

PACIFIC NORTHWEST STRUCTURAL GROUP, LLC

A PROFESSIONAL ENGINEERING COMPANY

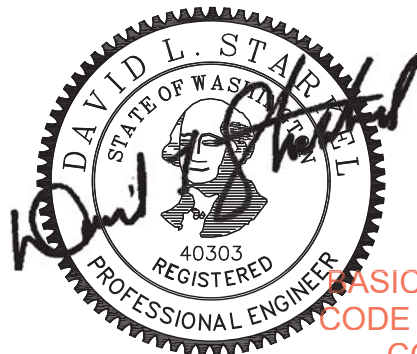
6193 NE MALBON CT.
KINGSTON, WA 98346
360.903.2803

Reviewed for code compliance
with IRC 2015
Kitsap County Building Department
gshapiro@co.kitsap.wa.us
08/05/2020

SUPPLEMENTAL STRUCTURAL CALCULATIONS

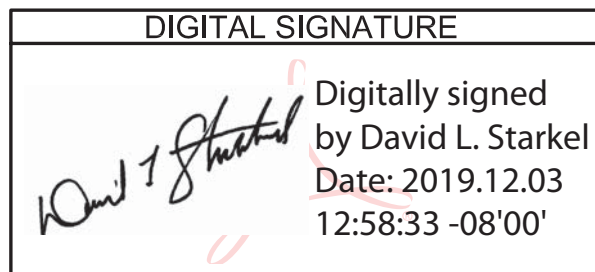
19-002A RED BARN LANE - DUPLEX 1880/1620A
NW HOGAN LN & NELS NELSON RD NW
BREMERTON, WA 98311

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



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

03-DEC-19



Established Basic Permit #

19-03650

Permit Number: 20-02542

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	

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. $\perp$ to Grain:	Fc $\perp$ = 650 psi	Fc $\perp$ = 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

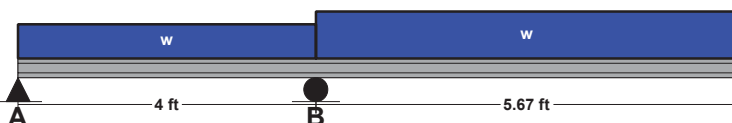
At a distance d from right support of span 2 (Center Span)

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

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.

NOTES

Established Basic Permit #

19-03650

Permit Number: 20-02542

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

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. $\perp$ to Grain: Fc - $\perp$ = 405 psi Fc - $\perp$ ' = 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

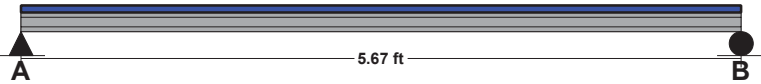
Area (Shear): 2.84 in² 10.88 in²

Moment of Inertia (deflection): 7.97 in⁴ 47.63 in⁴

Moment: 402 ft-lb 1028 ft-lb

Shear: 227 lb 870 lb

LOADING DIAGRAM



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 #

19-03650

Permit Number: 20-02542

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
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Comp. $\perp$ to Grain:	Fc $\perp$ = 900 psi	Fc $\perp$ ' = 900 psi
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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

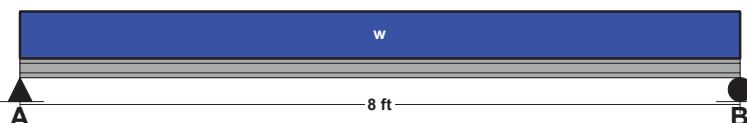
Area (Shear): 4.5 in² 41.56 in²

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 #

19-03650

Permit Number: 20-02542

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

I-JOIST PROPERTIES

TJI 110 / 11.875 - iLevel Trus Joist

Base Values

Adjusted

Moment Cap: Mcap = 3160 ft-lb Mcap' = 3160 ft-lb

Shear Stress: Vcap = 1560 lb Vcap' = 1560 lb

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

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

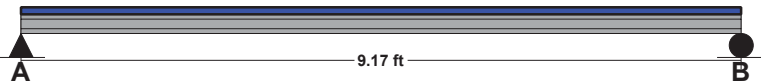
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E.I.: 50 in²-lb E6 267 in²-lb xE6

Moment: 771 ft-lb 3160 ft-lb

Shear: -336 lb 1560 lb

LOADING DIAGRAM



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

NOTES

Established Basic Permit #

19-03650

Permit Number: 20-02542

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

MATERIAL PROPERTIES

1.55E Timberstrand LSL - iLevel Trus Joist

Bending Stress: $F_b = 2325 \text{ psi}$ $F_b' = 2327 \text{ psi}$
 $C_d = 1.00$ $CF = 1.00$

Shear Stress: $F_v = 310 \text{ psi}$ $F_v' = 310 \text{ psi}$
 $C_d = 1.00$

Modulus of Elasticity: $E = 1550 \text{ ksi}$ $E' = 1550 \text{ ksi}$

Comp. $\perp$ to Grain: $F_c - \perp = 900 \text{ psi}$ $F_c - \perp' = 900 \text{ psi}$

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

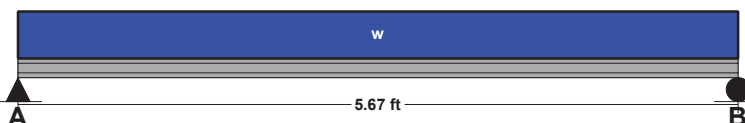
Area (Shear): 2.35 in² 20.78 in²

Moment of Inertia (deflection): 14.6 in⁴ 244.21 in⁴

Moment: 1043 ft-lb 7977 ft-lb

Shear: 486 lb 4295 lb

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.

NOTES

Established Basic Permit #

19-03650

Permit Number: 20-02542

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

Bending Stress: $F_b = 2325 \text{ psi}$ $F_b' = 2327 \text{ psi}$
 $C_d = 1.00$ $CF = 1.00$

Shear Stress: $F_v = 310 \text{ psi}$ $F_v' = 310 \text{ psi}$
 $C_d = 1.00$

Modulus of Elasticity: $E = 1550 \text{ ksi}$ $E' = 1550 \text{ ksi}$

Comp. $\perp$ to Grain: $F_c - \perp = 900 \text{ psi}$ $F_c - \perp' = 900 \text{ psi}$

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

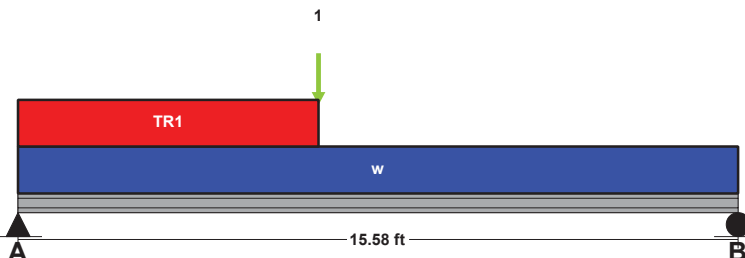
At a distance d from left support of span 2 (Center Span)

Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:

	Req'd	Provided
Section Modulus:	48.03 in ³	82.26 in ³
Area (Shear):	10.83 in ²	41.56 in ²
Moment of Inertia (deflection):	312.71 in ⁴	488.41 in ⁴
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 #

19-03650

Permit Number: 20-02542

Pacific Northwest Structural
Group, LLC

Project: Red Barn Lane - Duplex 1880/1620

Location: NW Hogan Ln & Nels Nelson Rd NW, Bremerton, WA 98311

Client: Envision Northwest, LLC

AWC SDPWS-2008 - Wood Shear Wall Design Aid
ALLOWABLE STRESS DESIGN

By: DLS

Project No.: 19-002

Last Update:

22-Feb-19

Mark	Sheathing 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
○	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
○	None	N/A	N/A

○ SEISMIC
● WIND

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

Established Basic Permit #

19-03650

C:\Users\dstal\Dropbox\PNW Project Files\2019 Projects\19-002A Red Barn Lane - Duplex 1880-1620\ENGR\19-002 Timber Shear Wall 2018 - Duplex.xlsx\Shear Wall & Hold Down Schedule 12/3/2019 12:54 PM

Permit Number: 20-02542

3rd Level															
Lateral Trib. Width	ft	10.0	Shearwall Type												
V from above	k	-	A												
Uniform v this level	psf	101.3													
Total Wall Length	ft	31.92													
V this level	k	1.0													
V accum	k	1.0													
Unit Wall Shear	psf	32													
Shear Wall Capacity	psf	365													
Demand vs. Capacity Ratio		0.09													
Apparent Stiffness, Ga	K/in	10.00													
Overturning Moment															
M _{OT} from above	k-ft	Wall 1	Wall 2	Wall 3	Wall 4	Wall 5	Wall 6								
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 _{OT}	k-ft	1.5	2.1	1.0	1.8	1.8	-								
M _{OT} accum	k-ft	1.5	2.1	1.0	1.8	1.8	-								
Shear Wall Deflection															
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	-								
Trib 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	-								
Hdr. Trib	ft	-	-	-	-	-	-								
End Wts. Trib to hdr	psf	-	-	-	-	-	-								
Perp. Wall Wt of wall	psf	6.00	8.25	3.92	6.92	6.83	-								
Wts. Wt of wall	lb	350	350	375	350	350	-								
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 _E accum	k	1.11	1.40	0.87	1.23	1.22	-								
HD Offset	ft	-	-	-	-	-	-								
HD Force	k	-	-	-	-	-	-								
HD Capacity	k	-	-	-	-	-	-								
Hold Down Type		○	○	○	○	○	○								
		Project:	Red Barn Lane - Duplex 1880/1620												
		Location:	LF-1 A												
		Client:	Envision Northwest, LLC												
		Wood Shear Wall Design Aid		Comments:											
2nd Level															
Lateral Trib. Width	ft	10.0	Shearwall Type												
V from above	k	1.0	A												
Uniform v this level	psf	96.1													
Total Wall Length	ft	14.17													
V this level	k	1.0													
V accum	k	2.0													
Unit Wall Shear	psf	139													
Shear Wall Capacity	psf	365													
Demand vs. Capacity Ratio		0.38													
Apparent Stiffness, Ga	K/in	10.00													
Overturning Moment															
M _{OT} from above	k-ft	Wall 1	Wall 2	Wall 3	Wall 4	Wall 5	Wall 6								
Story Ht	ft	1.5	2.1	1.0	1.8	1.8	-								
Length	ft	9.08	9.08	9.08	-	-	-								
Diaphragm Ratio		1.51	2.27	2.18	-	-	-								
Modified Capacity		365	365	365	NA	NA	NA								
M _{OT}	k-ft	7.6	5.1	5.3	-	-	-								
M _{OT} accum	k-ft	9.1	7.2	6.3	1.8	1.8	-								
Shear Wall Deflection															
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	-	-	-								
Trib above	ft	10.0	10.0	10.0	-	-	-								
Wts. Wt above	psf	15.0	15.0	15.0	-	-	-								
Hdr. Trib	ft	-	-	-	-	-	-								
End Wts. Trib to hdr	psf	-	-	-	-	-	-								
Perp. Wall Wt of wall	psf	6.00	4.00	4.17	-	-	-								
Wts. Wt of wall	lb	500	-	650	500	500	-								
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 _E accum	k	2.36	3.36	1.99	-	-	-								
HD Offset	ft	-	-	-	-	-	-								
HD Force	k	0.10	-	0.31	-	-	-								
HD Capacity	k	3.08	-	3.08	-	-	-								
Hold Down Type		I	○	I	○	○	○								
		By:	DLS												
		Job No.:	19-002												
		Last Update:	22-Feb-2019												
1st Level															
Lateral Trib. Width	ft	10.0	Shearwall Type												
V from above	k	2.0	A												
Uniform v this level	psf	96.1													
Total Wall Length	ft	36.75													
V this level	k	1.0													
V accum	k	2.8													
Unit Wall Shear	psf	80													
Shear Wall Capacity	psf	365													
Demand vs. Capacity Ratio		0.22													
Apparent Stiffness, Ga	K/in	10.00													
Overturning Moment															
M _{OT} from above	k-ft	Wall 1	Wall 2	Wall 3	Wall 4	Wall 5	Wall 6								
Story Ht	ft	9.1	7.2	6.3	1.8	1.8	-								
Length	ft	14.33	-	9.17	9.42	6.83	-								
Diaphragm Ratio		0.63	-	1.47	0.96	1.33	-								
Modified Capacity		365	NA	365	365	365	NA								
M _{OT}	k-ft	10.4	-	4.5	6.8	5.0	-								
M _{OT} accum	k-ft	19.5	7.2	10.8	8.6	6.7	-								
Shear Wall Deflection															
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	-								
Trib above	ft	10.0	-	10.0	10.0	10.0	-								
Wts. Wt above	psf	15.0	-	15.0	15.0	15.0	-								
Hdr. Trib	ft	-	-	-	-	-	-								
End Wts. Trib to hdr	psf	-	-	-	-	-	-								
Perp. Wall Wt of wall	psf	11.50	-	6.17	9.42	6.83	-								
Wts. Wt of wall	lb	250	-	250	250	250	-								
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 _E 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	○	○	○								

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3rd Level									
Lateral Trib. Width	ft	20.5	Shearwall Type						
V from above	k	2.7	A						
Uniform v this level	psf	132.0							
Total Wall Length	ft	19.42							
V this level	k	2.7							
V accum	k	2.7							
Unit Wall Shear	psf	139							
Shear Wall Capacity	psf	365							
Demand vs. Capacity Ratio		0.38							
Apparent Stiffness, Ga	K/ft	10.00							
Overturning Moment									
M _{OT} from above	k-ft		Wall 1	Wall 2	Wall 3	Wall 4	Wall 5	Wall 6	
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	NA	NA
M _{OT}	k-ft	4.5	4.4	3.4	9.6	-	-	-	-
M _{OT} accum	k-ft	4.5	4.4	3.4	9.6	-	-	-	-
Shear Wall Deflection									
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	psf	15.0	15.0	15.0	15.0	-	-	-	-
Hdr. Trib	ft	-	-	-	-	-	-	-	-
End Wts	psf	-	-	-	-	-	-	-	-
Wt to hdr	psf	-	-	-	-	-	-	-	-
Perp. Wall	ft	4.00	3.92	3.00	8.50	-	-	-	-
Wt of wall	lb	250	250	250	250	-	-	-	-
Dist to wall	ft	-	-	-	-	-	-	-	-
Wts	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	0.60	0.60
T _g 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	-	-	-	-
			Project:	Red Barn Lane - Duplex 1880/1620					
			Location:	TF-2					
			Client:	Envision Northwest, LLC					
			Wood Shear Wall Design Aid	Comments: See Perforated Shear Calculations					

2nd Level									
Lateral Trib. Width	ft	20.5	Shearwall Type						
V from above	k	2.7	B						
Uniform v this level	psf	175.9							
Total Wall Length	ft	12.83							
V this level	k	3.7							
V accum	k	6.4							
Unit Wall Shear	psf	497							
Shear Wall Capacity	psf	533							
Demand vs. Capacity Ratio		0.93							
Apparent Stiffness, Ga	K/ft	13.00							
Overturning Moment									
M _{OT} from above	k-ft	4.5	4.4	3.4	9.6	-	-	-	-
Story Ht	ft	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	NA	NA
M _{OT}	k-ft	-	15.0	16.9	25.9	-	-	-	-
M _{OT} accum	k-ft	-	4.5	19.4	20.3	35.5	-	-	-
Shear Wall Deflection									
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	psf	15.0	15.0	15.0	15.0	-	-	-	-
Hdr. Trib	ft	-	-	-	-	-	-	-	-
End Wts	psf	-	-	-	-	-	-	-	-
Wt to hdr	psf	-	-	-	-	-	-	-	-
Perp. Wall	ft	2.83	5.75	7.50	5.83	-	-	-	-
Wt of wall	lb	500	500	500	500	-	-	-	-
Dist to wall	ft	-	-	-	-	-	-	-	-
Wts	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	0.60	0.60
T _g 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	2	-	-	-

1st Level									
Lateral Trib. Width	ft	20.5	Shearwall Type						
V from above	k	6.4	A						
Uniform v this level	psf	175.9							
Total Wall Length	ft	33.91							
V this level	k	3.7							
V accum	k	10.0							
Unit Wall Shear	psf	296							
Shear Wall Capacity	psf	365							
Demand vs. Capacity Ratio		0.81							
Apparent Stiffness, Ga	K/ft	10.00							
Overturning Moment									
M _{OT} 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	NA	NA
M _{OT}	k-ft	-	19.3	48.0	13.8	-	-	-	-
M _{OT} accum	k-ft	-	4.5	38.8	49.3	-	-	-	-
Shear Wall Deflection									
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	psf	-	6.0	6.0	6.0	-	-	-	-
Hdr. Trib	ft	-	15.0	15.0	15.0	-	-	-	-
End Wts	psf	-	-	-	-	-	-	-	-
Wt to hdr	psf	-	-	-	-	-	-	-	-
Perp. Wall	ft	-	10.58	11.58	8.75	-	-	-	-
Wt of wall	lb	-	750	750	750	-	-	-	-
Dist to wall	ft	-	-	-	-	-	-	-	-
Wts	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	0.60	0.60
T _g 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	-	-	-	-
			By:	DLS					
			Job No.:	19-002					
			Last Update:	22-Feb-2019					

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19-03650

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