):       Fbx' =       2153       psi         Bending Stress Lateral Loads Only (Y-Y Axis):       Fby' =       0       psi         Allowable Bending Stress (Y-Y Axis):       Fby' =       0       psi         Allowable Bending Stress (Y-Y Axis):       Fby' =       2153       psi	Moment Due to Lateral Loads (X-X Axis): Mx = 168 ft-		
Bending Stress Lateral Loads Only (X-X Axis): Fbx =       266       psi         Allowable Bending Stress (X-X Axis):       Fbx' =       2153       psi         Bending Stress Lateral Loads Only (Y-Y Axis):       Fby =       0       psi         Allowable Bending Stress (Y-Y Axis):       Fby' =       2153       psi		lb LATERAL LOADING (Dy Face)	
Bending Stress Lateral Loads Only (Y-Y Axis):Fby =0psiAllowable Bending Stress (Y-Y Axis):Fby' =2153psi	<b>o , ( , , , , , , , , , ,</b>		
Allowable Bending Stress (Y-Y Axis): Fby' = 2153 psi		si <u> </u>	
Combined Stress Factor: CSF = 0.12		si	
	Combined Stress Factor: CSF = 0.12		

**NOTES** 

Established Basic Permit #

<del>19-03646</del>

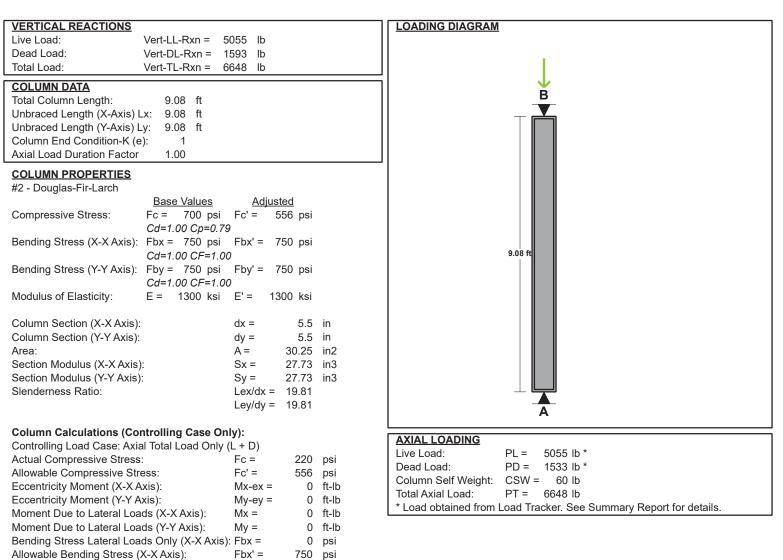
Location: PST-MLB2-1B Column [2015 International Building Code(2015 NDS)] 5.5 IN x 5.5 IN x 9.08 FT #2 - Douglas-Fir-Larch - Dry Use Section Adequate By: 60.5%



David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346

StruCalc Version 10.0.1.6

7/26/2019 3:55:03 PM



NOTES

Established Basic Permit #

Bending Stress Lateral Loads Only (Y-Y Axis): Fby =

Allowable Bending Stress (Y-Y Axis):

**Combined Stress Factor:** 

036

0 psi

750 psi

0.4

Fby' =

CSF =

Location: FTG-WALL-1ST-1 Footing

Section Footing Design Adequate

[2015 International Building Code(2015 NDS)]

Footing Size: 18.0 IN Wide x 8.0 IN Deep Continuous Footing With 8.0 IN Thick x 12.0 IN Tall Stemwall LongitudinalReinforcement: (2) Continuous #4 Bars TransverseReinforcement: #4 Bars @ 13.00 IN. O.C. (unnecessary)



David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346

StruCalc Version 10.0.1.6

7/26/2019 3:55:03 PM

FOOTING PROPERTIES		
	2500 psf	
	2500 psi	
	60000 psi	
Concrete Reinforcement Cover: c =	3 in	
FOOTING SIZE		
Width: W =	18 in	
Depth: Depth Effective Depth to Top Layer of Steel: d =	= 8 in 4.25 in	
	4.23 11	
STEMWALL SIZE		
Stemwall Width: 8 in		
Stemwall Height: 12 in		
Stemwall Weight: 150 pcf		
FOOTING CALCULATIONS		8 in
Description Optional attac		
Bearing Calculations:		
Ultimate Bearing Pressure:	Qu = 933 psf	
Effective Allowable Soil Bearing Pressure:	Qe = 2400 psf	
Width Required:	Wreq = 0.58 ft	
Beam Shear Calculations (One Way Shea		
Beam Shear:	Vu1 = 82 lb	
Allowable Beam Shear:	Vc1 = 3825 lb	
Transverse Direction:		
Bending Calculations:		3 ir
Factored Moment:	Mu = 1367 in-lb	
Nominal Moment Strength:	Mn = 0  in-lb	
Reinforcement Calculations:	UIII – UIII-D	1.5 ft
Concrete Compressive Block Depth:	a = 0.41 in	
Steel Required Based on Moment:	As(1) = 0.01 in2	FOOTING LOADING
Min. Code Req'd Reinf. Shrink./Temp. (AC		Live Load: PL = 721 plf *
Controlling Reinforcing Steel:	As-regd = 0.17 in2	Dead Load: $PD = 579 \text{ plf}^*$
Selected Reinforcement:	Trans: #4's @ 13.0 in. o.c.	Total Load: $PT = 1400 \text{ pf}^*$
Reinforcement Area Provided:	As = 0.17  in  2	Ultimate Factored Load: Pu = 1968 plf
Development Length Calculations:		* Load obtained from Load Tracker. See Summary Report for details.
Development Length Required:	Ld = 15 in	
Development Length Supplied:	Ld-sup = 2 in	
Longitudinal Direction:		
Reinforcement Calculations:		
Min. Code Req'd Reinf. Shrink./Temp. (AC	I-10.5.4): As(2) = 0.26 in2	
Controlling Reinforcing Steel:	As-reqd = $0.26$ in2	
	ngitudinal: (2) Cont. #4 Bars	
Reinforcement Area Provided:	As = 0.39  in  2	
NOTES		
Eptoblished Resis Darmit #		
Established Basic Permit #		
<u>19-03646</u>		J
		or: 20-0/80/

Location: WALL-2ND-6 Wall [2015 International Building Code(2015 NDS)] 1.5 IN x 5.5 IN x 8.08 FT @ 16 O.C. #2 - Douglas-Fir-Larch - Dry Use Section Adequate By: 87.5% Controlling Factor: Combined Stress Factor



David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346

StruCalc Version 10.0.1.6

7/26/2019 3:55:04 PM

LOADING DIAGRAM
В
8.08 ft w
A
WALL LOAD CALCULATOR
Live Load Dead Load Tributary Width
Load Tracker: $LL = 0 \text{ plf } DL = 0 \text{ plf}$
Roof: $LL = 25 \text{ psf } DL = 15 \text{ psf } TA = 0 \text{ ft}$
Upper Floor: LL = 40 psf DL = 15 psf TA = 0 ft Upper Floor Height: 0 ft
-11 5
Middle Floor: LL = 40 psf DL = 15 psf TA = 0 ft Middle Floor Height: 0 ft
Calculated Load: LL = 0 plf DL = 80.8 plf
) AXIAL LOADING
Live Load: $PL = 0 \text{ plf}^*$
Dead Load: $PD = 81 \text{ plf}^*$
Total Axial Load: PT = 81 plf
* Load obtained from Load Tracker. See Summary Report for details.
LATERAL LOADING (Dy Face)
LATERAL LOADING (Dy Face)
LATERAL LOADING(Dy Face)Uniform Lateral Load:wL-Lat = 15 psf

**NOTES** 

Established Basic Permit #

<del>19-03646</del>

Project: 19-002c Framing Location: MLB2-2 Multi-Loaded Multi-Span Beam [2015 International Building Code(2015 NDS)] 1.75 IN x 11.875 IN x 6.5 FT LSL 2360 Fb-1.55E - Louisiana Pacific Section Adequate By: 226.3% Controlling Factor: Moment	David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346 StruCalc Version 10.0.1.6 7/26/2019 3:55:04 PM
DEFLECTIONS       Center         Live Load       0.02       IN L/3704         Dead Load       0.03       in         Total Load       0.05       IN L/1564         Live Load Deflection Criteria: L/360       Total Load Deflection Criteria: L/240         REACTIONS       A       B         Live Load       645       Ib       645       Ib         Dead Load       883       Ib       883       Ib         Total Load       1528       Ib       B         Bearing Length       1.00       in       1.00       in	
Beaming Length     Floor in       BEAM DATA     Center       Span Length     6.5 ft       Unbraced Length-Top     0 ft       Unbraced Length-Bottom     6.5 ft       Live Load Duration Factor     1.00       Notch Depth     0.00	A 6.5 ft B
LSL 2360 Fb-1.55E - Louisiana PacificBase ValuesAdjustedBending Stress:Fb =2360 psiFb' =2364 psi $Cd=1.00$ $CF=1.00$ $Cf=1.00$ Fv' =410 psiShear Stress:Fv =410 psiFv' =410 psi $Cd=1.00$ Modulus of Elasticity:E =1550 ksiE' =1550 ksi	Uniform Dead Load 266 plf Beam Self Weight 6 plf Total Uniform Load 470 plf * Load obtained from Load Tracker. See Summary Report for details.
Comp. $\perp$ to Grain: $Fc - \perp = 875 \text{ psi}$ $Fc - \perp = 875 \text{ psi}$ Controlling Moment:2483 ft-lb3.25 Ft from left support of span 2 (Center Span)Created by combining all dead loads and live loads on span(s) 2Controlling Shear:1069 lbAt a distance d from left support of span 2 (Center Span)Created by combining all dead loads and live loads on span(s) 2	
Comparisons with required sections:Req'dProvidedSection Modulus:12.6 in341.13 in3Area (Shear):3.91 in220.78 in2Moment of Inertia (deflection):37.47 in4244.21 in4Moment:2483 ft-lb8101 ft-lbShear:1069 lb5680 lb	

NOTES

Established Basic Permit #

19-03646

Project: 19-002c Framing Location: RFB3 Roof Beam [2015 International Building Code(2015 NDS)] 3.5 IN x 7.25 IN x 8.33 FT #2 - Douglas-Fir-Larch - Dry Use Section Adequate By: 150.0% Controlling Factor: Moment	David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346 StruCalc Version 10.0.1.6 7/26/2019 3:55:04 PM
DEFLECTIONS       Center         Live Load       0.06       IN L/1751         Dead Load       0.04       in         Total Load       0.10       IN L/1035         Live Load Deflection Criteria: L/240       Total Load Deflection Criteria: L/180         REACTIONS       A       B         Live Load       390       Ib       390       Ib         Dead Load       270       Ib       270       Ib         Total Load       660       Ib       660       Ib         Bearing Length       0.30       in       0.30       in	
BEAM DATA         Span Length       8.3 ft         Unbraced Length-Top       0 ft         Unbraced Length-Bottom       0 ft         Roof Pitch       4 :12         Roof Duration Factor       1.15	A 8.33 ft B
MATERIAL PROPERTIES#2 - Douglas-Fir-LarchBase ValuesAdjustedBending Stress:Fb = 900 psiFb' = 1346 psi $Cd=1.15 \ CF=1.30$ Cd=1.15 $CF=1.30$ Shear Stress:Fv = 180 psiFv' = 207 psi $Cd=1.15$ Modulus of Elasticity:E = 1600 ksiE' = 1600 ksiComp. $\perp$ to Grain:Fc - $\perp$ = 625 psiFc - $\perp$ ' = 625 psiControlling Moment:	ROOF LOADING         Side One:         Roof Live Load:       LL =       25       psf         Roof Dead Load:       DL =       15       psf         Tributary Width:       TW =       3.8       ft         Side Two:
4.165 ft from left support         Created by combining all dead and live loads.         Controlling Shear:       -568 lb         At a distance d from support.         Created by combining all dead and live loads.         Comparisons with required sections:         Req'd       Provided         Section Modulus:       12.26 in3       30.66 in3         Area (Shear):       4.12 in2       25.38 in2	Adjusted Beam Length:Ladj =8.33 ftBeam Self Weight:BSW =6 plfBeam Uniform Live Load:wL =94 plfBeam Uniform Dead Load:wD_adj =65 plfTotal Uniform Load:wT =159 plf
Moment of Inertia (deflection):         19.33 in4         111.15 in4           Moment:         1375 ft-lb         3438 ft-lb           Shear:         -568 lb         3502 lb	

<u>NOTES</u>

Established Basic Permit #

19-03646

Project: 19-002c Framing Location: RFB4 Roof Beam [2015 International Building Code(2015 NDS)] 5.5 IN x 7.5 IN x 6.83 FT #2 - Douglas-Fir-Larch - Dry Use	David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346 StruCalc Version 10.0.1.6 7/26/2019 3:55:05 PM
Section Adequate By: 242.3% Controlling Factor: Moment DEFLECTIONS       Center         Live Load       0.02       IN L/3888         Dead Load       0.02       in         Total Load       0.04       IN L/2267         Live Load Deflection Criteria: L/240       Total Load Deflection Criteria: L/180         REACTIONS       A       B	LOADING DIAGRAM
Live Load370Ib370IbDead Load264Ib264IbTotal Load634Ib634IbBearing Length0.18in0.18in	
BEAM DATA         Span Length       6.8 ft         Unbraced Length-Top       0 ft         Unbraced Length-Bottom       0 ft         Roof Pitch       4 :12         Roof Duration Factor       1.15	A - 6.83 ft - B
MATERIAL PROPERTIES #2 - Douglas-Fir-Larch Base Values Adjusted	ROOF LOADING         Side One:         Roof Live Load:       LL =         25 psf         Roof Dead Load:       DL =         15 psf
Bending Stress:       Fb =       750 psi       Fb' =       863 psi $Cd=1.15$ CF=1.00         Shear Stress:       Fv =       170 psi       Fv' =       196 psi $Cd=1.15$	Tributary Width: TW = 4.3 ft Side Two: Roof Live Load: LL = 0 psf Roof Dead Load: DL = 0 psf
Modulus of Elasticity: $E =$ 1300 ksi $E' =$ 1300 ksiComp. $\perp$ to Grain: $Fc - \perp =$ 625 psi $Fc - \perp ' =$ 625 psi	Tributary Width: TW = 0 ft Wall Load: WALL = 0 plf
Controlling Moment:1083 ft-lb3.415 ft from left supportCreated by combining all dead and live loads.Controlling Shear:520 lbAt a distance d from support.Created by combining all dead and live loads.	SLOPE/PITCH ADJUSTED LENGTHS AND LOADSAdjusted Beam Length:Ladj =6.83ftBeam Self Weight:BSW =9plfBeam Uniform Live Load:wL =108plfBeam Uniform Dead Load:wD_adj =77plfTotal Uniform Load:wT =186plf
Comparisons with required sections:         Req'd         Provided           Section Modulus:         15.06 in3         51.56 in3           Area (Shear):         3.99 in2         41.25 in2           Moment of Inertia (deflection):         15.35 in4         193.36 in4           Moment:         1083 ft-lb         3706 ft-lb           Shear:         520 lb         5376 lb	

<u>NOTES</u>

Established Basic Permit #

19-03646

Location: MLB2-3 Multi-Loaded Multi-Span Beam [2015 International Building Code(2015 NDS)] 5.5 IN x 11.875 IN x 17.84 FT (10.9 + 6.9) / 30F - 30F-E DF2 - Dry Use Section Adequate By: 5.9% Controlling Factor: Shear



David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346

StruCalc Version 10.0.1.6

7/26/2019 3:55:05 PM

Controlling Factor: Shear								
	<u>Right</u>			LOADING DIAGRAM	1			
Live Load 0.16 IN L/832 -0.04								
Dead Load 0.11 in -0.01								
Total Load 0.27 IN L/488 -0.04								
Live Load Deflection Criteria: L/360 Tot	al Load Defleo	ction Criteria	: L/240					
REACTIONS A B	<u>C</u>							
	3890 lb							
	1846 lb							
Total Load 10267 lb 26350 lb								
	-411 lb				w		w	
Bearing Length 2.87 in 7.37 in	1.60 in							
BEAM DATA Center	<u>Right</u>					•		
	6.92 ft			Ā	10.92 ft	B		Ċ
Unbraced Length-Top 0 ft	0 ft					_		-
<b>J S S S</b>	5.92 ft							
Live Load Duration Factor 1.15				UNIFORM LOADS	Center	Right*		
Notch Depth 0.00				Uniform Live Load	1245 plf	1245 plf		
MATERIAL PROPERTIES				Uniform Dead Load	1008 plf	1008 plf		
30F - 30F-E/DF2				Beam Self Weight	14 plf	14 plf		
	Values	<u>Adju</u>		Total Uniform Load	2267 plf	2267 plf		
Bending Stress: Fb =	3000 psi	Controlled		* Load obtained from	Load Tracke	r. See Summar	y Report for details.	
	= 3000 psi	Fb_cmpr' =	= 3424 psi					
Cd=1.15 (								
Shear Stress: Fv =	265 psi	Fv' =	305 psi					
Cd=1.15								
Modulus of Elasticity: E =	2100 ksi	E' =	2100 ksi					
Comp. $\perp$ to Grain: Fc - $\perp$ =	650 psi	Fc - 上' =	650 psi					
Controlling Moment: -25950 ft-	lb							
10.92 Ft from left support of span 2 (Cer								
Created by combining all dead loads and		snan(s) 2	3					
Controlling Shear: -12527 lb		1 opun(o) 2, (	0					
At a distance d from right support of spa	n 2 (Center S	pan)						
Created by combining all dead loads and			3					
Comparisons with required sections:	<u>Req'd</u>	Provide						
Section Modulus:	90.95 in3	129.26 ir	13					
Area (Shear):	61.66 in2	65.31 ir						
Moment of Inertia (deflection):	377.17 in4	767.51 ir						
Moment:	-25950 ft-lb	36881 ft						
Shear:	-12527 lb	13269 lb	)					
NOTES								

# Established Basic Permit #

19-03646

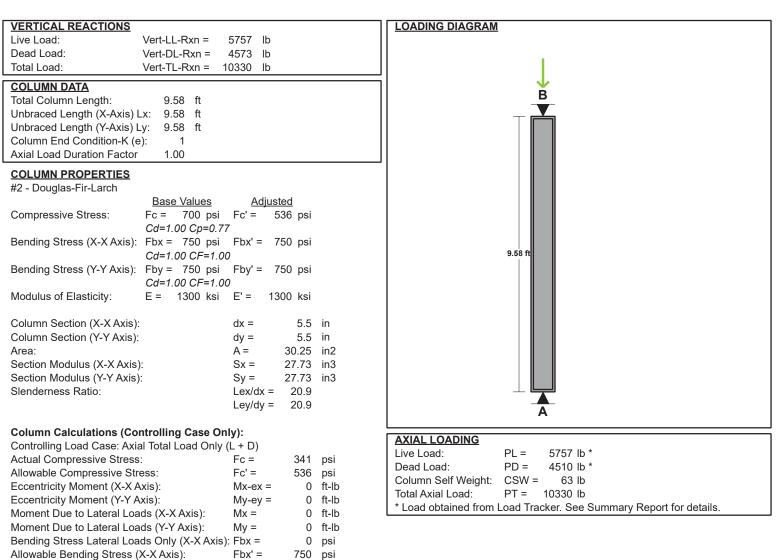
Location: PST-MLB2-3A Column [2015 International Building Code(2015 NDS)] 5.5 IN x 5.5 IN x 9.58 FT #2 - Douglas-Fir-Larch - Dry Use Section Adequate By: 36.2%



David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346

StruCalc Version 10.0.1.6

7/26/2019 3:55:06 PM



**NOTES** 

Established Basic Permit #

Bending Stress Lateral Loads Only (Y-Y Axis): Fby =

Allowable Bending Stress (Y-Y Axis):

**Combined Stress Factor:** 

036

0 psi

750 psi

0.64

Fby' =

CSF =

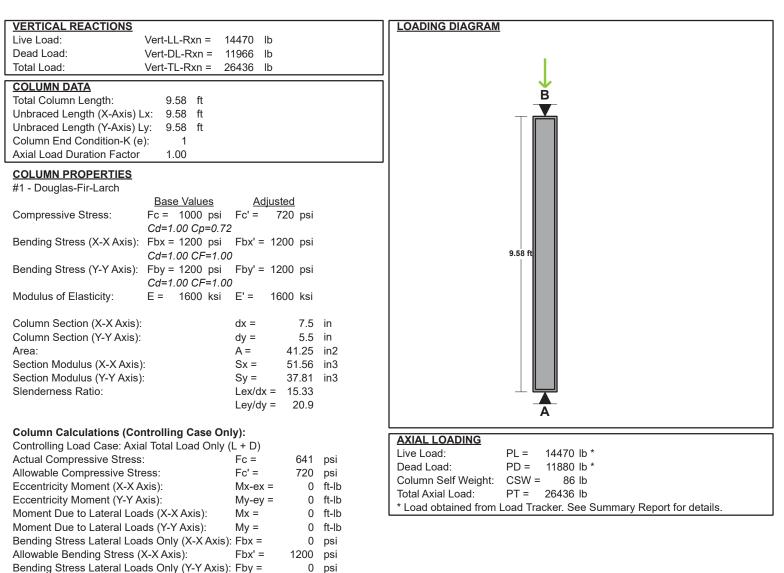
Location: PST-MLB2-3B Column [2015 International Building Code(2015 NDS)] 5.5 IN x 7.5 IN x 9.58 FT #1 - Douglas-Fir-Larch - Dry Use Section Adequate By: 11.0%



David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346

StruCalc Version 10.0.1.6

7/26/2019 3:55:06 PM



NOTES

Established Basic Permit #

Allowable Bending Stress (Y-Y Axis):

**Combined Stress Factor:** 

Fby' =

CSF =

1200 psi

0.89

<u> 136</u>

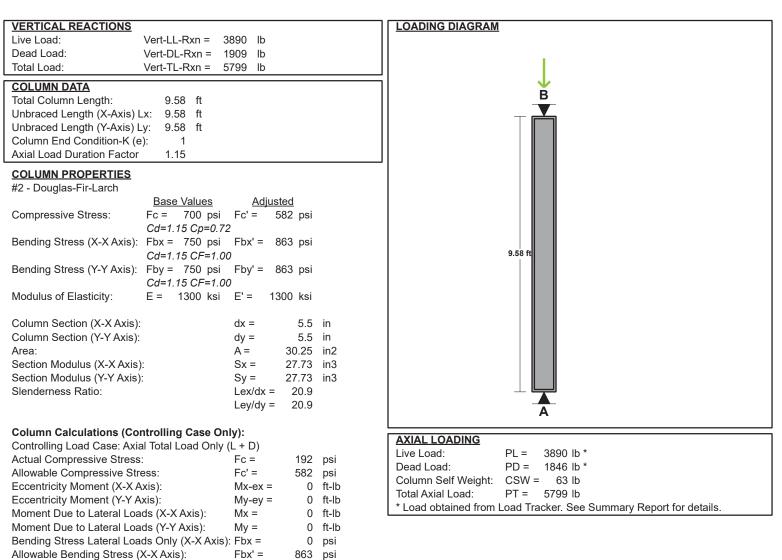
Location: PST-MLB2-3C Column [2015 International Building Code(2015 NDS)] 5.5 IN x 5.5 IN x 9.58 FT #2 - Douglas-Fir-Larch - Dry Use Section Adequate By: 67.0%



David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346

StruCalc Version 10.0.1.6

7/26/2019 3:55:07 PM



NOTES

# Established Basic Permit #

Bending Stress Lateral Loads Only (Y-Y Axis): Fby =

Allowable Bending Stress (Y-Y Axis):

**Combined Stress Factor:** 

036

0 psi

863 psi

0.33

Fby' =

CSF =

Location: FTG-PST-MLB2-3A Footing [2015 International Building Code(2015 NDS)] Footing Size: 2.5 FT x 2.5 FT x 10.00 IN Reinforcement: #4 Bars @ 11.00 IN. O.C. E/W / (3) min. Section Footing Design Adequate



David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346

StruCalc Version 10.0.1.6

7/26/2019 3:55:07 PM

Section 1 boung Design Adequate			
FOOTING PROPERTIES			LOADING DIAGRAM
Allowable Soil Bearing Pressure: Qs = 2500	psf		
Concrete Compressive Strength: F'c = 2500	psi		
Reinforcing Steel Yield Strength: Fy = 60000	psi		
Concrete Reinforcement Cover: c = 3	in		
FOOTING SIZE			
	5 ft		
	5 ft		
	0 in		
_ · ·	5 in		
COLUMN AND BASEPLATE SIZE			
Column Type: Steel			
Column Width: m = 4 in			
Column Depth: $n = 4$ in			
Baseplate Width: bsw = 6 in			
Baseplate Length: bsl = 6 in			
			4 in
FOOTING CALCULATIONS			
Bearing Calculations:			
Ultimate Bearing Pressure:	Qu =	1653 psf	
Effective Allowable Soil Bearing Pressure:	Qe =	2375 psf	
Required Footing Area:	Areq =	4.35 sf	
Area Provided:	A =	6.25 sf	10 in
Baseplate Bearing:			
Bearing Required:	Bear =	14699 lb	3 in
Allowable Bearing:	Bear-A =	99450 lb	
Beam Shear Calculations (One Way Shear):			
Beam Shear:	Vu1 =	3062 lb	2.5 ft
Allowable Beam Shear:	Vc1 =	14063 lb	
Punching Shear Calculations (Two Way Shear):			FOOTING LOADING
Critical Perimeter:	Bo =	45 in	Live Load: PL = 5757 lb *
Punching Shear:	Vu2 =	12632 lb	Dead Load: PD = 4573 lb *
Allowable Punching Shear (ACI 11-35):	vc2-a =	63281 lb	Total Load: PT = 10330 lb *
Allowable Punching Shear (ACI 11-36):	vc2-b =	79688 lb	Ultimate Factored Load: Pu = 14699 lb
Allowable Punching Shear (ACI 11-37):	vc2-c =	42188 lb	Footing plus soil above footing weight: Wt = 503 lb
Controlling Allowable Punching Shear:	vc2 =	42188 lb	* Load obtained from Load Tracker. See Summary Report for details.
Bending Calculations:			
Factored Moment:	Mu =	38278 in-lb	
Nominal Moment Strength:	Mn =	189895 in-lb	
Reinforcement Calculations:			
Concrete Compressive Block Depth:	a =	0.55 in	
Steel Required Based on Moment:	As(1) =	0.11 in2	
Min. Code Req'd Reinf. Shrink./Temp. (ACI-10.5.4	): As(2) =	0.54 in2	
Controlling Reinforcing Steel:	As-reqd =	0.54 in2	
	.0 in. o.c. e/	w (3) Min.	
Reinforcement Area Provided:	As =	0.59 in2	
Development Length Calculations:			
Development Length Required:	Ld =	15 in	
Development Length Supplied:	Ld-sup =	9.5 in	
Note: Plain concrete adequate for bending,			
therefore adequate development length not require	ed.		

NOTES

1

Established Basic Permit #

9-03646

Location: FTG-PST-MLB2-3C Footing [2015 International Building Code(2015 NDS)] Footing Size: 2.5 FT x 2.5 FT x 12.00 IN Reinforcement: #4 Bars @ 7.00 IN. O.C. E/W / (4) min. Section Footing Design Adequate



David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346

StruCalc Version 10.0.1.6

7/26/2019 3:55:07 PM

Section Footing Design Adequate					
$\begin{tabular}{ c c c c c } \hline FOOTING PROPERTIES \\ \hline Allowable Soil Bearing Pressure: Qs = 2500 \\ \hline Concrete Compressive Strength: F'c = 2500 \\ \hline Reinforcing Steel Yield Strength: Fy = 60000 \\ \hline Concrete Reinforcement Cover: c = 3 \\ \hline \end{tabular}$	psi			LOADING DIAGRAM	
FOOTING SIZE           Width:         W = 2.5           Length:         L = 2.5           Depth:         Depth = 12           Effective Depth to Top Layer of Steel:         d = 8.25	ift in				
COLUMN AND BASEPLATE SIZEColumn Type:ConcreteColumn Width:m = 4 inColumn Depth:n = 4 in					
FOOTING CALCULATIONS				4 in	
Bearing Calculations: Ultimate Bearing Pressure: Effective Allowable Soil Bearing Pressure: Required Footing Area: Area Provided: Baseplate Bearing: Bearing Required: Allowable Bearing: Beam Shear Calculations (One Way Shear): Beam Shear: Allowable Beam Shear: Punching Shear Calculations (Two Way Shear): Critical Perimeter: Punching Shear: Allowable Punching Shear (ACI 11-35): Allowable Punching Shear (ACI 11-36): Allowable Punching Shear (ACI 11-37): Controlling Allowable Punching Shear:	Qu = Qe = Areq = A = Bear = Bear-A = Vu1 = Vc1 = Vu2 = vc2-a = vc2-b = vc2 =	1856 r 2350 r 4.94 s 6.25 s 17030 l 44200 l 2696 l 18563 l 49 r 14190 l 90956 l 132413 l 60638 l 60638 l	osf if o o o o o o o o		 ∃ in 
Bending Calculations: Factored Moment:	Mu =	47967 i		Footing plus soil above footing weight: Wt = 604 lb * Load obtained from Load Tracker. See Summary Report for details.	
Reinforcement Area Provided:	Mn = a = As(1) = : As(2) = As-reqd = 0 in. o.c. e/v As =	334058 i 0.74 i 0.11 i 0.65 i 0.65 i v (4) Min. 0.79 i	า า2 า2 า2		
Development Length Calculations: Development Length Required: Development Length Supplied: Note: Plain concrete adequate for bending, therefore adequate development length not required	Ld = Ld-sup = d.	15 i 10 i			

NOTES

Established Basic Permit #

<del>19-03646</del>

Location: FTG-PST-MLB2-3B Footing [2015 International Building Code(2015 NDS)] Footing Size: 3.5 FT x 3.5 FT x 10.00 IN Reinforcement: #4 Bars @ 11.00 IN. O.C. E/W / (4) min. Section Footing Design Adequate

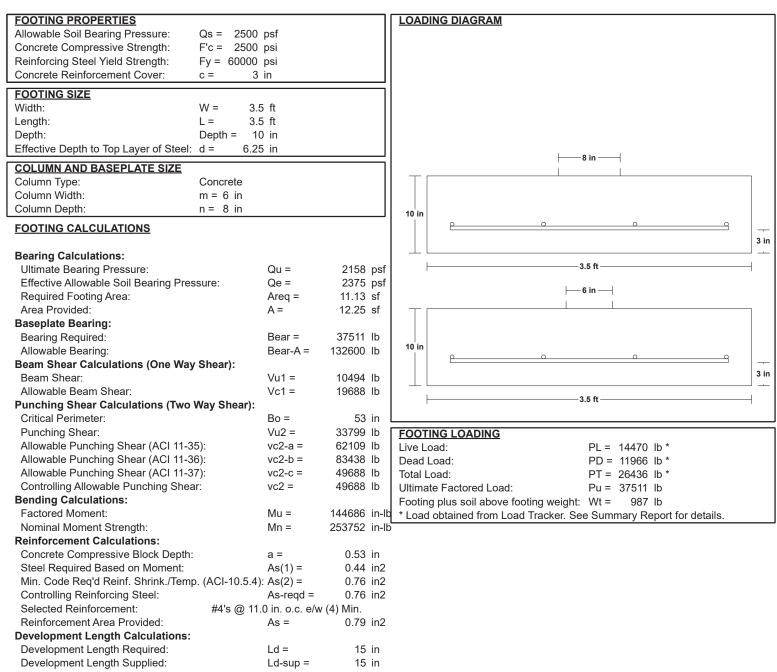


David L. Starkel Pacific Northwest Structural Group, Inc. 6193 NE Malbon Ct. Kingston, WA 98346



StruCalc Version 10.0.1.6

7/26/2019 3:55:08 PM



NOTES

Established Basic Permit #

19-03646

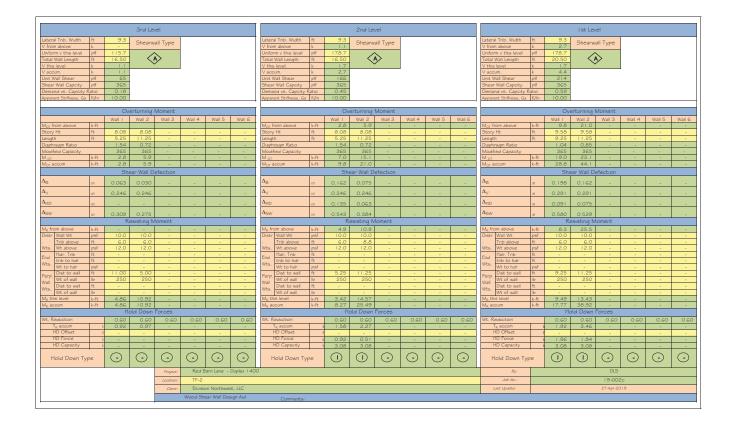
	~ .		Project:	Red Barn	Lane - Duplex 1400		By: DLS
Pacific Northwest	Sti	ructural 📘	Location:	NW Hoga	n Ln & Nels Nelson R	Rd NW, Bremerton, WA 98311	Project No.: 19-002c
Crown LLC			Client:		Northwest, LLC		Last Update:
Group, LLC				AWC		Vood Shear Wall Design Aid STRESS DESIGN	27-Apr-19
					STRESS DESIGN		
	Mark	Sheating Type, Nail S			stener Capacity	7	
		Spacing	g, & Capa	acity	(plf)		
	Ä	15/32" Sheathing W/ 8d			365	_	
	~	15/32" Sheathing W/ 8d	@ 4" oc		533	-	
	Ň	None			#N/A	-	
	$\times$	None			#N/A	-	
	$\times$	None None			#N/A #N/A	-	
	$\sim$	None			#IN/A	1	
					Holdown	1	
	Mark	Simpson Strong-	Tie	Capacity	Deflection at		
		Holdowns		(lb)	Highest Load (in)		
	(1)	HDU2-SDS2.5 W/ 3" F	Post	3,075	0.088	-	
		HDU5-SDS2.5 W/ 3" F	Post	5,645	0.115		
	3	HDU11-SDS2.5 W/ 5.5	5" Post	9,535		O SEISMIC	
	0	None		N/A	N/A	WIND	
	0	None		N/A	N/A		
	<u> </u>	None		N/A	N/A		
	<u> </u>	None		N/A	N/A		
	<u> </u>	None		N/A	N/A	-	
		None		N/A	N/A	_	
	<u> </u>	None		N/A	N/A	-	
	<u> </u>	None None		N/A	N/A	-	
	$\cup$	NONE		N/A	N/A	1	
	S	hear Wall Deflection					
G		90,000 psi					
E		1,200,000 psi					
		8.25 in <sup>2</sup>					



			3rd Le	vel								2nd Le	vel							l st Lev	el			
Lateral Trib. Width	ft	9.3	Shearw	all Type					eral Trib. Width	ft	9.3	Shearw	all Type				Lateral Trib. Width	ft	9.3	Shearw	all Type			
V from above Uniform v this level	k .	-							om above orm v this level	k	1.1						V from above Uniform v this level	k	2.7					
Total Wall Length	pit H	31.00		$\hat{A}$					al Wall Lenath	pH fr	178.7						Total Wall Lenath	pit fe	178.7	$\langle \cdot \rangle$	8			
V this level	k	1.1		~					is level	k	1.7		/				V this level	k	1.7		~			
V accum.	k	1.1							scum.	k	2.7						V accum.	k	4.4					
Unit Wall Shear	plf	35							Wall Shear	pH	105						Unit Wall Shear	pH	122					
Shear Wall Capcity Demand vs. Capcity R	plf	365	ł						ar Wall Capcity 1and vs. Capcity R	pH	365						Shear Wall Capcity Demand vs. Capcit	pH Ph	365					
Apparent Stiffness, Ga		10.00	ł											Apparent Stiffness, G		10.00								
	Overturning Moment										Overturning Moment									erturning l	Noment Wall 3			
	1	Wall I	Wall 2	Wall 3	Wall 4	Wall 5	Wall G			1	Wall I	Wall 2	Wall 3	Wall 4	Wall 5	Wall G						Wall 4	Wall 5	Wall G
M <sub>oT</sub> from above Story Ht	k-ft ft	8.08	8.08	8.08	8.08				from above rv Ht	k-ft fr	3.1 8.08	1.4 8.08	1.4	2.8 8.08	8.08	-	M <sub>OT</sub> from above Story Ht	k-ft fr	5.8 9.58	4.0 9.58	4.0	14.7 9.58	2.3	-
Length	ft	11.00	5.00	5.00	10.00	-	-		ath	ft	3.25	3.00	3.00	14.00	2.75		Length	ft	11.00	11.00		14.00	-	
Diaphragm Ratio		0.73	1.62	1.62	0.81	-	-	Diap	shragm Ratio		2.49	2.69	2.69	0.58	2.94	-	Diaphragm Ratio		0.87	0.87		0.68		-
Modified Capacity		365	365	365	365	-	-	Mod	dified Capacity		294	271	271	365	248	-	Modified Capacity		365	365		365	-	-
M or Mor accum	k-ft k-ft	3.1	1.4	1.4	2.8	-	-	Mo	T accum	k-ft k-ft	2.8 5.8	2.5 4.0	2.5	11.9	2.3	-	M or Mor accum	k-ft k-ft	12.9	12.9	- 4.0	16.4	- 2.3	-
MOL SCOUL	KHD.		ear Wall D		2.0		-	Mot	accom	KHU		ear Wall D		14.7	2.5	-	MOT accom	KHT.		ear Wall De		51.1	2.5	
4					_					1							4				necuon			
Δ <sub>B</sub>	II)	0.016	0.035	0.035	0.018	-	-	Δ <sub>B</sub>		II)	0.166	0.179	0.179	0.038	0.196		$\Delta_B$	In	0.095	0.095		0.074	-	-
$\Delta_V$	in	0.246	0.246	0.246	0.246	-	-	$\Delta_{\vee}$		m	0.246	0.246	0.246	0.246	0.246	-	$\Delta_{\vee}$	in	0.291	0.291		0.291	-	-
$\Delta_{HD}$	in	-		1	-			Δ <sub>ME</sub>	,	m	-	0.237	0.237	-	0.259	-	$\Delta_{HD}$	in	0.077	0.077	-	-	-	1.1
$\Delta_{SW}$	ir)	0.262	0.281	0.281	0.264	-	-	$\Delta_{SN}$	v	m	0.411	0.662	0.662	0.284	0.700		$\Delta_{SW}$	m	0.463	0.463		0.366	-	
		R	esisting N	Noment							R	esisting N	loment						R	esisting M	oment			
M <sub>R</sub> from above	k-ft	-	-	-	-	-	-		from above	k-ft	12.0	3.2	3.2	10.1	-	-	M <sub>R</sub> from above	k-ft	13.6	4.6	4.6	28.6	1.3	-
Distr Wall Wt	psł	10.0	10.0	10.0	10.0 6.0	-	-	Dist		pst	10.0	10.0	10.0	10.0	10.0	-	Distr Wall Wt	pst	10.0	10.0	-	10.0	-	-
. The above Wts. Wt above	ft rost	12.0	12.0	12.0	12.0			Wts	Trib above Wt above	re rest	12.0	12.0	12.0	6.0	12.0		. The above Wts. Wt above	ft psf	12.0	12.0	-	12.0		
End Hdr. Thb	ft	-	-	-	-	-	-	End	Hild Tab	ft	-	-	-	-	-	-	End Hdr. Tnb	ft	-	-	-	-	-	-
the to hdr	ft	-	-	-	-	-	-	Wts	thp to hdr	ft	-				-	-	the to har	ft	-			-	-	-
Wt to hdr Dist to wall	psł N	-	- 5.00	- 5.00	10.00	-	-		. Wt to hdr Dist to wall	pst	3.25	- 3.00	3.00	-	2.75	-	Dist to wall	pst	-	-	-	-	-	-
Perp.	lb	250	250	250	250		-	Per	2. Wt of wall	lb	250	250	250	250	2.75		Perp.	lb	500	500		500	-	
Wall Dist to wall	ft	-	-	-	-	-	-	Wall Wts	Dick to wall	ft	-	-	-	-	-	-	Wall Dist to wall	ft	-	-	-	-	-	-
Wt of wall	lb	-	-		-		-		Wt of wall	lb		-	-	-	-	-	Wt of wall	lb	-	-	-	-	-	
M <sub>R</sub> this level M <sub>R</sub> accum	k-ft k-ft	11.99	3.16	3.16	10.14	-	-		this level accum	k-ft k-ft	1.62	1.44	1.44	18.47	1.27	-	M <sub>R</sub> this level M <sub>R</sub> accum	k-ft	15.65	15.65	- 4.60	23.44 52.06	-	-
WK BODOM	KHU.		old Down		10.14			mig.	pocolii	AND.		old Down		20.01	1.27		WK BCCOIII	K*IC		old Down		52.08	1.67	
Wt. Reduction	-	0.60	0.60	0.60	0.60	0.60	0.60	Wt.	Reduction		0.60	0.60	0.60	0.60	0.60	0.60	Wt. Reduction		0.60	0.60	0.60	0.60	0.60	0.60
T <sub>R</sub> accum	1	1.09	0.63	0.63	1.01	-	-		T <sub>R</sub> accum		4.19	1.53	1.53	2.04	0.46	-	T <sub>R</sub> accum	ł	2.66	1.84	-	3.72	-	-
HD Offset	4	-	-	-	-	-	-		HD Offset	1	-	-	-	4.00	-	-	HD Offset	f	-	-	-	-	-	-
HD Force HD Capacity	ł				-		-		HD Force HD Capacity		-	0.40	0.40		0.57 3.08		HD Force HD Capacity		0.10	0.42			-	
The Capacity	. '								no capacity	-		-	-				no capacity		~	-				
Hold Down Typ	e e	$\odot$	$\odot$	$\odot$	$\odot$	$\odot$	$\odot$	Hold Down Type         Image: Open content of the second seco													$\odot$	$\odot$	$\odot$	
Red Barn Lane - Duplex 1400 By:															DLS									
Lacatori TF-1																								
				Chent:	Envisio	on Northwes	st, LLC										Last Update:				27-Apr-20	19		
					Wood Sh	ear Wall Des	sign Aid		Comments:		See Perfor	ated Shear	Calculations											

19-03646

7/28/2019 1:53 PM NUsers\dIsta\Dropbox\PNW Project Files\2019 Projects\19-002C Red Barn Lane - Duplex 1400/ENGR\19-002c Timber Shear Wall 2018.vtsx1TF-1



19-03646

7/26/2019 1:53 PM 2/Usersidista\Dropbox/PNW Project Files/2019 Projects/19-002C Red Barn Lane - Duplex 1400/ENGR(19-002c Timber Shear Wall 2018.vtsxTF-2

			3rd Le	vel								2nd Le	vel					I st Level						
Lateral Trib. Width	ft	18.5	Sheary	all Type					eral Trib. Width	ft	18.5	Sheary	all Type				Lateral Trib. Width	ft	18.5	Shearw	all Type			
V from above	k	-	Oneon	ion Type					om above	k	1.6	Onobra	on type				V from above	k	3.4	Onobriv	un rypo			
Uniform v this level	plf	88.3	/	$\hat{A}$					form v this level	pH	96.0	/	$\sim$				Uniform v this level	plf	101.6	/	$\sim$			
Total Wall Length	ft	7.84		<u>ا ۲</u>					al Wall Length	ft	13.08		<u>م</u>				Total Wall Length	ft	15.08		$\gamma$			
V this level	k	1.6							his level	k	1.8						V this level	k	1.9					
V accum. Unit Wall Shear	k	1.6 208							ccum. t Wall Shear	k	3.4						V accum. Unit Wall Shear	k	5.3 351					
Shear Wall Capcity	pir	365							ar Wall Capcity	pit	365						Shear Wall Capcity	pir	365					
Demand vs. Capcity	Pit	0.57	-						ar wai Capcity nand vs. Capcity F		0.71						Demand vs. Capcity	Patro	0.96					
Apparent Stiffness, Ga		10.00	ł												Apparent Stiffness, Ga		10.00							
separate settinass, or	1.400	10.00						144	arene bennebb, ca	1 VIII	10.00						reparent comments, co	1410	10.00					
		Overturning Moment											erturning											
		Wall I	Wall 2	Wall 3	Wall 4	Wall 5	Wall G				Wall I	Wall 2	Wall 3	Wall 4	Wall 5	Wall G			Wall I	Wall 2	Wall 3	Wall 4	Wall 5	Wall G
M <sub>ot</sub> from above	k-ft								from above	k-ft	4.1	5.1	4.1				M <sub>OT</sub> from above	k-ft	9.3	13.6	9.3	4.2	4.2	
Story Ht	ft	8.08	8.08	8.08					iry Ht	代	8.08	8.08	8.08	8.08	8.08		Story Ht	ft	9.58	9.58	9.58	9.58	9.58	
Length	代	2.42	3.00	2.42	-		-		gth	代	2.50	4.08	2.50	2.00	2.00		Length	ft:	1.75	7.58	1.75	2.00	2.00	
Diaphragm Ratio Modified Capacity		3.34	2.69	3.34	-	-	-		phragm Ratio dified Capacity	_	3.23	1.98	3.23	4.04	4.04	-	Diaphragm Ratio Modified Capacity		5.47	1.26	5.47	4.79	4.79	-
M	k-ft	4.1	5.1	4.1		-		MO	amea Capacity	k-ft	5.3	365	5.3	N/A 4.2	N/A 4.2	-	M	k-ft	N/A 5.9	25.5	N/A 5.9	N/A 6.7	N/A 6.7	
M <sub>OT</sub> accum	k-ft	4.1	5.1	4.1				M	r accum	k-ft	9.3	13.6	9.3	4.2	4.2		Mor accum	k-ft	15.2	39.1	15.2	10.9	10.9	
and become	1000		ear Wall D							A.T.		ear Wall D		2.12			mol woodin	10-10-		ear Wall D		10.0		
	-	On	car wall b	election						1	On:	ear wall D	election	-				-	Sne	sar wali D	election			
Δ <sub>B</sub>	in	0.440	0.355	0.440	-	-	-	Δ <sub>B</sub>		m	0.533	0.327	0.533	0.667	0.667	-	Δ <sub>B</sub>	ın	1.709	0.395	1.709	1.495	1.495	-
$\Delta_{\vee}$	in	0.246	0.246	0.246	-	-	-	$\Delta_{\vee}$		m	0.246	0.246	0.246	0.246	0.246	-	$\Delta_{\vee}$	ın	0.291	0.291	0.291	0.291	0.291	-
$\Delta_{HD}$	in	0.294	0.237	0.294	-	-	-	$\Delta_{HI}$	D	ın	0.372	0.174	0.372	0.356	0.356	-	Δ <sub>HD</sub>	ın	0.750	0.145	0.750	0.551	0.551	-
$\Delta_{SW}$	in	0.980	0.838	0.980	-			$\Delta_{S^{(i)}}$	N	in 1	1.151	0.747	1.151	1.268	1.268	-	$\Delta_{SW}$	in	2.750	0.831	2.750	2.337	2.337	
		R	esisting N	Noment							R	esisting N	Ioment			•			R	esisting N	loment			
M <sub>o</sub> from above	k-ft.		-		-			Me	from above	k-ft	0.8	1.2	0.8	-	-		M <sub>o</sub> from above	k-ft	1.3	2.5	1.3	0.3	0.3	
Distr Wall Wt	psł	10.0	10.0	10.0	-	-	-	Dist	tr Wall Wt	pst	10.0	10.0	10.0	10.0	10.0	-	Distr Wall Wt	pst	10.0	10.0	10.0	10.0	10.0	
. The above	ft	16.3	16.3	16.3	-	-	-		Trib above	ft	6.0	6.0	6.0	6.0	6.0	-	. Trib above	ft	6.0	6.0	6.0	6.0	6.0	-
Wts. Wt above	psf	12.0	12.0	12.0	-	-		Wts	<ol> <li>Wt above</li> </ol>	psf	12.0	12.0	12.0	12.0	12.0	-	Wts. Wt above	psł	12.0	12.0	12.0	12.0	12.0	-
End Hdr. Thb	ft	-	-		-	-		End	Hdr. Tnb	ft	-	-		-		-	End Hdr. Thb	ft	-	-				-
Whe the to her	ft	-	-		-			Wte	trip to hdr	ft		-	-	-	-		Whe the to har	ft	-	-	-		-	
Wt to hdr	psł	-		-	-				Wt to hdr	pst	-	-	-	-	-		Wt to hdr	pst	-	-	-			-
Perp. Dist to wall	10	-						Per	P. Dist to wall	10							Perp. Dist to wall	10		-	-			-
Wall Dist to wall	ID ID	-		-				Wal	Dist to wall	1D							Wall Dist to wall	1D		-	-			
Wts. Wt of wall	TC III				-			Wts	Wt of wall	it.	-		-		-		Wts. Ust to wall	TC Ibs		-				
M <sub>R</sub> this level	ID k_ft	0.81	1.24	0.81				Ma	this level	k-ft	0.48	1.27	0.48	0.31	0.31		M <sub>p</sub> this level	ID k_ft	0.26	4.82	0.26	0.34	0.34	
M <sub>R</sub> accum	k-ft	0.81	1.24	0.81					accum	k-ft	1.29	2.51	1.29	0.31	0.31		M <sub>P</sub> accum	k-ft	1.54	7.33	1.54	0.64	0.64	
			old Down									old Down								old Down				
Wt. Reduction		0.60	0.60	0.60	0.60	0.60	0.60	Wt.	Reduction		0.60	0.60	0.60	0.60	0.60	0.60	Wt. Reduction	-	0.60	0.60	0.60	0.60	0.60	0.60
T <sub>p</sub> accum		0.33	0.41	0.33					T <sub>R</sub> accum	1	0.51	0.62	0.51	0.15	0.15		T <sub>p</sub> accum	k	0.88	0.80	0.88	0.80	0.80	- 0.00
HD Offset		-	-	-	-		-		HD Offset			-	-	-			HD Offset	f		-	-	-	-	
HD Force		1.48	1.44	1.48	-		-		HD Force		3.43	2.97	3.43	2.01	2.01		HD Force	k	8.17	4.58	8.17	5.27	5.27	
HD Capacity		3.08	3.08	3.08	-	-	-		HD Capacity		5.65	3.08	5.65	3.08	3.08	-	HD Capacity	k	9.54	5.65	9.54	5.65	5.65	-
Hold Down Ty	/pe			0	$\odot$	$\odot$	$\odot$		Hold Down Typ	>e	2		2		0	$\odot$	Hold Down Ty	npe	3	2	3	2	2	$\odot$
				Project:	Red B	Barn Lane -	Duplex 140	00							By:			•	DLS					
Laaton: LF-1 Jde Mo.: 19-002c																								
1				Client:	Enviso	on Northwe	st, LLC										Last Update:				27-Apr-20	19		
							1										· · · ·	-						
Wood Shear Wall Design Aul Commerts: See Perforated Shear Calculations																								

19-03646

7/28/2019 1:53 PM Users/dista\Dropbox/PNW Project Files/2019 Projects\19-002C Red Barn Lane - Duplex 1400/ENGR(19-002c Timber Shear Wall 2018.xisx\LF-1

								_																	
			3rd Le	vel								2nd Le	vel				I st Level								
Lateral Trib. Width	ft	18.5	Shearw	all Type	1				eral Trib. Width	ft	18.5	Shearw	all Type				Lateral Trib. Width	ft	20.0	Shearw	all Type				
V from above	k	-	oncorri	ion Type					om above	k	1.6	Onobra	on type				V from above	k	3.4	Onobra	un rypo				
Uniform v this level	plf	88.3	/	$\sim$					orm v this level	pH	96.0	/	$\sim$				Uniform v this level	pH	101.6	/	$\sim$				
Total Wall Length	ft	21.08		$\rightarrow$					al Wall Length	ft	31.58		Y				Total Wall Length	ft	30.08		Y .				
V this level	k	1.6							ns level	k	1.8						V this level	k	2.0						
V accum.	k	1.6							ccum.	k	3.4						V accum.	k	5.4						
Unit Wall Shear	pił	77							: Wall Shear	pH	108						Unit Wall Shear	pH	181						
Shear Wall Capcity Demand vs. Capcity	pit	0.21							ar Wall Capcity	pH	365						Shear Wall Capcity Demand vs. Capcity	pit	365						
Apparent Stiffness, Ga		10.00													Apparent Stiffness, Ga		10.00								
Apparent Stiffness, Ga	a Miri	10.00						App;	arent btiffness, Ga	Niri	10.00						Apparent Stiffness, Ga	Nin	10.00						
	Overturning Moment Wall 1 Wall 2 Wall 3 Wall 4 Wall 5 Wall 6								Overturning Moment																
	Wall I Wall 2 Wall 3 Wall 4 Wall 5 Wall 6										Wall I			Wall 4	Wall 5	Wall G			Wall I	Wall 2 Wall 3 Wall 4 Wall 5 Wall 6					
M <sub>OT</sub> from above	k-ft								from above	k-ft	2.0	2.0	1.6	1.9	-	-	M <sub>OT</sub> from above	k-ft	5.3	5.3	3.7	14.2	-	-	
Story Ht	ft	8.08	8.08	8.08	8.08	-	-		ry Ht	ft	8.08	8.08	8.08	8.08		-	Story Ht	ft	9.58		-	9.58	-	100	
Length	ft	3.25	3.25	2.50	3.08	-	-		gth	ft	3.75	3.75	2.50	14.08	-	-	Length	ft	11.50		-	7.08	100 A	1.00	
Diaphragm Ratio		2.49	2.49	3.23	2.62	-	-		ohragm Ratio		2.15	2.15	3.23	0.57	-	-	Diaphragm Ratio		0.83	-	-	1.35	-	-	
Modified Capacity		294	294	226	278	-	-	Mod	dified Capacity		339	339	226	365	-	-	Modified Capacity	1	365	-	-	365	-	-	
M ot	k-ft	2.0	2.0	1.6	1.9			Mo	εT	k-ft	3.3	3.3	2.2	12.3			M OT	k-ft	19.9			12.3		100 A	
M <sub>OT</sub> accum	k-ft	2.0	2.0	1.6	1.9		-	Mot	accum	k-ft	5.3	5.3	3.7	14.2		-	M <sub>OT</sub> accum	k-ft	25.2	5.3	3.7	26.5		1.1	
		Sh	ear Wall D	efection							Sh	ear Wall D	efection						She	ear Wall D	efection				
$\Delta_B$	in	0.122	0.122	0.159	0.129	-	-	$\Delta_{\rm B}$		m	0.147	0.147	0.221	0.039	1.1	-	$\Delta_{B}$	in 1	0.134	-	-	0.218	-	-	
$\Delta_{\vee}$	irì	0.246	0.246	0.246	0.246	-	-	$\Delta_{\vee}$		ın	0.246	0.246	0.246	0.246	-	-	$\Delta_{\vee}$	in 1	0.291	-	-	0.291		1	
Δ <sub>HD</sub>	in	0.219	0.219	0.284	-	-	-	$\Delta_{HE}$	>	m	0.190	0.190	0.284	0.051	1	_	Δ <sub>HD</sub>	in .	0.073	-	-	0.119	-		
$\Delta_{SW}$	in	0.587	0.587	0.689	0.374	-	-	$\Delta_{SV}$	N	m	0.583	0.583	0.751	0.335		-	$\Delta_{SW}$	in .	0.499	-	-	0.628	-	-	
		R	esisting N	Noment							R	esisting N	Ioment						R	esisting N	loment				
M <sub>R</sub> from above	k-ft		-	-	-	-	-	M <sub>p</sub> I	from above	k-ft	1.6	1.6	1.5	2.8	-	-	M <sub>e</sub> from above	k-ft	2.7	2.7	2.0	18.0	- 1		
Distr Wall Wt	pst	10.0	10.0	10.0	10.0	-	-	Dist	tr Wall Wt	pst	10.0	10.0	10.0	10.0	-	-	Distr Wall Wt	pst	10.0	-	-	10.0		-	
. The above	ft	6.0	6.0	16.3	16.3	-	-		Trib above	ft	6.0	6.0	6.0	6.0	-	-	. The above	ft	6.0	-	-	6.0	-	-	
Wts. Wt above	pst	12.0	12.0	12.0	12.0	-	-	Wts	. Wt above	psf	12.0	12.0	12.0	12.0	-	-	Wts. Wt above	psf	12.0	-	-	12.0	-	-	
End Hdr. Thb	ft	-	-	-	-		-	End	Hdr. Tnb	ft	-	-	-		-	-	End Hdr. Thb	ft	-	-	-			-	
Whe to ndr	ft	-	-	-	-	-	-	Wts	thb to hdr	ft	-	-	-	-	-	-	Whe the to har	ft	-	-	-	-	-	-	
Wt to hdr	psł	-	-	-	-	-	-		Wt to hdr	pst	-	-	-		-		Wt to hdr	pst	-	-	-	-	-	-	
Perp. Dist to wall	ft	3.25	3.25	2.50	3.08	-	-	Perp	p. Dist to wall	代	-	-	-	-	-	-	Perp. Dist to wall	ft:	-	-	-	-	-	-	
Wt of wall	lb	250	250	250	500	-	-	Wall	Wt of wall	Ib			-		-		Wt of wall	Ib	-		-	-	-		
Wts. Dist to wall	10				-			Wts	Dist to wall Wt of wall	10							Wts. Dist to wall	31			-	-			
Me this level	k-ft	1.62	1.62	1.49	2.85			M.	this level	k-ft	1.07	1.07	0.48	15.15			M <sub>P</sub> this level	lb k-ft	11.10			4.21			
M <sub>R</sub> accum	k-ft k-ft	1.62	1.62	1.49	2.85	-	-		accum	k-ft k-ft	2.69	2.69	1.96	15.15		-	M <sub>R</sub> this level M <sub>R</sub> accum	k-ft k-ft	13.79	2.69	1.96	22.20			
Wig accom	KHU		old Down		2.05			mig i	pour diff	AND		old Down		17.55			WK BCCOM	NºIC .		old Down		22.20			
We Reduction	_				0.00	0.00	0.00	14/2	Paduction					0.00	0.00	0.00	Wt. Reduction					0.00	0.00	0.00	
Wt. Reduction Tp accum	-	0.60	0.60	0.60	0.60	0.60	0.60	we.	Reduction T <sub>R</sub> accum		0.60	0.60	0.60	0.60	0.60	0.60	To accum		0.60	0.60	0.60	0.60	0.60	0.60	
HD Offset		0.50	0.50	0.59	0.92				HD Offset		0.72	0.72	0.79	7.00	-		HD Offset		1.20			5.14	_		
HD Force		0.33	0.33	0.27			-		HD Force	-	0.98	0.98	1.03	0.48			HD Force		1.48		-	-	_	-	
HD Capacity		3.08	3.08	3.08					HD Capacity		3.08	3.08	3.08	3.08			HD Capacity		3.08			3.08			
Obpocity	_	3.00	~	-					the approvely		3.00	3.00	~				Dopology		3.00			-			
Hold Down T	уре		( <b>1</b> )	$\bigcirc$	$\odot$	$\odot$	$\odot$	Hold Down Type         (1)         (1)         (1)         (2)         (3)							Hold Down Ty	Hold Down Type 1 🖸 🕣 1				$\odot$	$\odot$				
				Project:		ðarn Lane -	Duplex 140	0				•	•				By:			•	DLS				
				Location:	LF-2												Job No.:				19-002	20			
				Client:	Ertvise	on Northwes	st, LLC										Last Update:				27-Apr-20	19			
					Wood Sh	ear Wall Day	sian Aid	-		_								_	_						
I	Wood Shear Wall Design Aid Commerts: See Perforated Shear Calculations																								

19-03646

7/28/2019 1:53 PM Users\dista\Dropbox\PNW Project Files\2019 Projects\19-002C Red Barn Lane - Duplex 1400\ENGR\19-002c Timber Shear Wall 2018.visx\LF-2

Project:	Red Barn Lane - Duplex 1400	By:	DLS
Location:	NW Hogan Ln & Nels Nelson Rd NW, Bremerton, WA 98311	Project No.:	19-002c
Client:	Envision Northwest, LLC	Last Update:	27-Apr-19
	PERFORATED SHEAR WALL EFFECTIVE SHEAR CA	APACITY RATIO	

Wall Line	Force to Wall [P] (K)	Total Length of Wall [L] (ft)	Length of Full Height Shearwall [A I +A3+A5] (ft)	Unit Shear in Wall (plf)	Percent Full Height Sheathing	Plate Height [H] (ft)	Unrestrain	imum ed Opening (B2+B3) (%)	Effective Shear Capacity Ratio	Required Capacity (plf)	Shearwall Capacity (plf)	Ratio	Revised Shearwall Type	Combined Resisting Force (K)	Required Uplift Capacity (K)	Revised Holdown Type
TF-I-2-WL   \$ 5	0.63	8.25	6.00	105	73%	8	5	62%	0.799	132	365	0.3608	A	4.19	(3.12)	
TF-1-2-WL 2 # 3	0.63	11.00	6.00	105	55%	8	5	62%	0.724	145	365	0.3979	A	1.53	(0.36)	
LF-I-2-WL   \$ 4	1.17	13.00	4.50	261	35%	8	5	62%	0.650	401	532.5	0.7529	В	0.51	2.73	
LF-2-3-WL   \$ 2	0.50	11.50	6.50	77	57%	8	5	62%	0.732	106	365	0.2902	A	-	0.86	
LF-2-3-WL 3-5	0.63	14.08	8.08	77	57%	8	5	62%	0.735	105	365	0.289	A	0.92	(0.07)	
	-	-	-			-	-							-	-	
	-	-	-			-	-							-	-	-
	-	-	-			-	-							-	-	
	-	-	-			-	-							-	-	
	-	-	-			-	-							-	-	$\overline{}$
	-	-	-			-	-							-	-	$\bigcirc$
	-	-	-			-	-							-	-	-
	-	-	-			-	-							-	-	$\overline{}$
	-	-	-			-	-							-	-	-
	-	-	-			-	-							-	-	-
	-	-	-			-	-							-	-	
	-	-	-			-	-							-	-	$\odot$
	-	-	-			-	-							-	-	
	-	-	-			-	-							-	-	$\odot$
	-	-	-			-	-							-	-	$\bigcirc$
	-	-	-			-	-							-	-	<u> </u>
	-	-	-			-	-							-	-	<u> </u>
	-	-	-			-	-							-	-	
	-	-	-			-	-							-	-	<u> </u>
	-	-	-			-	-							-	-	<u> </u>
	-	-	-			-	-							-	-	$\bigcirc$
	-	-	-			-	-							-	-	
	-	-	-			-	-							-	-	<u> </u>
	-	-	-			-	-							-	-	<u> </u>
	-	-	-			-	-							-	-	<u> </u>
	-	-	-			-	-							-	-	<u> </u>
	-	-	-			-	-							-	-	<u> </u>
	-	-	-			-	-							-	-	$\bigcirc$
	-	-	-			-	-							-	-	
	-	-	-			-	-							-	-	<u> </u>
	-	-	-			-	-							-	-	$\odot$