PACIFIC NORTHWEST STRUCTURAL GROUP, LLC

A PROFESSIONAL ENGINEERING COMPANY

6193 NE MALBON CT.
KINGSTON, WA 98346
360.903.2803

BASIC PERMIT PACKAGE
REVIEWED FOR CODE COMPLIANCE
WITH IRC 2015
KITSAP COUNTY BUILDING DEPARTMENT

SUPPLEMENTAL STRUCTURAL CALCULATIONS

19-002A RED BARN LANE - DUPLEX 1880/1620A
NW HOGAN LN & NELS NELSON RD NW
BREMERTON, WA 98311

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

Reviewed for code compliance
with IRC 2015
Kitsap County Building Department
lasmith@co.kitsap.wa.us
11/16/2020

Established Basic Permit #
19-03671

Permit Number: 20-04896

Project: 19-002 Framing - Duplex

Location: MLB3-5A
Multi-Loaded Multi-Span Beam
[2015 International Building Code(2015 NDS)]
3.5 IN x 18.0 IN x 9.67 FT (4 + 5.7)
24F-V4 - Visually Graded Western Species - Dry Use
Section Adequate By: 135.5%
Controlling Factor: Moment

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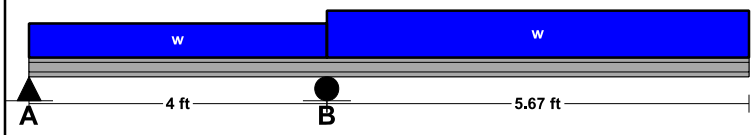
DEFLECTIONS	Center		Right	
Live Load	0.00	IN L/MAX	0.06	IN 2L/2306
Dead Load	0.00	in	0.04	in
Total Load	-0.01	IN L/7399	0.10	IN 2L/1308

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS	A		B	
Live Load	544	lb	4584	lb
Dead Load	-784	lb	3804	lb
Total Load	-240	lb	8388	lb
Uplift (1.5 F.S)	**-2459**	**lb**	0	**lb**
Bearing Length	0.00	in	3.69	in

BEAM DATA	Center		Right	
Span Length	4	ft	5.67	ft
Unbraced Length-Top	0	ft	0	ft
Unbraced Length-Bottom	4	ft	5.67	ft
Live Load Duration Factor	1.00			
Notch Depth	0.00			

LOADING DIAGRAM



UNIFORM LOADS	Center*		Right*	
Uniform Live Load	272	plf	417	plf
Uniform Dead Load	267	plf	321	plf
Beam Self Weight	14	plf	14	plf
Total Uniform Load	553	plf	752	plf

* Load obtained from Load Tracker. See Summary Report for details.

MATERIAL PROPERTIES

24F-V4 - Visually Graded Western Species

	Base Values			Adjusted		
Bending Stress:	Fb =	2400	psi	*Controlled by:*		
	Fb_cmpr =	1850	psi	Fb_cmpr' =	1806	psi
	Cd=1.00 Cl=0.98					
Shear Stress:	Fv =	265	psi	Fv' =	265	psi
	Cd=1.00					
Modulus of Elasticity:	E =	1800	ksi	E' =	1800	ksi
Comp. ⊥ to Grain:	Fc - ⊥ =	650	psi	Fc - ⊥' =	650	psi

Controlling Moment: -12082 ft-lb
Over left support of span 3 (Right Span)
Created by combining all dead loads and live loads on span(s) 3
Controlling Shear: -3308 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:	Req'd		Provided	
Section Modulus:	80.27	in3	189	in3
Area (Shear):	18.72	in2	63	in2
Moment of Inertia (deflection):	311.89	in4	1701	in4
Moment:	-12082	ft-lb	28449	ft-lb
Shear:	-3308	lb	11130	lb

NOTES

Established Basic Permit #
19-03671

Permit Number: 20-04896

Project: 19-002 Framing - Duplex

Location: DJST2-2A
Floor Joist
[2015 International Building Code(2015 NDS)]
1.5 IN x 7.25 IN x 5.67 FT Pressure Treated @ 16 O.C.
#2 - Hem-Fir - Dry Use
Section Adequate By: 155.7%
Controlling Factor: Moment

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DEFLECTIONS Center

Live Load	0.03	IN L/2152
Dead Load	0.01	in
Total Load	0.04	IN L/1722

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

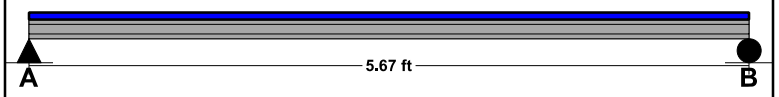
REACTIONS

	A	B
Live Load	227 lb	227 lb
Dead Load	57 lb	57 lb
Total Load	284 lb	284 lb
Bearing Length	0.47 in	0.47 in

SUPPORT LOADS

	A	B
Live Load	170 plf	170 plf
Dead Load	43 plf	43 plf
Total Load	213 plf	213 plf

LOADING DIAGRAM



MATERIAL PROPERTIES

#2 - Hem-Fir

	Base Values	Adjusted
Bending Stress:	Fb = 850 psi	Fb' = 938 psi
	Cd=1.00 CF=1.20 Cr=1.15 Ci=0.80	
Shear Stress:	Fv = 150 psi	Fv' = 120 psi
	Cd=1.00 Ci=0.80	
Modulus of Elasticity:	E = 1300 ksi	E' = 1235 ksi
	Ci=0.95	
Comp. ⊥ to Grain:	Fc - ⊥ = 405 psi	Fc - ⊥' = 405 psi

Controlling Moment: 402 ft-lb
2.84 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2
Controlling Shear: 227 lb
At 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'd	Provided
Section Modulus:	5.14 in3	13.14 in3
Area (Shear):	2.84 in2	10.88 in2
Moment of Inertia (deflection):	7.97 in4	47.63 in4
Moment:	402 ft-lb	1028 ft-lb
Shear:	227 lb	870 lb

JOIST DATA Center

Span Length	5.67	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

JOIST LOADING

Uniform Floor Loading Center

Live Load	LL =	60	psf
Dead Load	DL =	15	psf
Total Load	TL =	75	psf
TL Adj. For Joist Spacing	wT =	100	plf

NOTES

Established Basic Permit #
19-03671

Permit Number: 20-04896

Project: 19-002 Framing - Duplex

Location: MLBD-2-2A
Multi-Loaded Multi-Span Beam
[2015 International Building Code(2015 NDS)]
3.5 IN x 11.875 IN x 8.0 FT
1.55E Timberstrand LSL - iLevel Trus Joist
Section Adequate By: 551.7%
Controlling Factor: Moment

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DEFLECTIONS	Center	
Live Load	0.02	IN L/4639
Dead Load	0.02	in
Total Load	0.04	IN L/2578

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS	A		B	
Live Load	680	lb	680	lb
Dead Load	544	lb	544	lb
Total Load	1224	lb	1224	lb
Bearing Length	0.39	in	0.39	in

BEAM DATA	Center	
Span Length	8	ft
Unbraced Length-Top	0	ft
Unbraced Length-Bottom	8	ft
Live Load Duration Factor	1.00	
Notch Depth	0.00	

MATERIAL PROPERTIES

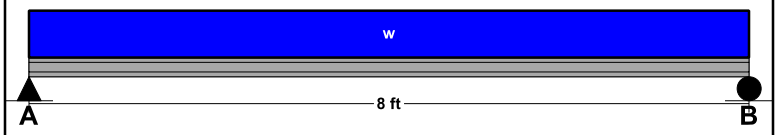
1.55E Timberstrand LSL - iLevel Trus Joist

	Base Values		Adjusted	
Bending Stress:	Fb = 2325	psi	Fb' = 2327	psi
	Cd=1.00 CF=1.00			
Shear Stress:	Fv = 310	psi	Fv' = 310	psi
	Cd=1.00			
Modulus of Elasticity:	E = 1550	ksi	E' = 1550	ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 900	psi	Fc - ⊥' = 900	psi

Controlling Moment: 2448 ft-lb
4.0 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2
Controlling Shear: 930 lb
At 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'd		Provided	
Section Modulus:	12.62	in3	82.26	in3
Area (Shear):	4.5	in2	41.56	in2
Moment of Inertia (deflection):	45.48	in4	488.41	in4
Moment:	2448	ft-lb	15953	ft-lb
Shear:	930	lb	8590	lb

LOADING DIAGRAM



UNIFORM LOADS	Center*	
Uniform Live Load	170	plf
Uniform Dead Load	123	plf
Beam Self Weight	13	plf
Total Uniform Load	306	plf

* Load obtained from Load Tracker. See Summary Report for details.

NOTES

Established Basic Permit #
19-03671

Permit Number: 20-04896

Project: 19-002 Framing - Duplex

Location: JST2-12A
Floor Joist
[2015 International Building Code(2015 NDS)]
TJI 110 / 11.875 - iLevel Trus Joist x 9.17 FT @ 16 O.C.
Section Adequate By: 170.6%
Controlling Factor: End Reaction

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DEFLECTIONS Center

Live Load	0.04	IN L/2629
Dead Load	0.02	in
Total Load	0.06	IN L/1912

Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360

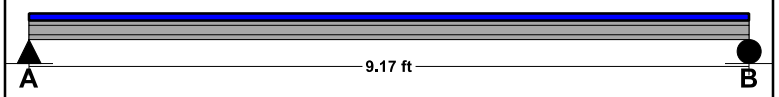
REACTIONS

	A		B	
Live Load	245	lb	245	lb
Dead Load	92	lb	92	lb
Total Load	337	lb	337	lb
Bearing Length	1.75	in	3.50	in
Web Stiffeners	No		No	

SUPPORT LOADS

	A		B	
Live Load	184	plf	184	plf
Dead Load	69	plf	69	plf
Total Load	253	plf	253	plf

LOADING DIAGRAM



I-JOIST PROPERTIES

TJI 110 / 11.875 - iLevel Trus Joist

	Base Values	Adjusted
Moment Cap:	Mcap = 3160 ft-lb	Mcap' = 3160 ft-lb
	Cd = 1.00	
Shear Stress:	Vcap = 1560 lb	Vcap' = 1560 lb
	Cd = 1.00	
Reaction A:	Rcap = 910 lb	Rcap' = 910 lb
Reaction B:	Rcap = 1375 lb	Rcap' = 1375 lb
E.I.:	EI = 267 lb-in2	EI' = 267 lb-in2

JOIST DATA Center

Span Length	9.17	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

JOIST LOADING

Uniform Floor Loading		Center	
Live Load	LL =	40	psf
Dead Load	DL =	15	psf
Total Load	TL =	55	psf
TL Adj. For Joist Spacing	wT =	73.3	plf

Controlling Moment: 771 ft-lb
4.58 Ft from left support of span 3 (Right Span)
Created by combining all dead and live loads.
Controlling Shear: -336 lb
9.0 Ft from left support of span 2 (Center Span)
Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
E.I.:	50 in2-lb E6	267 in2-lb xE6
Moment:	771 ft-lb	3160 ft-lb
Shear:	-336 lb	1560 lb

NOTES

Established Basic Permit #
19-03671

Permit Number: 20-04896

Project: 19-002 Framing - Duplex

Location: MLB2-10A
Multi-Loaded Multi-Span Beam
[2015 International Building Code(2015 NDS)]
1.75 IN x 11.875 IN x 5.67 FT
1.55E Timberstrand LSL - iLevel Trus Joist
Section Adequate By: 664.9%
Controlling Factor: Moment

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DEFLECTIONS Center

Live Load	0.01	IN L/6020
Dead Load	0.00	in
Total Load	0.02	IN L/4269

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

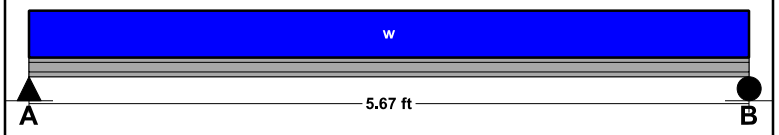
REACTIONS

	A		B	
Live Load	522	lb	522	lb
Dead Load	214	lb	214	lb
Total Load	736	lb	736	lb
Bearing Length	0.47	in	0.47	in

BEAM DATA Center

Span Length	5.67	ft
Unbraced Length-Top	0	ft
Unbraced Length-Bottom	5.67	ft
Live Load Duration Factor	1.00	
Notch Depth	0.00	

LOADING DIAGRAM



UNIFORM LOADS Center*

Uniform Live Load	184	plf
Uniform Dead Load	69	plf
Beam Self Weight	6	plf
Total Uniform Load	259	plf

* Load obtained from Load Tracker. See Summary Report for details.

MATERIAL PROPERTIES

1.55E Timberstrand LSL - iLevel Trus Joist

	Base Values		Adjusted	
Bending Stress:	Fb = 2325	psi	Fb' = 2327	psi
	Cd=1.00 CF=1.00			
Shear Stress:	Fv = 310	psi	Fv' = 310	psi
	Cd=1.00			
Modulus of Elasticity:	E = 1550	ksi	E' = 1550	ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 900	psi	Fc - ⊥' = 900	psi

Controlling Moment: 1043 ft-lb
2.84 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2
Controlling Shear: 486 lb
At 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'd	Provided
Section Modulus:	5.38 in3	41.13 in3
Area (Shear):	2.35 in2	20.78 in2
Moment of Inertia (deflection):	14.6 in4	244.21 in4
Moment:	1043 ft-lb	7977 ft-lb
Shear:	486 lb	4295 lb

NOTES

Established Basic Permit #
19-03671

Permit Number: 20-04896

Project: 19-002 Framing - Duplex

Location: MLBD-2-3A
Multi-Loaded Multi-Span Beam
[2015 International Building Code(2015 NDS)]
3.5 IN x 11.875 IN x 15.58 FT
1.55E Timberstrand LSL - iLevel Trus Joist
Section Adequate By: 56.2%
Controlling Factor: Deflection

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DEFLECTIONS Center

Live Load	0.25	IN L/737
Dead Load	0.25	in
Total Load	0.50	IN L/375

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A		B	
Live Load	1412	lb	682	lb
Dead Load	1148	lb	950	lb
Total Load	2560	lb	1632	lb
Bearing Length	0.81	in	0.52	in

BEAM DATA Center

Span Length	15.58	ft
Unbraced Length-Top	0	ft
Unbraced Length-Bottom	15.58	ft
Live Load Duration Factor	1.00	
Notch Depth	0.00	

MATERIAL PROPERTIES

1.55E Timberstrand LSL - iLevel Trus Joist

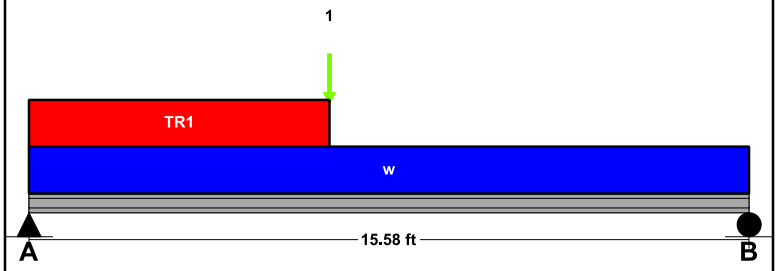
	Base Values		Adjusted	
Bending Stress:	Fb = 2325	psi	Fb' = 2327	psi
	Cd=1.00 CF=1.00			
Shear Stress:	Fv = 310	psi	Fv' = 310	psi
	Cd=1.00			
Modulus of Elasticity:	E = 1550	ksi	E' = 1550	ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 900	psi	Fc - ⊥' = 900	psi

Controlling Moment: 9315 ft-lb
6.54 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Controlling Shear: 2237 lb
At 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'd		Provided	
Section Modulus:	48.03	in3	82.26	in3
Area (Shear):	10.83	in2	41.56	in2
Moment of Inertia (deflection):	312.71	in4	488.41	in4
Moment:	9315	ft-lb	15953	ft-lb
Shear:	2237	lb	8590	lb

LOADING DIAGRAM



UNIFORM LOADS Center*

Uniform Live Load	30	plf
Uniform Dead Load	90	plf
Beam Self Weight	13	plf
Total Uniform Load	133	plf

* Load obtained from Load Tracker. See Summary Report for details.

POINT LOADS - CENTER SPAN

Load Number	One *
Live Load	522 lb
Dead Load	214 lb
Location	6.5 ft

* Load obtained from Load Tracker. See Summary Report for details.

TRAPEZOIDAL LOADS - CENTER SPAN

Load Number	One *
Left Live Load	170 plf
Left Dead Load	43 plf
Right Live Load	170 plf
Right Dead Load	43 plf
Load Start	0 ft
Load End	6.5 ft
Load Length	6.5 ft

* Load obtained from Load Tracker. See Summary Report for details.

NOTES

Established Basic Permit #
19-03671

Permit Number: 20-04896

Pacific Northwest Structural Group, LLC				
	Project:	Red Barn Lane - Duplex 1880/1620	By:	DLS
	Location:	NW Hogan Ln & Nels Nelson Rd NW, Bremerton, WA 98311	Project No.:	19-002
	Client:	Envision Northwest, LLC	*Last Update:*	22-Feb-19
	AWC SDPWS-2008 - Wood Shear Wall Design Aid ALLOWABLE STRESS DESIGN			

Mark	Sheating Type, Nail Size, Panel Edges Fastener Spacing, & Capacity	Capacity (plf)
A	15/32" Sheathing W/ 8d @ 6" oc	365
B	15/32" Sheathing W/ 8d @ 4" oc	533
C	15/32" Sheathing W/ 8d @ 3" oc	685
	None	#N/A
	None	#N/A
	None	#N/A

Mark	Simpson Strong-Tie Holdowns	Capacity (lb)	Holdown Deflection at Highest Load (in)	
1	HDU2-SDS2.5 W/ 3" Post	3,075	0.088	
2	HDU5-SDS2.5 W/ 3" Post	5,645	0.115	
	None	N/A	N/A	SEISMIC
	None	N/A	N/A	WIND
	None	N/A	N/A	
	None	N/A	N/A	
	None	N/A	N/A	
	None	N/A	N/A	
	None	N/A	N/A	
	None	N/A	N/A	
	None	N/A	N/A	
	None	N/A	N/A	

Shear Wall Deflection		
G	90,000	psi
E	1,200,000	psi
A	8.25	in^2

Established Basic Permit #

19-03671

Permit Number: 20-04896

3rd Level

Lateral Tnb. Width	ft	10.0
V from above	k	
Uniform v this level	plf	101.3
Total Wall Length	ft	31.92
V this level	k	1.0
V accum.	k	1.0
Unit Wall Shear	plf	32
Shear Wall Capcity	plf	365
Demand vs. Capcity Ratio		0.09
Apparent Stiffness, Ga	K/in	10.00

Shearwall Type: A

Overturning Moment

		Wall 1	Wall 2	Wall 3	Wall 4	Wall 5	Wall 6
M_{otf} from above	k-ft						
Story Ht	ft	8.08	8.08	8.08	8.08	8.08	-
Length	ft	6.00	8.25	3.92	6.92	6.83	-
Diaphragm Ratio		1.35	0.98	2.06	1.17	1.18	-
Modified Capacity		365	365	365	365	365	NA
M_{otf}	k-ft	1.5	2.1	1.0	1.8	1.8	-
M_{otf} accum	k-ft	1.5	2.1	1.0	1.8	1.8	-

Shear Wall Defection

Δ_B	in	0.027	0.020	0.041	0.023	0.024	-
Δ_V	in	0.246	0.246	0.246	0.246	0.246	-
Δ_{HD}	in	-	-	-	-	-	-
Δ_{SW}	in	0.273	0.265	0.287	0.269	0.270	-

Resisting Moment

M_R from above		k-ft	-	-	-		-	-
Distr Wall Wt		psf	11.0	11.0	11.0	11.0	11.0	-
	Tnb above	ft	11.0	11.0	11.0	11.0	11.0	-
Wts.	Wt above	psf	15.0	15.0	15.0	15.0	15.0	-
End	Hdr. Tnb	ft	-	-	-	-	-	-
Wts.	tnb to hdr	ft	-	-	-	-	-	-
	Wt to hdr	psf	-	-	-	-	-	-
Perp. Wall Wts.	Dist to wall	ft	6.00	8.25	3.92	6.92	6.83	-
	Wt of wall	lb	350	350	375	350	350	-
	Dist to wall	ft	-	-	-	-	-	-
	Wt of wall	lb	-	-	-	-	-	-
M_R this level		k-ft	6.67	11.53	3.42	8.50	8.31	-
M_R accum		k-ft	6.67	11.53	3.42	8.50	8.31	-

Hold Down Forces

Wt. Reduction		0.60	0.60	0.60	0.60	0.60	0.60
T_R accum	k	1.11	1.40	0.87	1.23	1.22	-
HD Offset	ft	-	-	-	-	-	-
HD Force	k	-	-	-	-	-	-
HD Capacity	k	-	-	-	-	-	-
Hold Down Type		-	-	-	-	-	-

2nd Level

Lateral Tnb. Width	ft	10.0
V from above	k	1.0
Uniform v this level	plf	96.1
Total Wall Length	ft	14.17
V this level	k	1.0
V accum.	k	2.0
Unit Wall Shear	plf	139
Shear Wall Capcity	plf	365
Demand vs. Capcity Ratio		0.38
Apparent Stiffness, Ga	K/in	10.00

Shearwall Type: A

Overturning Moment

		Wall 1	Wall 2	Wall 3	Wall 4	Wall 5	Wall 6
M_{otf} from above	k-ft	1.5	2.1	1.0	1.8	1.8	-
Story Ht	ft	9.08	9.08	9.08	-	-	-
Length	ft	6.00	4.00	4.17	-	-	-
Diaphragm Ratio		1.51	2.27	2.18	-	-	-
Modified Capacity		365	365	365	NA	NA	NA
M_{otf}	k-ft	7.6	5.1	3.3	-	-	-
M_{otf} accum	k-ft	9.1	7.2	6.3	1.8	1.8	-

Shear Wall Defection

Δ_B	in	0.169	0.253	0.243	-	-	-
Δ_V	in	0.276	0.276	0.276	-	-	-
Δ_{HD}	in	0.133	-	0.192	-	-	-
Δ_{SW}	in	0.578	0.529	0.710	-	-	-

Resisting Moment

M_R from above		k-ft	6.7	11.5	3.4	8.5	8.3	-
Distr Wall Wt		psf	11.0	11.0	11.0	-	-	-
	Tnb above	ft	10.0	10.0	10.0	-	-	-
Wts.	Wt above	psf	15.0	15.0	15.0	-	-	-
End	Hdr. Tnb	ft	-	-	-	-	-	-
Wts.	tnb to hdr	ft	-	-	-	-	-	-
	Wt to hdr	psf	-	-	-	-	-	-
Perp. Wall Wts.	Dist to wall	ft	6.00	4.00	4.17	-	-	-
	Wt of wall	lb	500	-	650	500	500	-
	Dist to wall	ft	-	-	-	-	-	-
	Wt of wall	lb	-	-	-	-	-	-
M_R this level		k-ft	7.50	2.00	4.88	-	-	-
M_R accum		k-ft	14.17	13.53	8.30	8.50	8.31	-

Hold Down Forces

Wt. Reduction		0.60	0.60	0.60	0.60	0.60	0.60
T_R accum	k	2.36	3.35	1.89	-	-	-
HD Offset	ft	-	-	-	-	-	-
HD Force	k	0.10	-	0.31	-	-	-
HD Capacity	k	3.08	-	3.08	-	-	-
Hold Down Type		I	-	I	-	-	-

1st Level

Lateral Tnb. Width	ft	10.0
V from above	k	2.0
Uniform v this level	plf	96.1
Total Wall Length	ft	36.75
V this level	k	1.0
V accum.	k	2.9
Unit Wall Shear	plf	80
Shear Wall Capcity	plf	365
Demand vs. Capcity Ratio		0.22
Apparent Stiffness, Ga	K/in	10.00

Shearwall Type: A

Overturning Moment

		Wall 1	Wall 2	Wall 3	Wall 4	Wall 5	Wall 6
M_{otf} from above	k-ft	9.1	7.2	6.3	1.8	1.8	-
Story Ht	ft	9.08	-	9.08	9.08	9.08	-
Length	ft	14.33	-	6.17	9.42	6.83	-
Diaphragm Ratio		0.63	-	1.47	0.96	1.33	-
Modified Capacity		365	NA	365	365	365	NA
M_{otf}	k-ft	10.4		4.5	6.8	5.0	-
M_{otf} accum	k-ft	19.5	7.2	10.8	8.6	6.7	-

Shear Wall Defection

Δ_B	in	0.040	-	0.094	0.062	0.085	-
Δ_V	in	0.276	-	0.276	0.276	0.276	-
Δ_{HD}	in	-	-	0.130	-	-	-
Δ_{SW}	in	0.317	-	0.500	0.338	0.361	-

Resisting Moment

M_R from above		k-ft	14.2	13.5	8.3	8.5	8.3	-
Distr Wall Wt		psf	11.0	-	11.0	11.0	11.0	-
	Tnb above	ft	10.0	-	10.0	10.0	10.0	-
Wts.	Wt above	psf	15.0	-	15.0	15.0	15.0	-
End	Hdr. Tnb	ft	-	-	-	-	-	-
Wts.	tnb to hdr	ft	-	-	-	-	-	-
	Wt to hdr	psf	-	-	-	-	-	-
Perp. Wall Wts.	Dist to wall	ft	11.50	-	6.17	9.42	6.83	-
	Wt of wall	lb	250	-	250	250	250	-
	Dist to wall	ft	-	-	-	-	-	-
	Wt of wall	lb	-	-	-	-	-	-
M_R this level		k-ft	28.53	-	6.30	13.44	7.54	-
M_R accum		k-ft	42.70	13.53	14.60	21.94	15.85	-

Hold Down Forces

Wt. Reduction		0.60	0.60	0.60	0.60	0.60	0.60
T_R accum	k	2.98	-	2.37	2.33	2.32	-
HD Offset	ft	-	-	-	-	-	-
HD Force	k	-	-	0.32	-	-	-
HD Capacity	k	-	-	3.08	-	-	-
Hold Down Type		-	-	I	-	-	-

Project:	Red Barn Lane - Duplex 1880/1620
Location:	LF-1 A
Client:	Envision Northwest, LLC
By:	DLS
Job No.:	19-002
Last Updated:	22-Feb-2019

Wood Shear Wall Design Aid

Comments:

Established Basic Permit #

19-03671

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Permit Number: 20-04896

3rd Level

Lateral Trib. Width	ft	20.5
V from above	k	-
Uniform v this level	plf	132.0
Total Wall Length	ft	19.42
V this level	k	2.7
V accum.	k	2.7
Unit Wall Shear	plf	139
Shear Wall Capcity	plf	365
Demand vs. Capcity Ratio		0.38
Apparent Stiffness, Ga	K/in	10.00

Shearwall Type: A

Overturning Moment

		Wall 1	Wall 2	Wall 3	Wall 4	Wall 5	Wall 6
M_{otr} from above	k-ft						
Story Ht	ft	8.08	8.08	8.08	8.08	-	-
Length	ft	4.00	3.92	3.00	8.50	-	-
Diaphragm Ratio		2.02	2.06	2.69	0.95	-	-
Modified Capacity		365	365	365	365	NA	NA
M_{otr}	k-ft	4.5	4.4	3.4	9.6	-	-
M_{otr} accum	k-ft	4.5	4.4	3.4	9.6	-	-

Shear Wall Defection

Δ_B	in	0.178	0.182	0.238	0.084	-	-
Δ_V	in	0.246	0.246	0.246	0.246	-	-
Δ_{HD}	in	0.178	0.181	0.237	0.084	-	-
Δ_{SW}	in	0.602	0.609	0.720	0.413	-	-

Resisting Moment

M_R from above		k-ft	-	-	-		-	-
Distr Wall Wt		psf	11.0	11.0	11.0	11.0	-	-
	Trib above	ft	6.0	6.0	6.0	6.0	-	-
Wts.	Wt above	psf	15.0	15.0	15.0	15.0	-	-
End	Hdr. Trib	ft	-	-	-	-	-	-
Wts.	trib to hdr	ft	-	-	-	-	-	-
	Wt to hdr	psf	-	-	-	-	-	-
Perp.	Dist to wall	ft	4.00	3.92	3.00	8.50	-	-
Wall	Wt of wall	lb	250	250	250	250	-	-
Wts.	Dist to wall	ft	-	-	-	-	-	-
	Wt of wall	lb	-	-	-	-	-	-
M_R this level		k-ft	2.43	2.35	1.55	8.59	-	-
M_R accum		k-ft	2.43	2.35	1.55	8.59	-	-

Hold Down Forces

Wt. Reduction		0.60	0.60	0.60	0.60	0.60	0.60
T_R accum	k	0.61	0.60	0.52	1.01	-	-
HD Offset	ft	-	-	-	-	-	-
HD Force	k	0.76	0.77	0.81	0.52	-	-
HD Capacity	k	3.08	3.08	3.08	3.08	-	-
Hold Down Type		1	1	1	1	-	-

2nd Level

Lateral Trib. Width	ft	20.5
V from above	k	2.7
Uniform v this level	plf	178.9
Total Wall Length	ft	12.83
V this level	k	3.7
V accum.	k	6.4
Unit Wall Shear	plf	497
Shear Wall Capcity	plf	533
Demand vs. Capcity Ratio		0.93
Apparent Stiffness, Ga	K/in	13.00

Shearwall Type: B

Overturning Moment

		Wall 1	Wall 2	Wall 3	Wall 4	Wall 5	Wall 6
M_{otr} from above	k-ft	4.5	4.4	3.4	9.6	-	-
Story Ht	ft	9.08	9.08	9.08	9.08	9.08	-
Length	ft	-	3.33	3.75	5.75	-	-
Diaphragm Ratio		-	2.73	2.42	1.58	-	-
Modified Capacity		NA	533	533	533	NA	NA
M_{otr}	k-ft		15.0	16.3	25.9	-	-
M_{otr} accum	k-ft	4.5	19.4	20.3	35.5	-	-

Shear Wall Defection

Δ_B	in	-	1.083	0.962	0.627	-	-
Δ_V	in	-	0.403	0.403	0.403	-	-
Δ_{HD}	in	-	0.314	0.278	0.182	-	-
Δ_{SW}	in	-	1.799	1.643	1.212	-	-

Resisting Moment

M_R from above		k-ft	2.4	2.4	1.6	8.6	-	-
Distr Wall Wt		psf	11.0	11.0	11.0	11.0	-	-
	Trib above	ft	6.0	6.0	6.0	6.0	-	-
Wts.	Wt above	psf	15.0	15.0	15.0	15.0	-	-
End	Hdr. Trib	ft	-	-	-	-	-	-
Wts.	trib to hdr	ft	-	-	-	-	-	-
	Wt to hdr	psf	-	-	-	-	-	-
Perp.	Dist to wall	ft	2.83	5.75	7.50	5.83	-	-
Wall	Wt of wall	lb	500	500	500	500	-	-
Wts.	Dist to wall	ft	-	-	-	-	-	-
	Wt of wall	lb	-	-	-	-	-	-
M_R this level		k-ft	1.42	3.93	5.09	6.05	-	-
M_R accum		k-ft	3.85	6.28	6.64	14.64	-	-

Hold Down Forces

Wt. Reduction		0.60	0.60	0.60	0.60	0.60	0.60
T_R accum	k	-	1.89	1.77	2.55	-	-
HD Offset	ft	-	-	-	-	-	-
HD Force	k	-	4.70	4.35	4.65	-	-
HD Capacity	k	-	5.65	5.65	5.65	-	-
Hold Down Type		-	2	2	2	-	-

1st Level

Lateral Trib. Width	ft	20.5
V from above	k	6.4
Uniform v this level	plf	178.9
Total Wall Length	ft	33.91
V this level	k	3.7
V accum.	k	10.0
Unit Wall Shear	plf	296
Shear Wall Capcity	plf	365
Demand vs. Capcity Ratio		0.81
Apparent Stiffness, Ga	K/in	10.00

Shearwall Type: A

Overturning Moment

		Wall 1	Wall 2	Wall 3	Wall 4	Wall 5	Wall 6
M_{otr} from above	k-ft	4.5	19.4	20.3	35.5	-	-
Story Ht	ft	-	8.08	8.08	8.08	-	-
Length	ft	-	8.08	20.08	5.75	-	-
Diaphragm Ratio		-	1.00	0.40	1.41	-	-
Modified Capacity		NA	365	365	365	NA	NA
M_{otr}	k-ft	-	19.3	48.0	13.2	-	-
M_{otr} accum	k-ft	4.5	38.8	68.3	49.3	-	-

Shear Wall Defection

Δ_B	in	-	0.187	0.075	0.263	-	-
Δ_V	in	-	0.246	0.246	0.246	-	-
Δ_{HD}	in	-	0.115	0.035	#N/A	-	-
Δ_{SW}	in	-	0.548	0.357	-	-	-

Resisting Moment

M_R from above		k-ft	3.8	6.3	6.6	14.6	-	-
Distr Wall Wt		psf	-	-	-	-	-	-
	Trib above	ft	-	11.0	11.0	11.0	-	-
Wts.	Wt above	psf	-	6.0	6.0	6.0	-	-
End	Hdr. Trib	ft	-	15.0	15.0	15.0	-	-
Wts.	trib to hdr	ft	-	-	-	-	-	-
	Wt to hdr	psf	-	-	-	-	-	-
Perp.	Dist to wall	ft	-	10.58	11.58	8.75	-	-
Wall	Wt of wall	lb	-	750	750	750	-	-
Wts.	Dist to wall	ft	-	-	-	-	-	-
	Wt of wall	lb	-	-	-	-	-	-
M_R this level		k-ft	-	10.09	21.99	7.65	-	-
M_R accum		k-ft	3.85	16.37	28.63	22.29	-	-

Hold Down Forces

Wt. Reduction		0.60	0.60	0.60	0.60	0.60	0.60
T_R accum	k	-	2.03	1.43	3.88	-	-
HD Offset	ft	-	-	-	-	-	-
HD Force	k	-	3.58	2.55	6.24	-	-
HD Capacity	k	-	5.65	3.08	#N/A	-	-
Hold Down Type		-	2	1	#N/A	-	-

Project:	Red Barn Lane - Duplex 1880/1620
Location:	TF-2
Client:	Envision Northwest, LLC
By:	DLS
Job No.:	19-002
Last Updated:	22-Feb-2019

Wood Shear Wall Design Aid

Comments: See Perforated Shear Calculations

Established Basic Permit #

19-03671

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Permit Number: 20-04896

Project:	Red Barn Lane - Duplex 1880/1620	By:	DLS
Location:	NW Hogan Ln & Nels Nelson Rd NW, Bremerton, WA 98311	Project No.:	19-002
Client:	Envision Northwest, LLC	Last Update:	22-Feb-19

PERFORATED SHEAR WALL EFFECTIVE SHEAR CAPACITY RATIO

Wall Line	Force to Wall [P] (K)	Total Length of Wall [L] (ft)	Length of Full Height Shearwall [A1+A3+A5] (ft)	Unit Shear in Wall (plf)	Percent Full Height Sheathing	Plate Height [H] (ft)	Maximum Unrestrained Opening Height (B2+B3) (ft)	(%)	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
LF-1-3RD LVL-WALL 1&2	1.49	15.00	9.00	166	60%	8	4	50%	0.835	198	365	0.5433	A	-	1.60	1
LF-1-3RD LVL-WALL 3&4	1.21	14.33	7.33	166	51%	8	4	50%	0.809	205	365	0.5606	A	-	1.65	1
LF-2=3RD LVL-WALL 1&2	1.10	9.50	7.92	139	83%	8	4	50%	0.926	151	365	0.4124	A	-	1.22	1
LF-2=3RD LVL-WALL 3&4	1.32	16.50	9.50	139	58%	8	4	50%	0.828	168	365	0.4611	A	-	1.36	1
LF-1-3ND LVL-WALL 3-5	1.33	25.00	20.42	65	82%	9	4	44%	0.946	69	365	0.1878	A	-	0.62	1
LF-2-2ND LVE-WALL 3-5	1.74	28.50	20.49	85	72%	9	4	44%	0.916	93	365	0.2539	A	-	0.84	1
LF2-1ST LVL-WALL 3&5	1.63	23.00	20.50	80	89%	8	4	50%	0.948	84	365	0.2303	A	-	0.68	1
TF-1-2ND LVL-WALL 1&2	4.28	15.00	7.16	598	48%	9	3	33%	1.000	598	685	0.8728	C	1.66	3.77	2
TF-2-2ND LVL-WALL 1&2	1.22	10.58	2.83	430	27%	9	4	44%	0.827	520	532.5	0.9765	B	0.40	4.32	2
TF-2-2ND LVL-WALL 3&4	4.30	19.92	10.00	430	50%	9	4	44%	0.872	493	532.5	0.9258	B	2.53	1.95	1
TF-2-1ST LVL WALL 1-3	10.04	40.00	33.91	296	85%	8	4	50%	0.931	318	365	0.8712	A	2.72	(0.15)	-
LF-1A-2ND LEVEL	1.97	10.67	8.17	242	77%	9	4	44%	0.913	265	365	0.7248	A	-	2.38	1
TF-2A-2ND LVL	6.37	29.25	12.83	497	44%	9	4	44%	0.854	581	685	0.8488	C	-	5.23	2
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Established Basic Permit #

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Permit Number: 20-04896