Structural Calculations

for

Spring Run Subdivision - Building 11
The Boulder 4-Plex

Eagle Mountain, Utah

submitted to:

ARCFLO

Solutions you can build on for over 70 years

contact:
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LICENSED PROFESSIONAL ENGINEER
No. 9412168
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11/22/2023
STATE OF UTAH

Notice

Reeve & Associate's, Inc., has authorized this copy only if the seal is in **black** ink and the signature is in **red** or **blue** ink. We assume responsibility only for the items addressed herein and do not assume responsibility for the remainder of the structure. No site observations are scheduled to verify the understanding of the contractor or the proper installation of the items addressed herein.

November 2023
4899-A97

Project Information

Project Name:	Spring Run Subdivision - Building 11 - The Boulder 4-Plex
Project Location:	Eagle Mountain, Utah

Design Criteria

Governing Building Code:	2021 IBC	
Construction Type:	Wood Bearing Wall	
Wind Zone and Exposure:	115mph. (3 sec. gust), Exp C	
Seismic Design Category:	D	
Soil Site Class:	D	
Spectral Accelerations	$S_S = 1.139g$	$S_{DS} = 0.793g$
	$S_1 = 0.385g$	$S_{D1} = 0.418g$
Design Loads:	Roof Dead Load = 15 psf	
	Ground Snow Load = 45 psf	
	Roof Snow Load = 35 psf	
	Floor Dead Load = 15 psf	
	Floor Live Load = 40 psf	

Construction Materials

<u>Concrete 28-Day Compressive Strength</u>

Foundations:	f'_c = 3000 psi (2500 psi design)
Exterior Slabs on Grade:	f'_c = 4000 psi
Reinforcing Grade:	ASTM A615 Grade 60

<u>Structural Steel</u>	ASTM A992 (f_y = 50000 psi)

<u>Wood</u>

Sawn Lumber:			
DF#2 or better	Fb=875 psi	Fv=95 psi	$E=1.6\cdot10^6$ psi
Laminated Veneer Lumber:			
Microllam®	Fb=2600 psi	Fv=285 psi	$E=1.9\cdot10^6$ psi
Parallel Strand Lumber:			
Parallam®	Fb=2900 psi	Fv=290 psi	$E=2.0\cdot10^6$ psi
Glu-Laminated Beams:			
24F-V4 DF/DF	Fb=2400 psi	Fv=195 psi	$E=1.8\cdot10^6$ psi

Roof Sheathing	15/32"	OSB
Floor Sheathing	3/4"	OSB
Wall Sheathing	7/16"	OSB

Soil Criteria

Geotechnical Consultant:	None
Report Number:	N/A
Bearing Pressure:	1500 psf (Assumed)
Min. Bearing Depth:	30” to bottom of footing

(Contractor/Owner to verify proper bearing conditions are provided)

USGS Design Maps Summary Report

User–Specified Input

Building Code Reference Document	ASCE7-16
Site Coordinates	40.38966°N, 111.8474°W
Site Soil Classification	Site Class D – “Stiff Soil”
Risk Category	I/II/III

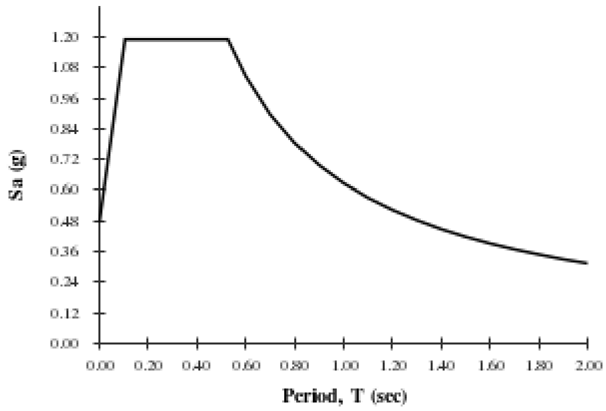
USGS–Provided Output

S_S = 1.139 g **S_{MS} =** 1.190 g **S_{DS} =** 0.793 g

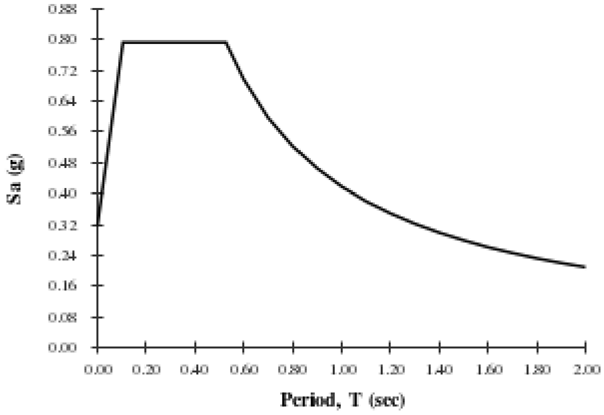
S_1 = 0.385 g **S_{M1} =** 0.627 g **S_{D1} =** 0.418 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the “2009 NEHRP” building code reference document.

$\mathrm{MCE_R}$ Response Spectrum



Design Response Spectrum



Reeve & Associates, Inc.	PROJECT		PROJ NO.		
			CALC NO.		
	SUBJECT	**Low Roof Snow Load per ASCE 7** **Leeward and Windward Snow Drift**	BY JMG	DATE	1/7/20
			CHK	DATE	
			SHEET	OF	REV

Description:

GENERAL INPUT AND OUTPUT:

"Leeward" or "Windward":	1.00	*Leeward*
Roof Slope:	8:12	*33.69 °*
County (State of Utah)	UTAH	
Elevation at Site	4700 ft	
p_g (SEAU Flat Roof Snow)	45 psf	________ *<---Manual Entry*
C_e (Exposure Factor):	1.0	
C_t (Thermal Factor):	1.1	
I_s (Importance Factor):	1.0	
L_u (Length of Roof):	0.00 feet	*Upper Roof*
Elevation Difference:	0.00 feet	
P_f (Roof Snow):	**34.5 psf**	
C_s (Roof Slope Factor):	1.0	
P_s (Sloped Roof Snow):	**34.5 psf**	

Snow Load Density:	19.83 pcf
h_b (Snow Depth):	1.74 feet
h_d (potential drift height):	-1.50 feet
h_c (Roof to Snow):	0.00 feet
Maximum Drift Height:	0.00 feet
Drift Width:	0.00 feet
Maximum Snow Load:	**34.50 psf**
Maximum Drift Weight:	**0.00 psf**
Drift Width:	**0.00 feet**

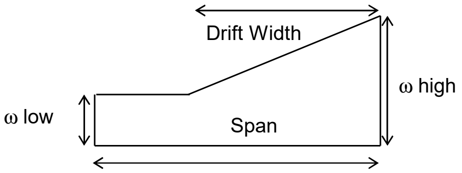


Diagram A

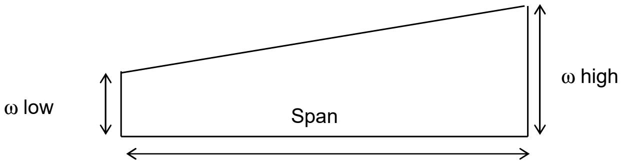


Diagram B

Reeve & Associates, Inc.

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Date:	Sheet	Of
1/7/2020	1	1
Designed By: **JMG**	Project Number:	

Seismic Calculations

Earthquake Loads-Site Ground Motion

I= 1

R= 6.5 Wood Brg Wall

S_s= 1.139

S_1= 0.385

Site Class= D

h_n= 28.00 ft (Building Height)

Structure Type = Other

C_t= 0.02

x= 0.75

Check Height for LFRS = 28.0ft > NP (per exception 12.2.5.6 where DL <20psf allowed up to 65ft)

DL = 6.5 psf (Estimated)

F_a= 1.04

S_{MS}= 1.190 S_{MS}= F_a*S_S

S_{DS}= 0.793 S_{DS}= 2*S_{MS}/3

F_v= 1.63

S_{M1}= 0.628 S_{M1}= F_v*S_1

S_{D1}= 0.418 S_{D1}= 2*S_{M1}/3

Earthquake Loads-Minimum Design Lateral Force

C_s= 0.122

C_s= 0.264

C_s= 0.035

T= 0.243 s

Load Combinations that control lateral:

D+0.75L+0.75S+0.75(0.7*E)

0.6D+0.7E

ASD Load Factor = 0.7

Rho = 1.3

USE

C_s= 0.122

V=C_S*W

V = ASD Load Factor*Rho*Cs*W = 0.11 *W

Dead Load Effect

0.2*S_{DS}= 0.159

(+/-) 0.2*S_{DS}*D

Seismic Design Category

SDS => D

SD1 => D

Wind Design - ASCE 7-16 Chp 27

Risk Category = II
Basic Wind Speed V = 115 mph
Exposure Category = C 3
Wind Directionality Factor, Kd = 0.85
Topographic Factor, Kzt = 1
Gust Effect Factor, G = 0.85
Total Stories = 2 (5 max)
Internal Pressure Coefficient, Gcpi = 0.18
-0.18

Enclosure Classification

	Length	Height	Ag	Ao	% open	Open	Partial 1	Partial 2	Partial Total
Wall 1 =	100	10	1000	800	80.0	Y	Y	N	N
Wall 2 =	100	10	1000	200	20.0	N	N	Y	N
Wall 3 =	25	10	250	30	12.0	N	N	Y	N
Wall 4 =	25	10	250	50	20.0	N	N	Y	N

Open Building: NO
Partially Open: NO
Enclosed: YES

Wall Pressure	Front to Back		Side to Side	
Windward Wall, Cp =	0.8		0.8	
Windward Wall Width, B =	32 ft		49 ft	
Side Wall Width, L =	49 ft		32 ft	
L/B =	1.53125		0.653061	
Leeward Wall, Cp =	-0.3		-0.5	
Side Wall, Cp =	-0.7		-0.7	
Roof Pressure				
Roof Type =	Gable 1		Gable 1	
Roof Pitch =	8/12	33.7 °	8/12	33.7 °
Ridge Height =	28 ft		28 ft	
Eave Height =	18 ft		18 ft	
Mean Roof Height, h =	22.8 ft		22.8 ft	
h/L =	0.46		0.71	
h/2 =	11 ft		11 ft	
Kh =	0.93		0.93	
qh =	26.7 psf		26.7 psf	

Parapet Wall Pressure
Parapet Wall Height = 0 ft
Building Height to top of parapet= 0 ft
Kz = 0.85
qp = 24.4 psf
WW GCpn = 1.50
LW GCpn+ -1.00
Pp = 61.1 psf
Adj. Pp = 36.6 psf
Parapet Load per foot = 0.0 plf

Roof Pressure Coefficient, Cp		WW Area: 548 ft²		LW Area: 548 ft²			WW Area: 839 ft²		LW Area: 839 ft²	
		Front to Back					Side to Side			
		Distance from Windward Edge, ft					Distance from Windward Edge, ft			
	Max/Min	0 ft	11 ft	23 ft	46 ft	Max/Min	0 ft	11 ft	23 ft	46 ft
Windward Normal to Ridge =	Max	0.29	0.29	0.29	0.29	Max	0.24	0.24	0.24	0.24
	Min	-0.18	-0.18	-0.18	-0.18	Min	-0.21	-0.21	-0.21	-0.21
Leeward Normal to Ridge =	Max	-0.60	-0.60	-0.60	-0.60	Max	-0.60	-0.60	-0.60	-0.60
	Min	-0.60	-0.60	-0.60	-0.60	Min	-0.60	-0.60	-0.60	-0.60
Parallel to Ridge =	Max	-0.18	-0.18	-0.18	-0.18	Max	-0.18	-0.18	-0.18	-0.18
	Min	-0.90	-0.90	-0.50	-0.30	Min	-1.07	-1.07	-0.58	-0.47

ASD Factor
0.6

	Overall	Wall			Front to Back				Total	Shear	Adj. Shear	Adj. Wall
Load Description	Height	Trib	Kz	qz	WW	LW	SW	Int +/-	WW+LW	Force, lbs	Force, lbs	Force
Roof	22.8 ft	-	-	max-->	6.5 psf	-13.6 psf	varies	4.8 psf	20.1 psf	6120 lbs	3672 lbs	
				min-->	-4.1 psf	-13.6 psf	varies	-4.8 psf	9.5 psf	2902 lbs	1741 lbs	
Wall 2	8 ft	4.5	0.85	24.4 psf	16.6 psf	-6.8 psf	-15.9 psf	4.8 psf	23.4 psf	3371 lbs	2023 lbs	
Wall 1	9 ft	8.5	0.85	24.4 psf	16.6 psf	-6.8 psf	-15.9 psf	4.8 psf	23.4 psf	6368 lbs	3821 lbs	
			0.85	24.4 psf	16.6 psf	-6.8 psf	-15.9 psf	4.8 psf	23.4 psf	0 lbs	0 lbs	
			0.85	24.4 psf	16.6 psf	-6.8 psf	-15.9 psf	4.8 psf	23.4 psf	0 lbs	0 lbs	
			0.85	24.4 psf	16.6 psf	-6.8 psf	-15.9 psf	4.8 psf	23.4 psf	0 lbs	0 lbs	
Other												
									Front to Back Total Shear:	15859 lbs	9515 lbs	

		Side to Side				Total	Shear	Adj. Shear	Adj. Wall
		WW	LW	SW	Int +/-	WW + LW	Force, lbs	Force, lbs	Force
Roof	max-->	5.5 psf	-13.6 psf	varies	4.8 psf	19.1 psf	8892 lbs	5335 lbs	
	min-->	-4.8 psf	-13.6 psf	varies	-4.8 psf	8.8 psf	4104 lbs	2462 lbs	
Wall 2		16.6 psf	-11.3 psf	-15.9 psf	4.8 psf	27.9 psf	6162 lbs	3697 lbs	
Wall 1		16.6 psf	-11.3 psf	-15.9 psf	4.8 psf	27.9 psf	11639 lbs	6984 lbs	
		16.6 psf	-11.3 psf	-15.9 psf	4.8 psf	27.9 psf	0 lbs	0 lbs	
		16.6 psf	-11.3 psf	-15.9 psf	4.8 psf	27.9 psf	0 lbs	0 lbs	
		16.6 psf	-11.3 psf	-15.9 psf	4.8 psf	27.9 psf	0 lbs	0 lbs	
Other									
						Side to Side Total Shear:	26693 lbs	16016 lbs	

LATERAL ANALYSIS

Side-to-Side Dim:	32 ft		Roof Area =	1568 ft²
Front-to-Back Dim:	49 ft	Height	Floor Area =	1568
Roof Trib:	4.5 ft	18 ft	Floor Area =	
Floor Trib:	8.5 ft	9 ft	Floor Area =	
Floor Trib:				
Floor Trib:				
Roof Seismic DL:	15 psf			
Floor Seismic DL:	15 psf			
Wall Seismic DL:	12 psf			

Seismic: V = 0.11 *W

F-front-to-back:	V		W	WxHx	Cvx	Fx
Roof	2995 lbs	lb	26976	485568	0.64	4066 lbs
Floor	3336 lbs	lb	30048	270432	0.36	2265 lbs
Floor	0 lbs	lb	0	0	0.00	0 lbs
Floor	0 lbs	lb	0	0	0.00	0 lbs
	6331 lbs		57024	756000		6331 lbs
F-side-to-side:						
Roof	3199 lbs	lb	28812	518616	0.63	4375 lbs
Floor	3721 lbs	lb	33516	301644	0.37	2545 lbs
Floor	0 lbs	lb	0	0	0.00	0 lbs
Floor	0 lbs	lb	0	0	0.00	0 lbs
	6920 lbs		62328	820260		6920 lbs

Wind:

F-front-to-back:	
Roof	5695 lbs
Floor	3821 lbs
Floor	0 lbs
Floor	0 lbs
F-side-to-side:	
Roof	9032 lbs
Floor	6984 lbs
Floor	0 lbs
Floor	0 lbs

Use for Design:

F-front-to-back:			
Roof	5695 lbs	**Wind Governs**	1.4
Floor	3821 lbs	**Wind Governs**	1.4
Floor	0 lbs		1
Floor	0 lbs		1
F-side-to-side:			
Roof	9032 lbs	**Wind Governs**	1.4
Floor	6984 lbs	**Wind Governs**	1.4
Floor	0 lbs		1
Floor	0 lbs		1

SW capacities (plf):

	seismic	wind
SW-1	260	365
SW-2	380	532
SW-3	490	685
SW-4	640	896
SW-5	760	1065
SW-6	980	1370

Hold Down capacities (lb):

0	NONE		0	NONE	
200	LSTHD8	1610	200	MST37	1725
1610	STHD10	2175	1725	MST48	3215
2175	STHD14	5345	3215	MST60	5240
5345	HDU4	4565	5240	MST72	6730
4565	HDU5	5645	6730	(2) MST60	10480
5645	HDU8	7870	10480	(2) MST72	13460
7870	HDU11	9535	13460	NG	

SHEAR WALLS 14445 NG

Resisting DL: 10 psf

ROOF

Front-to-Back SW:	**Line 1**	**Line 2**	**Line 3**	**Line 4**	**Line 5**	**Line 6**	**Line 7**	**Line 8**	**Line 9**	**Line 10**
SW Height (ft):	8	8								
SW Trib (ft):	16	16								
SW Forces:	2847	2847	0	0	0	0	0	0	0	0
Total SW Length (ft):	32.5	38	0	0	0	0	0	0	0	0
Shear (lb/ft):	88	75	0	0	0	0	0	0	0	0
Uplift (lb):	701	599	0	0	0	0	0	0	0	0
SW Length (ft):	35	38								
Sum Perf Sgmts (ft):	32.5	38								
Area Openings (sf):	6.25	0								
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:	**SW-1**	**SW-1**								
Trib DL (ft):	8	8								
2/3 resisting DL (lb):	933.3333	1013.333	0	0	0	0	0	0	0	0
Net Uplift (lb):	-236	-414	0	0	0	0	0	0	0	0
Hold Down:	**#N/A**	**#N/A**								
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	701	599	0	0	0	0	0	0	0	0
Hold Down:	**MST37**									
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	701	599	0	0	0	0	0	0	0	0
Hold Down:	**MST37**									
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	701	599	0	0	0	0	0	0	0	0
Hold Down:										
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	701	599	0	0	0	0	0	0	0	0
Hold Down:										

FLOOR

Front-to-Back SW:	Line 1	Line 2	Line 3	Line 4	Line 5	Line 6	Line 7	Line 8	Line 9	Line 10
SW Height (ft):	9	9								
SW Trib (ft):	16	16								
SW Forces:	1910	1910	0	0	0	0	0	0	0	0
Total SW Length (ft):	28.5	48	0	0	0	0	0	0	0	0
Shear (lb/ft):	167	99	0	0	0	0	0	0	0	0
Uplift (lb):	2302	1367	0	0	0	0	0	0	0	0
SW Length (ft):	10	48								
Sum Perf Sgmts (ft):	7	48								
Area Openings (sf):	18	0								
Co:	0.77	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:	**SW-1**	**SW-1**								
Trib DL (ft):	8	8								
2/3 resisting DL (lb):	1200	2293.333	0	0	0	0	0	0	0	0
Net Uplift (lb):	1792	-927	0	0	0	0	0	0	0	0
Hold Down:	**STHD10**	**#N/A**								
SW Length (ft):	7									
Sum Perf Sgmts (ft):	7									
Area Openings (sf):	0									
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:	**SW-1**									
Trib DL (ft):	8									
2/3 resisting DL (lb):	186.6667	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	2115	1367	0	0	0	0	0	0	0	0
Hold Down:	**STHD10**									
SW Length (ft):	14.5									
Sum Perf Sgmts (ft):	14.5									
Area Openings (sf):	0									
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:	**SW-1**									
Trib DL (ft):	8									
2/3 resisting DL (lb):	386.6667	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	1915	1367	0	0	0	0	0	0	0	0
Hold Down:	**STHD10**									
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	2302	1367	0	0	0	0	0	0	0	0
Hold Down:										
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	2302	1367	0	0	0	0	0	0	0	0
Hold Down:										

ROOF

Side-to-Side SW:	**Line A**	**Line B**	**Line C**	**Line D**	**Line E**	**Line F**	**Line G**	**Line H**	**Line J**	**Line K**
SW Height (ft):	8	8								
SW Trib (ft):	22	22								
SW Forces:	4055	4055	0	0	0	0	0	0	0	0
Total SW Length (ft):	20.5	16	0	0	0	0	0	0	0	0
Shear (lb/ft):	198	253	0	0	0	0	0	0	0	0
Uplift (lb):	1583	2028	0	0	0	0	0	0	0	0
	FTAO	FTAO								
SW Length (ft):	11	16								
Sum Perf Sgmts (ft):	11	16								
Area Openings (sf):	0	0								
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:	**SW-3**	**SW-3**								
Trib DL (ft):	8	10								
2/3 resisting DL (lb):	293.3333	533.3333	0	0	0	0	0	0	0	0
Net Uplift (lb):	1289	1494	0	0	0	0	0	0	0	0
Hold Down:	**MST37**	**MST37**	**NONE**							
	FTAO									
SW Length (ft):	9.5									
Sum Perf Sgmts (ft):	9.5									
Area Openings (sf):	0									
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:	**SW-1**									
Trib DL (ft):	27									
2/3 resisting DL (lb):	855	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	728	2028	0	0	0	0	0	0	0	0
Hold Down:	**MST37**									
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	1583	2028	0	0	0	0	0	0	0	0
Hold Down:										
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	1583	2028	0	0	0	0	0	0	0	0
Hold Down:										
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	1583	2028	0	0	0	0	0	0	0	0
Hold Down:										

FLOOR

Side-to-Side SW:	**Line A**	**Line B**	**Line C**	**Line D**	**Line E**	**Line F**	**Line G**	**Line H**	**Line J**	**Line K**
SW Height (ft):	8	9	9							
SW Trib (ft):	10	14	24							
SW Forces:	1425	1995	3421	0	0	0	0	0	0	0
Total SW Length (ft):	16.25	16	21	0	0	0	0	0	0	0
Shear (lb/ft):	337	378	163	0	0	0	0	0	0	0
Uplift (lb):	4694	5431	1466	0	0	0	0	0	0	0
		FTAO								
SW Length (ft):	11	16	21							
Sum Perf Sgmts (ft):	11	16	21							
Area Openings (sf):	0	0	0							
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:	**Pframe**	**SW-4**	**SW-1**							
Trib DL (ft):	14	15	21							
2/3 resisting DL (lb):	806.6667	1333.333	1470	0	0	0	0	0	0	0
Net Uplift (lb):	3888	4098	-4	0	0	0	0	0	0	0
Hold Down:	**STHD14**	**MST60**	**#N/A**							
SW Length (ft):	5.25									
Sum Perf Sgmts (ft):	5.25									
Area Openings (sf):	0									
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:	**SW-1**									
Trib DL (ft):	14									
2/3 resisting DL (lb):	1100	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	3594	5431	1466	0	0	0	0	0	0	0
Hold Down:	**STHD14**									
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	4694	5431	1466	0	0	0	0	0	0	0
Hold Down:										
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	4694	5431	1466	0	0	0	0	0	0	0
Hold Down:										
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	4694	5431	1466	0	0	0	0	0	0	0
Hold Down:										

FLOOR

Side-to-Side SW:	**Line A**	**Line B**	**Line C**	**Line D**	**Line E**	**Line F**	**Line G**	**Line H**	**Line J**	**Line K**
SW Height (ft):		4.3								
SW Trib (ft):		14								
SW Forces:	0	1995	0	0	0	0	0	0	0	0
Total SW Length (ft):	0	10	0	0	0	0	0	0	0	0
Shear (lb/ft):	0	805	0	0	0	0	0	0	0	0
Uplift (lb):	0	12149	0	0	0	0	0	0	0	0
		10d Nailing								
SW Length (ft):		5								
Sum Perf Sgmts (ft):		5								
Area Openings (sf):		0								
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:		**SW-4**								
Trib DL (ft):		15								
2/3 resisting DL (lb):	806.6667	1583.333	1470	0	0	0	0	0	0	0
Net Uplift (lb):	-807	10566	-1470	0	0	0	0	0	0	0
Hold Down:		**HDU14**								
		10d Nailing								
SW Length (ft):		5								
Sum Perf Sgmts (ft):		5								
Area Openings (sf):		0								
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:		**SW-4**								
Trib DL (ft):		40								
2/3 resisting DL (lb):	1100	666.6667	0	0	0	0	0	0	0	0
Net Uplift (lb):	-1100	11483	0	0	0	0	0	0	0	0
Hold Down:		**HDU14**								
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	0	12149	0	0	0	0	0	0	0	0
Hold Down:										
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	0	12149	0	0	0	0	0	0	0	0
Hold Down:										
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	0	12149	0	0	0	0	0	0	0	0
Hold Down:										

Reeve & Associates, Inc.

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Spring Run 4-plex Lehi, Utah			
Date: **1/7/2020**		Sheet 1	Of 1
Designed By: **JMG**	Project Number: **4899-AXX**		

Force Transfer Around Openings - Diekmann Technique

Shear Line: Upper level Grid H

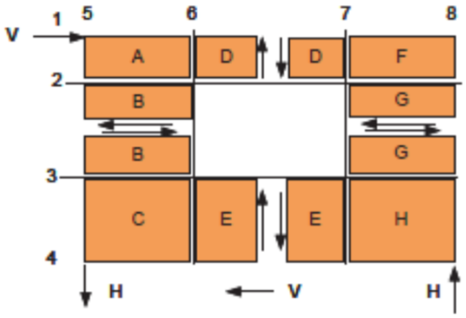
Horizontal Shear, V =	1311	lbs
Total Wall Length =	9.5	ft
Number of Openings =	1	
Wall Height =	8	ft
Total Pier Length =	4.5	ft
Controlling Lateral Force =	Wind	

									Seismic			
		Pier	Pier	Opening		Top	Bot	Min	Red.	D-E	B-G	Max
	#	Left	Right	W	H	Dist	Dist	H/W	%	Sum	Sum	Strap
1	1	2.25	2.25	5	3	1	4	1.3	100	5	4.5	552
		2.25	2.25								4.5	

Holdown Force, H =	1104	lbs
D,E Shear =	220.8	lb/ft
B,G Shear =	291.3	lb/ft
Total Tension, F =	1104	lbs
Min Strap =	**552**	lbs
Max Strap =	**552**	lbs
Check 1	245.3	lb/ft
Check 2	245.3	lb/ft
A,C,F,H Shear =	46.0	lb/ft

Results Summary

Level	Ht	V	Vt	SW	Adj.	SW'
-	ft	lbs	lbs	-	%	-
5	8	292	292	1	100	1
4			292			
3			292			
2			292			
1			292			



Shear Wall Capacities

		Seismic	Wind
SW-1	-	260 plf	365 plf
SW-2	-	380 plf	532 plf
SW-3	-	490 plf	685 plf
SW-4	-	640 plf	896 plf
SW-5	-	760 plf	1065 plf
SW-6	-	980 plf	1370 plf

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Spring Run 4-plex
Lehi, Utah

Date:	Sheet	Of
1/7/2020	1	1

Designed By:	Project Number:
JMG	**4899-AXX**

Force Transfer Around Openings - Diekmann Technique

Shear Line: Upper level Grid F

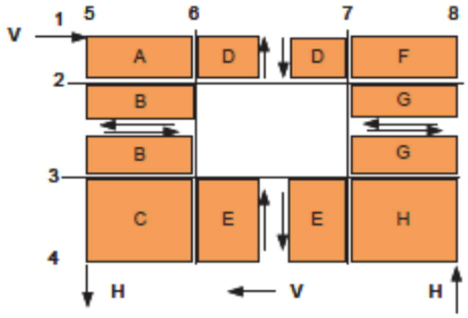
Horizontal Shear, V =	2744	lbs
Total Wall Length =	11	ft
Number of Openings =	1	
Wall Height =	8	ft
Total Pier Length =	5.0	ft
Controlling Lateral Force =	Wind	

			Pier	Pier	Opening		Top	Bot	Min	Seismic Red.	D-E	B-G	Max
	#		Left	Right	W	H	Dist	Dist	H/W	%	Sum	Sum	Strap
1	1		2.5	2.5	6	5	1	2	2.0	100	3	5	1996
			2.5	2.5								5	

Holdown Force, H =	1996	lbs
D,E Shear =	665.2	lb/ft
B,G Shear =	548.8	lb/ft
Total Tension, F =	3991	lbs
Min Strap =	**1996**	lbs
Max Strap =	**1996**	lbs
Check 1	798.3	lb/ft
Check 2	798.3	lb/ft
A,C,F,H Shear =	-249.5	lb/ft

Results Summary

Level	Ht	V	Vt	SW	Adj.	SW'
-	ft	lbs	lbs	-	%	-
5	8	665	665	3	100	3
4			665			
3			665			
2			665			
1			665			



Shear Wall Capacities

		Seismic	Wind
SW-1	-	260 plf	365 plf
SW-2	-	380 plf	532 plf
SW-3	-	490 plf	685 plf
SW-4	-	640 plf	896 plf
SW-5	-	760 plf	1065 plf
SW-6	-	980 plf	1370 plf

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Spring Run 4-plex Lehi, Utah			
Date: **1/7/2020**		Sheet 1	Of 1
Designed By: **JMG**		Project Number: **4899-AXX**	

Force Transfer Around Openings - Diekmann Technique

Shear Line: Grid T upper level - ASPEN

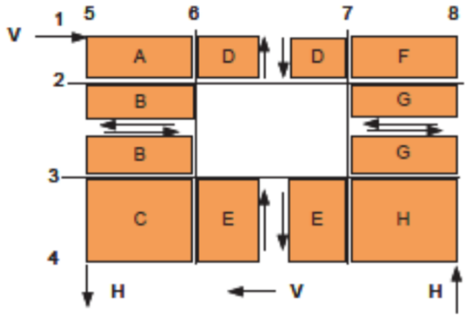
Horizontal Shear, V = 4055 lbs
Total Wall Length = 16 ft
Number of Openings = 1
Wall Height = 8 ft
Total Pier Length = 10.0 ft
Controlling Lateral Force = Wind

Holdown Force, H = 2028 lbs
D,E Shear = 675.8 lb/ft
B,G Shear = 405.5 lb/ft
Total Tension, F = 4055 lbs
Min Strap = **2028** lbs
Max Strap = **2028** lbs
Check 1 405.5 lb/ft
Check 2 405.5 lb/ft
A,C,F,H Shear = 0.0 lb/ft

	#	Pier Left	Pier Right	Opening W	Opening H	Top Dist	Bot Dist	Min H/W	Seismic Red. %	D-E Sum	B-G Sum	Max Strap
1	1	5	5	6	5	1	2	1.0	100	3	10	2028
		5	5								10	

Results Summary

Level	Ht	V	Vt	SW	Adj.	SW'
-	ft	lbs	lbs	-	%	-
5	8	676	676	3	100	3
4			676			
3			676			
2			676			
1			676			



Shear Wall Capacities

		Seismic	Wind
SW-1	-	260 plf	365 plf
SW-2	-	380 plf	532 plf
SW-3	-	490 plf	685 plf
SW-4	-	640 plf	896 plf
SW-5	-	760 plf	1065 plf
SW-6	-	980 plf	1370 plf

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Spring Run 4-plex
Lehi, Utah

Date:	Sheet	Of
1/7/2020	1	1

Designed By:	Project Number:
JMG	**4899-AXX**

Force Transfer Around Openings - Diekmann Technique

Shear Line: Grid T main level - ASPEN

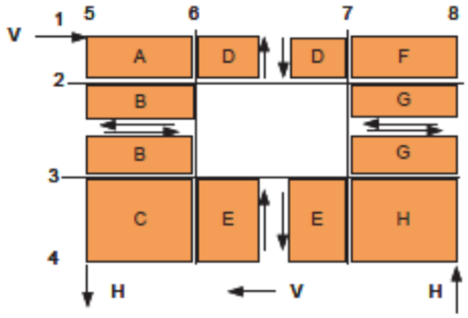
Horizontal Shear, V = 6050 lbs
Total Wall Length = 16 ft
Number of Openings = 1
Wall Height = 9 ft
Total Pier Length = 10.0 ft
Controlling Lateral Force = Wind

		Pier	Pier	Opening		Top	Bot	Min	Seismic Red.	D-E	B-G	Max
	#	Left	Right	W	H	Dist	Dist	H/W	%	Sum	Sum	Strap
1	1	5	5	6	5	2	2	1.0	100	4	10	2552
		5	5								10	

Holdown Force, H = 3403 lbs
D,E Shear = 850.8 lb/ft
B,G Shear = 605 lb/ft
Total Tension, F = 5105 lbs
Min Strap = **2552** lbs
Max Strap = **2552** lbs
Check 1 510.5 lb/ft
Check 2 510.5 lb/ft
A,C,F,H Shear = 94.5 lb/ft

Results Summary

Level	Ht	V	Vt	SW	Adj.	SW'
-	ft	lbs	lbs	-	%	-
5	8	851	851	4	100	4
4			851			
3			851			
2			851			
1			851			



Shear Wall Capacities

		Seismic	Wind
SW-1	-	260 plf	365 plf
SW-2	-	380 plf	532 plf
SW-3	-	490 plf	685 plf
SW-4	-	640 plf	896 plf
SW-5	-	760 plf	1065 plf
SW-6	-	980 plf	1370 plf

Simple Span Beam Calculation

Adjustment Factors - ASD

Cd:	1.15	Cfu:	NA	
Cm:	1.00	Ci:	1.00	
Ct:	1.00	Cr:	1.00	
Cl:	1.00	Cv:	-	Glu-Lam & LVL Only
Cf:	-	Cc:	1.00	Glu-Lam Only

Roof DL	10	psf	Include Self Wt?
Floor DL	15	psf	No
Live	40	psf	
Snow	35	psf	

--->> Point Load distance must be >= midspan distance!

Active Member for Deflection Calc and Shear Diagram: RB-6

					point load				left reaction			right reaction														
member ID	span ft	roof trib ft	floor trib ft	wall load plf	dead lbs	live lbs	snow lbs	dist from left, ft	dead lbs	live lbs	snow lbs	dead lbs	live lbs	snow lbs	applied moment lb-ft	% Str	applied shear lbs	% Str	Selected Member	Live/Total Deflection	actual Δ, in.	Δ limit, L/	Δ act, L/	check	Max Defl Location, ft	Min Bearing Length, in
RB-1	4	21							420	0	1470	420	0	1470	1890	69.5	1890	63.0	(2) 2x8	Live	0.03	L/240	L/1728	Pass	2.0	1.0
RB-2	6	5							150	0	525	150	0	525	1013	37.2	675	22.5	(2) 2x8	Live	0.03	L/240	L/2151	Pass	3.0	0.4
RB-3	6	26							780	0	2730	780	0	2730	5265	64.4	3510	63.3	(2) 1-3/4"x7-1/4" LVL	Live	0.12	L/240	L/603	Pass	3.0	1.3
RB-4	8	8							320	0	1120	320	0	1120	2880	70.6	1440	32.0	(3) 2x8	Live	0.11	L/240	L/851	Pass	4.0	0.5
RB-5	10.5	19			700		1650	8.5	1131	0	3806	1564	0	4827	14250	73.7	6391	60.2	(3) 1-3/4"x9-1/4" LVL	Live	0.32	L/360	L/393	Pass	5.4	1.6
RB-6	14	5		100					1050	0	1225	1050	0	1225	7963	41.2	2275	21.4	(3) 1-3/4"x9-1/4" LVL	Live	0.22	L/360	L/769	Pass	7.0	0.6
RB-7									0	0	0	0	0	0	0		0			Live		L/360				
RB-8									0	0	0	0	0	0	0		0			Live		L/360				
RB-9									0	0	0	0	0	0	0		0			Live		L/360				
RB-10									0	0	0	0	0	0	0		0			Live		L/360				
RB-11									0	0	0	0	0	0	0		0			Live		L/360				
RB-12									0	0	0	0	0	0	0		0			Live		L/360				
RB-13									0	0	0	0	0	0	0		0			Live		L/360				
RB-14									0	0	0	0	0	0	0		0			Live		L/360				
RB-15									0	0	0	0	0	0	0		0			Live		L/360				
RB-16									0	0	0	0	0	0	0		0			Live		L/360				
RB-17									0	0	0	0	0	0	0		0			Live		L/360				
RB-18									0	0	0	0	0	0	0		0			Live		L/360				
RB-19									0	0	0	0	0	0	0		0			Live		L/360				
RB-20									0	0	0	0	0	0	0		0			Live		L/360				
RB-21									0	0	0	0	0	0	0		0			Live		L/360				
RB-22									0	0	0	0	0	0	0		0			Live		L/360				
RB-23									0	0	0	0	0	0	0		0			Live		L/360				
RB-24									0	0	0	0	0	0	0		0			Live		L/360				
RB-25									0	0	0	0	0	0	0		0			Live		L/360				
RB-26									0	0	0	0	0	0	0		0			Live		L/360				
RB-27									0	0	0	0	0	0	0		0			Live		L/360				

Simple Span Beam Calculation

Adjustment Factors - ASD

Cd:	1.00	Cfu:	NA	
Cm:	1.00	Ci:	1.00	
Ct:	1.00	Cr:	1.15	
Cl:	1.00	Cv:	-	Glu-Lam & LVL Only
Cf:	-	Cc:	1.00	Glu-Lam Only

Roof DL	15	psf	Include Self Wt?	
Floor DL	15	psf	No	
Live	40	psf		
Snow	35	psf		

--->> Point Load distance must be >= midspan distance!

Active Member for Deflection Calc and Shear Diagram: FB-21

member ID	span ft	roof trib ft	floor trib ft	wall load plf	point load			dist from left, ft	left reaction			right reaction			applied moment lb-ft	% Str	applied shear lbs	% Str	Selected Member	Live/Total Deflection	actual Δ, in.	Δ limit L/	Δ act L/	check	Max Defl Location, ft	Min Bearing Length, in
					dead lbs	live lbs	snow lbs		dead lbs	live lbs	snow lbs	dead lbs	live lbs	snow lbs												
FB-1	4		16						480	1280	0	480	1280	0	1760	64.7	1760	67.4	(2) 2x8	Live	0.04	L/360	L/1227	Pass	3.2	0.9
FB-2	6		13						585	1560	0	585	1560	0	3218	78.9	2145	54.8	(3) 2x8	Live	0.07	L/360	L/1086	Pass	3.0	0.8
FB-3	6		13						585	1560	0	585	1560	0	3218	79.3	2145	64.4	(2) 2x10	Live	0.05	L/360	L/1503	Pass	3.0	1.1
FB-4	4		7						210	560	0	210	560	0	770	3.8	770	9.8	(2) 1-3/4"x11-7/8" LVL	Live	0.00	L/480	L/29072	Pass	2.0	0.3
FB-5	3	22	6						630	360	1155	630	360	1155	1339	49.2	1785	68.4	(2) 2x8	Live	0.01	L/480	L/3910	Pass	1.5	1.1
FB-6	10	5	8	100					1475	1600	875	1475	1600	875	8328	40.6	3331	42.2	(2) 1-3/4"x11-7/8" LVL	Live	0.09	L/480	L/1403	Pass	5.0	1.5
FB-7	5.5	18	5	100					1224	550	1733	1224	550	1733	4065	19.8	2956	37.4	(2) 1-3/4"x11-7/8" LVL	Live	0.01	L/480	L/4970	Pass	2.7	1.3
FB-8	4.5	8	7	100					731	630	630	731	630	630	1886	9.2	1676	21.2	(2) 1-3/4"x11-7/8" LVL	Live	0.00	L/480	L/13612	Pass	2.2	0.8
FB-9	20								0	0	0	0	0	0	0	#N/A	0	#N/A	see calc	Live		L/360	######	######		
FB-10	20								0	0	0	0	0	0	0	#N/A	0	#N/A	see calc	Live		L/480	######	######		
FB-11	16								0	0	0	0	0	0	0	#N/A	0	#N/A	see calc	Live		L/480	######	######		
FB-12									0	0	0	0	0	0	0		0		not used	Live		L/480			6.5	
FB-13	15		14						1575	4200	0	1575	4200	0	21656	70.3	5775	48.8	(3) 1-3/4"x11-7/8" LVL	Live	0.44	L/360	L/413	Pass	7.5	1.5
FB-14	3		28	100					780	1680	0	780	1680	0	1845	45.5	2460	73.9	(2) 2x10	Live	0.01	L/480	L/5583	Pass	1.5	1.3
FB-15	8		18	100					1480	2880	0	1480	2880	0	8720	71.1	4360	60.3	(3) 1-3/4"x7-1/4" LVL	Live	0.20	L/480	L/482	Pass	4.0	1.1
FB-16									0	0	0	0	0	0	0		0			Live		L/480				
FB-17	5		22						825	2200	0	825	2200	0	3781	51.6	3025	55.1	(3) 1-3/4"x5-1/2" LVL	Live	0.09	L/480	L/706	Pass	2.5	0.8
FB-18									0	0	0	0	0	0	0		0			Live		L/480				
FB-19	20.5		8						1230	3280	0	1230	3280	0	23114	53.5	4510	33.2	5-1/8"x15" GLB	Live	0.49	L/480	L/502	Pass	10.2	1.4
FB-20	8		5						300	800	0	300	800	0	2200	54.2	1100	33.0	(2) 2x10	Live	0.06	L/480	L/1649	Pass	4.0	0.6
FB-21	14		3						315	840	0	315	840	0	4043	30.6	1155	19.9	3-1/8"x10-1/2" GLB	Live	0.19	L/480	L/879	Pass	7.0	0.6
FB-22									0	0	0	0	0	0	0		0			Live		L/480				
FB-23									0	0	0	0	0	0	0		0			Live		L/480				
FB-24									0	0	0	0	0	0	0		0			Live		L/480				
FB-25									0	0	0	0	0	0	0		0			Live		L/480				
FB-26									0	0	0	0	0	0	0		0			Live		L/480				
FB-27									0	0	0	0	0	0	0		0			Live		L/480				

FOOTINGS:

ALLOWABLE BEARING PRESSURE = 1.5 KSF
Assumed Coefficient of Friction Soil to Foundation = 0.3

	Frame Line	GRAVITY DL	LL	SL	$Trib_{DL}$	$Trib_{LL}$	$Trib_{SL}$	Wall	$Trib_{Wall}$	DL	Factored LL	SL	Required FTG	Specified FTG
Grid L	L	15.0 psf	40.0 psf	35.0 psf	28.0ft	28.0ft	0.0ft	53.0 psf	17.0ft	1.3 k	1.1k		19.5 in	FC- 24
rear left	T	15.0 psf	40.0 psf	35.0 psf	28.0ft	7.0ft	21.0ft	45.0 psf	21.0ft	1.4 k	0.8k		17.0 in	FC- 20
rear right	T	15.0 psf	40.0 psf	35.0 psf	19.0ft	14.0ft	5.0ft	40.0 psf	25.0ft	1.3 k	0.6k		14.8 in	FC- 20
side	1	15.0 psf	40.0 psf	35.0 psf	10.0ft	5.0ft	5.0ft	40.0 psf	25.0ft	1.2 k	0.3k		11.5 in	FC- 20
marriage	2	15.0 psf	40.0 psf	35.0 psf	21.0ft	4.0ft	17.0ft	15.0 psf	50.0ft	1.1 k	0.6k		13.3 in	FC- 20
Grid P	P	15.0 psf	40.0 psf	35.0 psf	28.0ft	28.0ft	0.0ft	12.0 psf	17.0ft	0.6 k	1.1k		14.0 in	FC- 18
Grid 1.4	1.4	15.0 psf	40.0 psf	35.0 psf	14.0ft	5.0ft	9.0ft	12.0 psf	17.0ft	0.4 k	0.4k		6.4 in	FC- 18
SPOT FTGS														
	B	0.0 psf	0.0 psf	0.0 psf	0.0sf	0.0sf	0.0sf	0.0 psf	0.0sf	0.0 k	0.0k		0.0 in	FS- 0
F porch	C	15.0 psf	40.0 psf	35.0 psf	50.0sf	0.0sf	25.0sf	0.0 psf	0.0sf	0.8 k	0.9k		12.5 in	FS- 24
1.4 - P	D	15.0 psf	40.0 psf	35.0 psf	205.0sf	105.0sf	100.0sf	0.0 psf	0.0sf	3.1 k	5.8k		29.1 in	FS- 36

TYPICAL FOOTINGS AND REINFORCING

Footing Parameters

Soil Bearing Pressure = 1500 psf
f'c = 2500 psi
fy steel = 60 ksi
pmax = 0.016

Note: Not all footings were used on this project

Continuous Footings							Trial Reinf			
Callout	Typ Eccent	Allowable Load	Ftg Reqd	Nom Ftg	Asmin/ft	As Reqd/ft	Num Bar	Bar #	As Prov	√ As
FC-1.5	0.1%	*2.2 klf*	1.48'	*1.5'*	0.18 in^2	0.36 in^2	(2)	4	0.4	OK
FC-2.0	0.1%	*3.0 klf*	1.98'	*2.0'*	0.24 in^2	0.48 in^2	(3)	4	0.6	OK
FC-2.5	0.1%	*3.7 klf*	2.48'	*2.5'*	0.30 in^2	0.60 in^2	(3)	5	0.93	OK
FC-3.0	0.1%	*4.5 klf*	2.98'	*3.0'*	0.36 in^2	0.72 in^2	(3)	5	0.93	OK
FC-3.5	0.1%	*5.2 klf*	3.48'	*3.5'*	0.42 in^2	0.84 in^2	(3)	5	0.93	OK
FC-4.0	0.1%	*6.0 klf*	3.98'	*4.0'*	0.48 in^2	0.96 in^2	(4)	5	1.24	OK
FC-4.5	0.1%	*6.7 klf*	4.48'	*4.5'*	0.54 in^2	1.08 in^2	(4)	5	1.24	OK
FC-5.0	0.1%	*7.5 klf*	4.98'	*5.0'*	0.60 in^2	1.20 in^2	(5)	5	1.55	OK
FTS-1.5	0.1%	*2.2 klf*	1.48'	*1.5'*	0.18 in^2	0.36 in^2	(2)	4	0.4	OK
FTS-2.0	0.1%	*3.0 klf*	1.98'	*2.0'*	0.24 in^2	0.48 in^2	(3)	4	0.6	OK
FTS-2.5	0.1%	*3.7 klf*	2.48'	*2.5'*	0.30 in^2	0.60 in^2	(3)	5	0.93	OK
FTS-3.0	0.1%	*4.5 klf*	2.98'	*3.0'*	0.36 in^2	0.72 in^2	(3)	5	0.93	OK
FTS-3.5	0.1%	*5.2 klf*	3.48'	*3.5'*	0.42 in^2	0.84 in^2	(3)	5	0.93	OK

Spot Footings										Trial Reinf			
Callout	Typ Eccent	Allowable Load	Ftg Reqd	Nom Ftg	Mu	p	√ p	Asmin	As Reqd	Num Bar	Bar #	As Prov	√ As
FS-2.0	0.1%	*5.9 k*	1.99'	*2.0'*	1.02 k-ft	0.000	OK	0.43 in^2	0.05 in^2	(2)	5	0.62	OK
FS-2.5	0.1%	*9.2 k*	2.49'	*2.5'*	2.16 k-ft	0.000	OK	0.54 in^2	0.10 in^2	(3)	5	0.93	OK
FS-3.0	0.1%	*13.3 k*	2.99'	*3.0'*	3.95 k-ft	0.001	OK	0.65 in^2	0.18 in^2	(3)	5	0.93	OK
FS-3.5	0.1%	*18.2 k*	3.49'	*3.5'*	6.52 k-ft	0.000	OK	0.90 in^2	0.22 in^2	(3)	5	0.93	OK
FS-4.0	0.1%	*23.8 k*	3.99'	*4.0'*	10.02 k-ft	0.001	OK	1.03 in^2	0.33 in^2	(4)	5	1.24	OK
FS-4.5	0.1%	*30.1 k*	4.49'	*4.5'*	14.58 k-ft	0.001	OK	1.16 in^2	0.48 in^2	(4)	5	1.24	OK
FS-5.0	0.1%	*37.2 k*	4.99'	*5.0'*	19.63 k-ft	0.001	OK	1.29 in^2	0.65 in^2	(5)	5	1.55	OK
FS-5.5	0.1%	*45.0 k*	5.50'	*5.5'*	26.59 k-ft	0.001	OK	1.42 in^2	0.89 in^2	(5)	5	1.55	OK
FS-6.0	0.1%	*53.5 k*	5.99'	*6.0'*	33.81 k-ft	0.001	OK	1.60 in^2	1.07 in^2	(6)	5	1.86	OK

PUNCHING SHEAR CHECK

Note: Not all footings were used on this project

Callout	Factored Load	Min Col. Dim	factored qu		Assumed depth	d	bo	Vu	Vc	√ Capacity
FS-2.0	8.5 k	4"	2.12 ksf		10"	7.0"	44"	6.7 k	52.4 k	OK
FS-2.5	13.3 k	4"	2.13 ksf		10"	7.0"	44"	11.5 k	52.4 k	OK
FS-3.0	19.2 k	4"	2.13 ksf		10"	7.0"	44"	17.4 k	52.4 k	OK
FS-3.5	26.2 k	4"	2.14 ksf		12"	9.0"	52"	23.7 k	79.6 k	OK
FS-4.0	34.2 k	4"	2.14 ksf		12"	9.0"	52"	31.7 k	79.6 k	OK
FS-4.5	43.4 k	4"	2.14 ksf		12"	9.0"	52"	40.8 k	79.6 k	OK
FS-5.0	53.6 k	5"	2.14 ksf		12"	9.0"	56"	50.7 k	85.7 k	OK
FS-5.5	64.9 k	5"	2.14 ksf		12"	9.0"	56"	61.9 k	85.7 k	OK
FS-6.0	77.0 k	6"	2.14 ksf		12"	9.4"	62"	73.5 k	98.4 k	OK

Reeve & Associates, Inc.

PROJECT		PROJ NO.		
		CALC NO.		
SUBJECT	**Low Roof Snow Load per ASCE 7** **Leeward and Windward Snow Drift**	BY JMG	DATE	1/8/20
		CHK	DATE	
		SHEET	OF	REV

Description:

GENERAL INPUT AND OUTPUT:

"Leeward" or "Windward":	1.00	*Leeward*	Snow Load Density:	19.83 pcf
Roof Slope:	8:12	*33.69 °*	h_b (Snow Depth):	1.74 feet
County (State of Utah)	UTAH		h_d (potential drift height):	-1.50 feet
Elevation at Site	4700 ft		h_c (Roof to Snow):	0.00 feet
p_g (SEAU Flat Roof Snow)	45 psf	________ *<---Manual Entry*	Maximum Drift Height:	0.00 feet
C_e (Exposure Factor):	1.0		Drift Width:	0.00 feet
C_t (Thermal Factor):	1.1			
I_s (Importance Factor):	1.0		Maximum Snow Load:	**34.50 psf**
L_u (Length of Roof):	0.00 feet	*Upper Roof*		
Elevation Difference:	0.00 feet		Maximum Drift Weight:	**0.00 psf**
P_f (Roof Snow):	**34.5 psf**		Drift Width:	**0.00 feet**
C_s (Roof Slope Factor):	1.0			
P_s (Sloped Roof Snow):	**34.5 psf**			

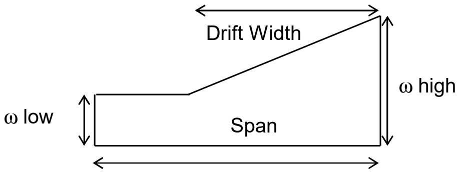


Diagram A

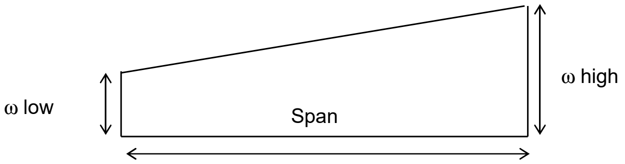


Diagram B

Reeve & Associates, Inc.

Land Planners · Civil Engineers · Land Surveyors
Traffic Engineers · Structural Engineers · Landscape Architects
920 Chambers Street, Suite 14 -- Ogden, UT 84403
Phone: (801) 621-3100
Fax: (801) 621-2666

Date:	Sheet	Of
1/8/2020	1	1

Designed By:	Project Number:
JMG	

Seismic Calculations

Earthquake Loads-Site Ground Motion

I= 1

R= 6.5 Wood Brg Wall

S_s= 1.139

S_1= 0.385

Site Class= D

h_n= 28.00 ft (Building Height)

Structure Type = Other

C_t= 0.02

x= 0.75

Check Height for LFRS = 28.0ft > NP (per exception 12.2.5.6 where

DL = 6.5 psf (Estimated) DL <20psf allowed up to 65ft)

F_a= 1.04

S_{MS}= 1.190 S_{MS}= F_a*S_S

S_{DS}= 0.793 S_{DS}= 2*S_{MS}/3

F_v= 1.63

S_{M1}= 0.628 S_{M1}= F_v*S_1

S_{D1}= 0.418 S_{D1}= 2*S_{M1}/3

Earthquake Loads-Minimum Design Lateral Force

C_s= 0.122

C_s= 0.264

C_s= 0.035

T= 0.243 s

Load Combinations that control lateral:

D+0.75L+0.75S+0.75(0.7*E)

0.6D+0.7E

ASD Load Factor = 0.7

Rho = 1.3

USE

C_s= 0.122

V=C_S*W

V = ASD Load Factor*Rho*Cs*W = 0.11 *W

Dead Load Effect

0.2*S_{DS}= 0.159

(+/-) 0.2*S_{DS}*D

Seismic Design Category

SDS => D

SD1 => D

Wind Design - ASCE 7-16 Chp 27

Risk Category =	II		
Basic Wind Speed V =	115	mph	
Exposure Category =	C		3
Wind Directionality Factor, Kd =	0.85		
Topographic Factor, Kzt =	1		
Gust Effect Factor, G =	0.85		
Total Stories =	2	(5 max)	
Internal Pressure Coefficient, Gcpi =	0.18		
	-0.18		

Enclosure Classification

	Length	Height	Ag	Ao	% open	Open	Partial 1	Partial 2	Partial Total
Wall 1 =	100	10	1000	800	80.0	Y	Y	N	N
Wall 2 =	100	10	1000	200	20.0	N	N	Y	N
Wall 3 =	25	10	250	30	12.0	N	N	Y	N
Wall 4 =	25	10	250	50	20.0	N	N	Y	N

Open Building: NO
Partially Open: NO
Enclosed: YES

Wall Pressure	Front to Back		Side to Side	
Windward Wall, Cp =	0.8		0.8	
Windward Wall Width, B =	30 ft		53 ft	
Side Wall Width, L =	53 ft		30 ft	
L/B =	1.766667		0.566038	
Leeward Wall, Cp =	-0.3		-0.5	
Side Wall, Cp =	-0.7		-0.7	
Roof Pressure				
Roof Type =	Gable 1		Gable 1	
Roof Pitch =	8/12	33.7 °	8/12	33.7 °
Ridge Height =	28 ft		28 ft	
Eave Height =	18 ft		18 ft	
Mean Roof Height, h =	22.8 ft		22.8 ft	
h/L =	0.43		0.76	
h/2 =	11 ft		11 ft	
Kh =	0.93		0.93	
qh =	26.7 psf		26.7 psf	

Parapet Wall Pressure

Parapet Wall Height =	0 ft
Building Height to top of parapet=	0 ft
Kz =	0.85
qp =	24.4 psf
WW GCpn =	1.50
LW GCpn+	-1.00
Pp =	61.1 psf
Adj. Pp =	36.6 psf
Parapet Load per foot =	0.0 plf

Roof Pressure Coefficient, Cp		WW Area: 514 ft²		LW Area: 514 ft²			WW Area: 908 ft²		LW Area: 908 ft²	
		Front to Back					Side to Side			
		Distance from Windward Edge, ft					Distance from Windward Edge, ft			
	Max/Min	0 ft	11 ft	23 ft	46 ft	Max/Min	0 ft	11 ft	23 ft	46 ft
Windward Normal to Ridge =	Max	0.30	0.30	0.30	0.30	Max	0.24	0.24	0.24	0.24
	Min	-0.16	-0.16	-0.16	-0.16	Min	-0.21	-0.21	-0.21	-0.21
Leeward Normal to Ridge =	Max	-0.60	-0.60	-0.60	-0.60	Max	-0.60	-0.60	-0.60	-0.60
	Min	-0.60	-0.60	-0.60	-0.60	Min	-0.60	-0.60	-0.60	-0.60
Parallel to Ridge =	Max	-0.18	-0.18	-0.18	-0.18	Max	-0.18	-0.18	-0.18	-0.18
	Min	-0.90	-0.90	-0.50	-0.30	Min	-1.11	-1.11	-0.60	-0.51

ASD Factor
0.6

					Front to Back				Total			
Load Description	Overall Height	Wall Trib	Kz	qz	WW	LW	SW	Int +/-	WW+LW	Shear Force, lbs	Adj. Shear Force, lbs	Adj. Wall Force
Roof	22.8 ft	-	-	max-->	6.8 psf	-13.6 psf	varies	4.8 psf	20.4 psf	5828 lbs	3497 lbs	
				min-->	-3.6 psf	-13.6 psf	varies	-4.8 psf	10.0 psf	2854 lbs	1712 lbs	
Wall 2	8 ft	4.5	0.85	24.4 psf	16.6 psf	-6.8 psf	-15.9 psf	4.8 psf	23.4 psf	3161 lbs	1896 lbs	
Wall 1	9 ft	8.5	0.85	24.4 psf	16.6 psf	-6.8 psf	-15.9 psf	4.8 psf	23.4 psf	5970 lbs	3582 lbs	
			0.85	24.4 psf	16.6 psf	-6.8 psf	-15.9 psf	4.8 psf	23.4 psf	0 lbs	0 lbs	
			0.85	24.4 psf	16.6 psf	-6.8 psf	-15.9 psf	4.8 psf	23.4 psf	0 lbs	0 lbs	
			0.85	24.4 psf	16.6 psf	-6.8 psf	-15.9 psf	4.8 psf	23.4 psf	0 lbs	0 lbs	
Other												
									Front to Back Total Shear:	14958 lbs	8975 lbs	

		Side to Side				Total			
		WW	LW	SW	Int +/-	WW + LW	Shear Force, lbs	Adj. Shear Force, lbs	Adj. Wall Force
Roof	max-->	5.3 psf	-13.6 psf	varies	4.8 psf	18.9 psf	9538 lbs	5723 lbs	
	min-->	-4.8 psf	-13.6 psf	varies	-4.8 psf	8.8 psf	4411 lbs	2646 lbs	
Wall 2		16.6 psf	-11.3 psf	-15.9 psf	4.8 psf	27.9 psf	6665 lbs	3999 lbs	
Wall 1		16.6 psf	-11.3 psf	-15.9 psf	4.8 psf	27.9 psf	12589 lbs	7554 lbs	
		16.6 psf	-11.3 psf	-15.9 psf	4.8 psf	27.9 psf	0 lbs	0 lbs	
		16.6 psf	-11.3 psf	-15.9 psf	4.8 psf	27.9 psf	0 lbs	0 lbs	
		16.6 psf	-11.3 psf	-15.9 psf	4.8 psf	27.9 psf	0 lbs	0 lbs	
Other									
						Side to Side Total Shear:	28792 lbs	17275 lbs	

LATERAL ANALYSIS

Side-to-Side Dim:	30 ft		Roof Area =	1590 ft²
Front-to-Back Dim:	53 ft	Height	Floor Area =	1590
Roof Trib:	4.5 ft	18 ft	Floor Area =	
Floor Trib:	8.5 ft	9 ft	Floor Area =	
Floor Trib:				
Floor Trib:				
Roof Seismic DL:	15 psf			
Floor Seismic DL:	15 psf			
Wall Seismic DL:	12 psf			

Seismic: V = 0.11 *W

F-front-to-back:	V		W	WxHx	Cvx	Fx
Roof	3008 lbs	lb	27090	487620	0.64	4079 lbs
Floor	3327 lbs	lb	29970	269730	0.36	2256 lbs
Floor	0 lbs	lb	0	0	0.00	0 lbs
Floor	0 lbs	lb	0	0	0.00	0 lbs
	6335 lbs		57060	757350		6335 lbs
F-side-to-side:						
Roof	3284 lbs	lb	29574	532332	0.63	4497 lbs
Floor	3848 lbs	lb	34662	311958	0.37	2635 lbs
Floor	0 lbs	lb	0	0	0.00	0 lbs
Floor	0 lbs	lb	0	0	0.00	0 lbs
	7132 lbs		64236	844290		7132 lbs

Wind:

F-front-to-back:	
Roof	5393 lbs
Floor	3582 lbs
Floor	0 lbs
Floor	0 lbs

F-side-to-side:	
Roof	9722 lbs
Floor	7554 lbs
Floor	0 lbs
Floor	0 lbs

Use for Design:

F-front-to-back:			
Roof	5393 lbs	**Wind Governs**	1.4
Floor	3582 lbs	**Wind Governs**	1.4
Floor	0 lbs		1
Floor	0 lbs		1

F-side-to-side:			
Roof	9722 lbs	**Wind Governs**	1.4
Floor	7554 lbs	**Wind Governs**	1.4
Floor	0 lbs		1
Floor	0 lbs		1

SW capacities (plf):

	seismic	wind
SW-1	260	365
SW-2	380	532
SW-3	490	685
SW-4	640	896
SW-5	760	1065
SW-6	980	1370

Hold Down capacities (lb):

0	NONE		0	NONE	
200	LSTHD8	1610	200	MST37	1725
1610	STHD10	2175	1725	MST48	3215
2175	STHD14	3500	3215	MST60	5240
3500	HDU4	4565	5240	MST72	6730
4565	HDU5	5645	6730	(2) MST60	10480
5645	HDU8	7870	10480	(2) MST72	13460
7870	HDU11	9535	13460	NG	
9535	HDU14	14445			

SHEAR WALLS 14445 NG

Resisting DL: 10 psf

ROOF

Front-to-Back SW:	**Line 1**	**Line 2**	**Line 3**	**Line 4**	**Line 5**	**Line 6**	**Line 7**	**Line 8**	**Line 9**	**Line 10**
SW Height (ft):	9	8	8							
SW Trib (ft):	4	11	15							
SW Forces:	719	1977	2697	0	0	0	0	0	0	0
Total SW Length (ft):	15	54	21	0	0	0	0	0	0	0
Shear (lb/ft):	48	37	128	0	0	0	0	0	0	0
Uplift (lb):	431	293	1027	0	0	0	0	0	0	0
SW Length (ft):	27	54	21							
Sum Perf Sgmts (ft):	15	54	21							
Area Openings (sf):	45	0	0							
Co:	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:	**SW-1**	**SW-1**	**SW-1**							
Trib DL (ft):	9	8	8							
2/3 resisting DL (lb):	810	1440	560	0	0	0	0	0	0	0
Net Uplift (lb):	-331	-1147	467	0	0	0	0	0	0	0
Hold Down:	**#N/A**	**#N/A**	**MST37**		**NONE**					
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	431	293	1027	0	0	0	0	0	0	0
Hold Down:										
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	431	293	1027	0	0	0	0	0	0	0
Hold Down:										
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	431	293	1027	0	0	0	0	0	0	0
Hold Down:										
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	431	293	1027	0	0	0	0	0	0	0
Hold Down:										

FLOOR

Front-to-Back SW:	**Line 1**	**Line 2**	**Line 3**	**Line 4**	**Line 5**	**Line 6**	**Line 7**	**Line 8**	**Line 9**	**Line 10**
SW Height (ft):	9	9	9		9					
SW Trib (ft):	4	11	15		14					
SW Forces:	478	1313	1791	0	1672	0	0	0	0	0
Total SW Length (ft):	15.5	42	21	0	5.5	0	0	0	0	0
Shear (lb/ft):	77	78	214	0	304	0	0	0	0	0
Uplift (lb):	1112	1082	2950	0	2735	0	0	0	0	0
SW Length (ft):	21.5	42	21		5.5					
Sum Perf Sgmts (ft):	15.5	42	21		5.5					
Area Openings (sf):	33	0	0		0					
Co:	0.81	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:	**SW-1**	**SW-1**	**SW-1**		**SW-1**					
Trib DL (ft):	9	9	9		9					
2/3 resisting DL (lb):	1455	2700	1190	0	165	0	0	0	0	0
Net Uplift (lb):	-84	-1618	1760	0	2570	0	0	0	0	0
Hold Down:	**#N/A**	**#N/A**	**STHD10**		**STHD14**					
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	1112	1082	2950	0	2735	0	0	0	0	0
Hold Down:										
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	1112	1082	2950	0	2735	0	0	0	0	0
Hold Down:										
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	1112	1082	2950	0	2735	0	0	0	0	0
Hold Down:										
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	1112	1082	2950	0	2735	0	0	0	0	0
Hold Down:										

ROOF

Side-to-Side SW:	**Line A**	**Line B**	**Line C**	**Line D**	**Line E**	**Line F**	**Line G**	**Line H**	**Line J**	**Line K**
SW Height (ft):	8	8								
SW Trib (ft):	27	27								
SW Forces:	4952	4952	0	0	0	0	0	0	0	0
Total SW Length (ft):	22	14	0	0	0	0	0	0	0	0
Shear (lb/ft):	225	354	0	0	0	0	0	0	0	0
Uplift (lb):	1801	2830	0	0	0	0	0	0	0	0
	FTAO	FTAO								
SW Length (ft):	14	14								
Sum Perf Sgmts (ft):	14	14								
Area Openings (sf):	0	0								
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:	**SW-4**	**SW-4**								
Trib DL (ft):	8	8	8							
2/3 resisting DL (lb):	373.3333	373.3333	0	0	0	0	0	0	0	0
Net Uplift (lb):	1428	2457	0	0	0	0	0	0	0	0
Hold Down:	**MST37**	**MST48**	**NONE**	**NONE**						
	FTAO									
SW Length (ft):	8									
Sum Perf Sgmts (ft):	8									
Area Openings (sf):	0									
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:	**SW-2**									
Trib DL (ft):	8									
2/3 resisting DL (lb):	213.3333	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	1588	2830	0	0	0	0	0	0	0	0
Hold Down:	**MST37**	**MST48**		**NONE**						
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	1801	2830	0	0	0	0	0	0	0	0
Hold Down:										
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	1801	2830	0	0	0	0	0	0	0	0
Hold Down:										
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	1801	2830	0	0	0	0	0	0	0	0
Hold Down:										

FLOOR

Side-to-Side SW:	**Line A**	**Line B**	**Line C**	**Line D**	**Line E**	**Line F**	**Line G**	**Line H**	**Line J**	**Line K**
SW Height (ft):	9	9	9	9						
SW Trib (ft):	10.5	13	17	12.5						
SW Forces:	1496	1853	2423	1782	0	0	0	0	0	0
Total SW Length (ft):	16	7.5	10	17	0	0	0	0	0	0
Shear (lb/ft):	403	907	242	105	0	0	0	0	0	0
Uplift (lb):	6104	13449	2181	943	0	0	0	0	0	0
SW Length (ft):	14	4	13	10						
Sum Perf Sgmts (ft):	8	4	10	10						
Area Openings (sf):	30	0	20	0						
Co:	0.78	1.00	0.78	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:	**SW-2**	**SW-4**	**SW-1**	**SW-1**						
Trib DL (ft):	19	19	21	22						
2/3 resisting DL (lb):	1260	626.6667	910	733.3333	0	0	0	0	0	0
Net Uplift (lb):	6588	12822	1886	210	0	0	0	0	0	0
Hold Down:	**HDU8**	**(2) MST72**	**STHD10**	**LSTHD8**						
SW Length (ft):	8	3.5		7						
Sum Perf Sgmts (ft):	8	3.5		7						
Area Openings (sf):	0	0		0						
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:	**SW-2**	**SW-4**		**SW-1**						
Trib DL (ft):	19	19		22						
2/3 resisting DL (lb):	720	221.6667	0	513.3333	0	0	0	0	0	0
Net Uplift (lb):	5384	13227	2181	430	0	0	0	0	0	0
Hold Down:	**STHD14**	**(2) MST72**		**LSTHD8**						
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	6104	13449	2181	943	0	0	0	0	0	0
Hold Down:										
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	6104	13449	2181	943	0	0	0	0	0	0
Hold Down:										
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	6104	13449	2181	943	0	0	0	0	0	0
Hold Down:										

FLOOR

Side-to-Side SW:	**Line A**	**Line B**	**Line C**	**Line D**	**Line E**	**Line F**	**Line G**	**Line H**	**Line J**	**Line K**
SW Height (ft):		4.3								
SW Trib (ft):		13								
SW Forces:	0	0	0	0	0	0	0	0	0	0
Total SW Length (ft):	0	7.5	0	0	0	0	0	0	0	0
Shear (lb/ft):	0	907	0	0	0	0	0	0	0	0
Uplift (lb):	0	17351	0	0	0	0	0	0	0	0
		10d Nailing								
SW Length (ft):		4								
Sum Perf Sgmts (ft):		4								
Area Openings (sf):		0								
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:		**SW-4**								
Trib DL (ft):		14								
2/3 resisting DL (lb):	1260	813.3333	910	733.3333	0	0	0	0	0	0
Net Uplift (lb):	-1260	14139	-910	-733	0	0	0	0	0	0
Hold Down:		**HDU14**								
		10d Nailing								
SW Length (ft):		3.5								
Sum Perf Sgmts (ft):		3.5								
Area Openings (sf):		0								
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:		**SW-4**								
Trib DL (ft):		22								
2/3 resisting DL (lb):	720	478.3333	0	513.3333	0	0	0	0	0	0
Net Uplift (lb):	-720	14233	0	-513	0	0	0	0	0	0
Hold Down:		**HDU14**								
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	0	17351	0	0	0	0	0	0	0	0
Hold Down:										
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	0	17351	0	0	0	0	0	0	0	0
Hold Down:										
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	0	17351	0	0	0	0	0	0	0	0
Hold Down:										

Reeve & Associates, Inc. Land Planners · Civil Engineers · Land Surveyors Traffic Engineers · Structural Engineers · Landscape Architects 5160 South 1500 West -- Riverdale, Utah 84405 Phone: (801) 621-3100 Fax: (801) 621-2666	**Spring Run 4-plex** Lehi, Utah	
	Date: **1/7/2020**	Sheet 1 Of 1
	Designed By: **JMG**	Project Number: **4899-AXX**

Force Transfer Around Openings - Diekmann Technique

Shear Line: upper level rear wall - DOVER

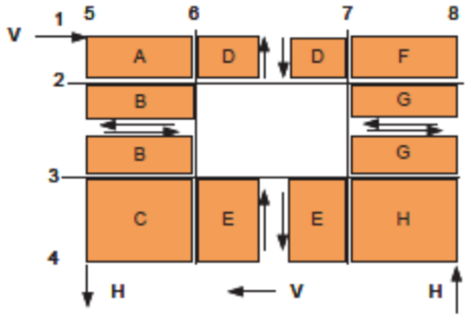
Horizontal Shear, V =	4952	lbs
Total Wall Length =	14	ft
Number of Openings =	1	
Wall Height =	11.75	ft
Total Pier Length =	8.0	ft
Controlling Lateral Force =	Wind	

Holdown Force, H =	4156	lbs
D,E Shear =	977.9	lb/ft
B,G Shear =	619	lb/ft
Total Tension, F =	5867	lbs
Min Strap =	**2934**	lbs
Max Strap =	**2934**	lbs
Check 1	733.4	lb/ft
Check 2	733.4	lb/ft
A,C,F,H Shear =	-114.4	lb/ft

		Pier	Pier	Opening		Top	Bot	Min	Seismic Red.	D-E	B-G	Max
	#	Left	Right	W	H	Dist	Dist	H/W	%	Sum	Sum	Strap
1	1	4	4	6	7.5	2.25	2	1.9	100	4.25	8	2934
		4	4								8	

Results Summary

Level	Ht	V	Vt	SW	Adj.	SW'
-	ft	lbs	lbs	-	%	-
5	8	851	851	4	100	4
4			851			
3			851			
2			851			
1			851			



Shear Wall Capacities

		Seismic	Wind
SW-1	-	260 plf	365 plf
SW-2	-	380 plf	532 plf
SW-3	-	490 plf	685 plf
SW-4	-	640 plf	896 plf
SW-5	-	760 plf	1065 plf
SW-6	-	980 plf	1370 plf

Simple Span Beam Calculation

Adjustment Factors - ASD

Cd:	1.15	Cfu:	NA	
Cm:	1.00	Ci:	1.00	
Ct:	1.00	Cr:	1.00	
Cl:	1.00	Cv:	-	Glu-Lam & LVL Only
Cf:	-	Cc:	1.00	Glu-Lam Only

Roof DL	10	psf	Include Self Wt?	
Floor DL	15	psf	No	
Live	40	psf		
Snow	35	psf		

--->> Point Load distance must be >= midspan distance!

Active Member for Deflection Calc and Shear Diagram: RB-4

					point load				left reaction			right reaction														
member ID	span ft	roof trib ft	floor trib ft	wall load plf	dead lbs	live lbs	snow lbs	dist from left, ft	dead lbs	live lbs	snow lbs	dead lbs	live lbs	snow lbs	applied moment lb-ft	% Str	applied shear lbs	% Str	Selected Member	Live/Total Deflection	actual Δ, in.	Δ limit, L/	Δ act, L/	check	Max Defl Location, ft	Min Bearing Length, in
RB-1	4	16							320	0	1120	320	0	1120	1440	52.9	1440	48.0	(2) 2x8	Live	0.02	L/240	L/2268	Pass	2.0	0.8
RB-2	6	5							150	0	525	150	0	525	1013	37.2	675	22.5	(2) 2x8	Live	0.03	L/240	L/2151	Pass	3.0	0.4
RB-3	6	26							780	0	2730	780	0	2730	5265	64.4	3510	63.3	(2) 1-3/4"x7-1/4" LVL	Live	0.12	L/240	L/603	Pass	3.0	1.3
RB-4	8	8							320	0	1120	320	0	1120	2880	70.6	1440	32.0	(3) 2x8	Live	0.11	L/240	L/851	Pass	4.0	0.5
RB-5									0	0	0	0	0	0	0		0			Live		L/360				
RB-6									0	0	0	0	0	0	0		0			Live		L/360				
RB-7									0	0	0	0	0	0	0		0			Live		L/360				
RB-8									0	0	0	0	0	0	0		0			Live		L/360				
RB-9									0	0	0	0	0	0	0		0			Live		L/360				
RB-10									0	0	0	0	0	0	0		0			Live		L/360				
RB-11									0	0	0	0	0	0	0		0			Live		L/360				
RB-12									0	0	0	0	0	0	0		0			Live		L/360				
RB-13									0	0	0	0	0	0	0		0			Live		L/360				
RB-14									0	0	0	0	0	0	0		0			Live		L/360				
RB-15									0	0	0	0	0	0	0		0			Live		L/360				
RB-16									0	0	0	0	0	0	0		0			Live		L/360				
RB-17									0	0	0	0	0	0	0		0			Live		L/360				
RB-18									0	0	0	0	0	0	0		0			Live		L/360				
RB-19									0	0	0	0	0	0	0		0			Live		L/360				
RB-20									0	0	0	0	0	0	0		0			Live		L/360				
RB-21									0	0	0	0	0	0	0		0			Live		L/360				
RB-22									0	0	0	0	0	0	0		0			Live		L/360				
RB-23									0	0	0	0	0	0	0		0			Live		L/360				
RB-24									0	0	0	0	0	0	0		0			Live		L/360				
RB-25									0	0	0	0	0	0	0		0			Live		L/360				
RB-26									0	0	0	0	0	0	0		0			Live		L/360				
RB-27									0	0	0	0	0	0	0		0			Live		L/360				

Simple Span Beam Calculation

Adjustment Factors - ASD

Cd:	1.00	Cfu:	NA	
Cm:	1.00	Ci:	1.00	
Ct:	1.00	Cr:	1.15	
Cl:	1.00	Cv:	-	Glu-Lam & LVL Only
Cf:	-	Cc:	1.00	Glu-Lam Only

Roof DL	15	psf	Include Self Wt?
Floor DL	15	psf	No
Live	40	psf	
Snow	35	psf	

--->> Point Load distance must be >= midspan distance!

Active Member for Deflection Calc and Shear Diagram: FB-17

member ID	span ft	roof trib ft	floor trib ft	wall load plf	point load			dist from left, ft	left reaction			right reaction			applied moment lb-ft	% Str	applied shear lbs	% Str	Selected Member	Live/Total Deflection	actual Δ, in.	Δ limit L/	Δ act L/	check	Max Defl Location, ft	Min Bearing Length, in
					dead lbs	live lbs	snow lbs		dead lbs	live lbs	snow lbs	dead lbs	live lbs	snow lbs												
FB-1	4		16						480	1280	0	480	1280	0	1760	64.7	1760	67.4	(2) 2x8	Live	0.04	L/360	L/1227	Pass	3.2	0.9
FB-2	6		13						585	1560	0	585	1560	0	3218	78.9	2145	54.8	(3) 2x8	Live	0.07	L/360	L/1086	Pass	3.0	0.8
FB-3	6		13						585	1560	0	585	1560	0	3218	79.3	2145	64.4	(2) 2x10	Live	0.05	L/360	L/1503	Pass	3.0	1.1
FB-4	4		7						210	560	0	210	560	0	770	7.5	770	19.5	1-3/4"x11-7/8" LVL	Live	0.00	L/480	L/14536	Pass	2.0	0.6
FB-5	14	26	3	80					3605	840	6370	3605	840	6370	34913	83.4	9975	71.4	(3) 1-3/4"x14" LVL	Live	0.33	L/480	L/513	Pass	7.0	2.7
FB-6	15	2	3	80					1163	900	525	1163	900	525	8367	27.2	2231	18.8	(3) 1-3/4"x11-7/8" LVL	Live	0.11	L/480	L/1625	Pass	7.5	0.7
FB-7	7		11.5						604	1610	0	604	1610	0	3874	47.4	2214	45.9	(2) 1-3/4"x7-1/4" LVL	Live	0.11	L/480	L/751	Pass	3.5	0.8
FB-8	15		11.5						1294	3450	0	1294	3450	0	17789	57.8	4744	40.0	(3) 1-3/4"x11-7/8" LVL	Live	0.36	L/480	L/503	Pass	7.5	1.2
FB-9	16	26	11.5						4500	3680	7280	4500	3680	7280	50880	94.8	12720	79.7	(3) 1-3/4"x16" LVL	Live	0.42	L/360	L/454	Pass	8.0	3.9
FB-10	16		13.5						1620	4320	0	1620	4320	0	23760	56.8	5940	42.5	(3) 1-3/4"x14" LVL	Live	0.33	L/480	L/579	Pass	8.0	1.5
FB-11	16	12	2						1680	640	3360	1680	640	3360	20160	48.2	5040	36.1	(3) 1-3/4"x14" LVL	Live	0.26	L/480	L/744	Pass	8.0	1.4
FB-12	6	7	4	80					735	480	735	735	480	735	2469	60.5	1646	42.0	(3) 2x8	Live	0.04	L/480	L/1859	Pass	3.0	0.7
FB-13	5		22						825	2200	0	825	2200	0	3781	92.7	3025	77.3	(3) 2x8	Live	0.05	L/480	L/1109	Pass	2.5	1.1
FB-14	7		10.5						551	1470	0	551	1470	0	3537	86.7	2021	51.6	(3) 2x8	Live	0.10	L/480	L/846	Pass	3.5	0.7
FB-15	7		5	200					963	700	0	963	700	0	2909	14.2	1663	21.1	(2) 1-3/4"x11-7/8" LVL	Live	0.01	L/480	L/7594	Pass	3.5	0.6
FB-16	7			200	963	700		3.5	1182	350	0	1182	350	0	4135	20.1	1532	19.4	(2) 1-3/4"x11-7/8" LVL	Live	0.01	L/480	L/9493	Pass	3.5	0.6
FB-17	5		22						825	2200	0	825	2200	0	3781	51.6	3025	55.1	(3) 1-3/4"x5-1/2" LVL	Live	0.09	L/480	L/706	Pass	2.5	0.8
FB-18	13		8						780	2080	0	780	2080	0	9295	48.1	2860	38.5	3-1/2"x12" GLB	Live	0.23	L/480	L/688	Pass	6.5	1.3
FB-19									0	0	0	0	0	0	0		0			Live		L/480				
FB-20									0	0	0	0	0	0	0		0			Live		L/480				
FB-21									0	0	0	0	0	0	0		0			Live		L/480				
FB-22									0	0	0	0	0	0	0		0			Live		L/480				
FB-23									0	0	0	0	0	0	0		0			Live		L/480				
FB-24									0	0	0	0	0	0	0		0			Live		L/480				
FB-25									0	0	0	0	0	0	0		0			Live		L/480				
FB-26									0	0	0	0	0	0	0		0			Live		L/480				
FB-27									0	0	0	0	0	0	0		0			Live		L/480				

FOOTINGS:

ALLOWABLE BEARING PRESSURE = 1.5 KSF
Assumed Coefficient of Friction Soil to Foundation = 0.3

	Frame Line	GRAVITY DL	LL	SL	Trib$_{DL}$	Trib$_{LL}$	Trib$_{SL}$	Wall	Trib$_{Wall}$	DL	LL	Required FTG	Specified FTG
mid bear		15.0 psf	40.0 psf	35.0 psf	22.0ft	22.0ft	0.0ft	12.0 psf	25.0ft	0.6 k	0.9k	12.1 in	FC- 18
mid rear		15.0 psf	40.0 psf	35.0 psf	39.0ft	16.0ft	23.0ft	40.0 psf	25.0ft	1.6 k	1.4k	24.2 in	FC- 30
end rear		15.0 psf	40.0 psf	35.0 psf	21.0ft	18.0ft	3.0ft	40.0 psf	25.0ft	1.3 k	0.8k	17.1 in	FC- 20
side		15.0 psf	40.0 psf	35.0 psf	20.0ft	4.0ft	16.0ft	40.0 psf	25.0ft	1.3 k	0.7k	16.2 in	FC- 20
marriage		15.0 psf	40.0 psf	35.0 psf	21.0ft	4.0ft	17.0ft	15.0 psf	50.0ft	1.1 k	0.8k	14.6 in	FC- 20
										0.0 k	0.0k	0.0 in	FC- 22
		15.0 psf	40.0 psf	35.0 psf	33.0ft	28.0ft	21.0ft	51.0 psf	10.0ft	1.0 k	1.9k	22.9 in	FC- 24
SPOT FTGS													
R porch	B	15.0 psf	40.0 psf	35.0 psf	315.0sf	0.0sf	195.0sf	0.0 psf	0.0sf	4.7 k	6.8k	33.3 in	FS- 36
F porch	C	15.0 psf	40.0 psf	35.0 psf	50.0sf	0.0sf	25.0sf	0.0 psf	0.0sf	0.8 k	0.9k	12.5 in	FS- 24
1	D	15.0 psf	0.0 psf	35.0 psf	0.0sf	0.0sf	0.0sf	0.0 psf	0.0sf	0.0 k	0.0k	0.0 in	FS- 0

TYPICAL FOOTINGS AND REINFORCING

Footing Parameters

Soil Bearing Pressure = 1500 psf

f'c = 2500 psi
fy steel = 60 ksi
pmax = 0.016

Note: Not all footings were used on this project

Continuous Footings							Trial Reinf			
Callout	Typ Eccent	Allowable Load	Ftg Reqd	Nom Ftg	Asmin/ft	As Reqd/ft	Num Bar	Bar #	As Prov	√ As
FC-1.5	0.1%	*2.2 klf*	1.48'	*1.5'*	0.18 in^2	0.36 in^2	(2)	4	0.4	OK
FC-2.0	0.1%	*3.0 klf*	1.98'	*2.0'*	0.24 in^2	0.48 in^2	(3)	4	0.6	OK
FC-2.5	0.1%	*3.7 klf*	2.48'	*2.5'*	0.30 in^2	0.60 in^2	(3)	5	0.93	OK
FC-3.0	0.1%	*4.5 klf*	2.98'	*3.0'*	0.36 in^2	0.72 in^2	(3)	5	0.93	OK
FC-3.5	0.1%	*5.2 klf*	3.48'	*3.5'*	0.42 in^2	0.84 in^2	(3)	5	0.93	OK
FC-4.0	0.1%	*6.0 klf*	3.98'	*4.0'*	0.48 in^2	0.96 in^2	(4)	5	1.24	OK
FC-4.5	0.1%	*6.7 klf*	4.48'	*4.5'*	0.54 in^2	1.08 in^2	(4)	5	1.24	OK
FC-5.0	0.1%	*7.5 klf*	4.98'	*5.0'*	0.60 in^2	1.20 in^2	(5)	5	1.55	OK
FTS-1.5	0.1%	*2.2 klf*	1.48'	*1.5'*	0.18 in^2	0.36 in^2	(2)	4	0.4	OK
FTS-2.0	0.1%	*3.0 klf*	1.98'	*2.0'*	0.24 in^2	0.48 in^2	(3)	4	0.6	OK
FTS-2.5	0.1%	*3.7 klf*	2.48'	*2.5'*	0.30 in^2	0.60 in^2	(3)	5	0.93	OK
FTS-3.0	0.1%	*4.5 klf*	2.98'	*3.0'*	0.36 in^2	0.72 in^2	(3)	5	0.93	OK
FTS-3.5	0.1%	*5.2 klf*	3.48'	*3.5'*	0.42 in^2	0.84 in^2	(3)	5	0.93	OK

Spot Footings										Trial Reinf			
Callout	Typ Eccent	Allowable Load	Ftg Reqd	Nom Ftg	Mu	p	√ p	Asmin	As Reqd	Num Bar	Bar #	As Prov	√ As
FS-2.0	0.1%	*5.9 k*	1.99'	*2.0'*	1.02 k-ft	0.000	OK	0.43 in^2	0.05 in^2	(2)	5	0.62	OK
FS-2.5	0.1%	*9.2 k*	2.49'	*2.5'*	2.16 k-ft	0.000	OK	0.54 in^2	0.10 in^2	(3)	5	0.93	OK
FS-3.0	0.1%	*13.3 k*	2.99'	*3.0'*	3.95 k-ft	0.001	OK	0.65 in^2	0.18 in^2	(3)	5	0.93	OK
FS-3.5	0.1%	*18.2 k*	3.49'	*3.5'*	6.52 k-ft	0.000	OK	0.90 in^2	0.22 in^2	(3)	5	0.93	OK
FS-4.0	0.1%	*23.8 k*	3.99'	*4.0'*	10.02 k-ft	0.001	OK	1.03 in^2	0.33 in^2	(4)	5	1.24	OK
FS-4.5	0.1%	*30.1 k*	4.49'	*4.5'*	14.58 k-ft	0.001	OK	1.16 in^2	0.48 in^2	(4)	5	1.24	OK
FS-5.0	0.1%	*37.2 k*	4.99'	*5.0'*	19.63 k-ft	0.001	OK	1.29 in^2	0.65 in^2	(5)	5	1.55	OK
FS-5.5	0.1%	*45.0 k*	5.50'	*5.5'*	26.59 k-ft	0.001	OK	1.42 in^2	0.89 in^2	(5)	5	1.55	OK
FS-6.0	0.1%	*53.5 k*	5.99'	*6.0'*	33.81 k-ft	0.001	OK	1.60 in^2	1.07 in^2	(6)	5	1.86	OK

PUNCHING SHEAR CHECK

Note: Not all footings were used on this project

Callout	Factored Load	Min Col. Dim	factored qu		Assumed depth	d	bo	Vu	Vc	√ Capacity
FS-2.0	8.5 k	4"	2.12 ksf		10"	7.0"	44"	6.7 k	52.4 k	OK
FS-2.5	13.3 k	4"	2.13 ksf		10"	7.0"	44"	11.5 k	52.4 k	OK
FS-3.0	19.2 k	4"	2.13 ksf		10"	7.0"	44"	17.4 k	52.4 k	OK
FS-3.5	26.2 k	4"	2.14 ksf		12"	9.0"	52"	23.7 k	79.6 k	OK
FS-4.0	34.2 k	4"	2.14 ksf		12"	9.0"	52"	31.7 k	79.6 k	OK
FS-4.5	43.4 k	4"	2.14 ksf		12"	9.0"	52"	40.8 k	79.6 k	OK
FS-5.0	53.6 k	5"	2.14 ksf		12"	9.0"	56"	50.7 k	85.7 k	OK
FS-5.5	64.9 k	5"	2.14 ksf		12"	9.0"	56"	61.9 k	85.7 k	OK
FS-6.0	77.0 k	6"	2.14 ksf		12"	9.4"	62"	73.5 k	98.4 k	OK

Reeve & Associates, Inc.	PROJECT		PROJ NO.		
			CALC NO.		
	SUBJECT	**Low Roof Snow Load per ASCE 7** **Leeward and Windward Snow Drift**	BY JMG	DATE	1/8/20
			CHK	DATE	
			SHEET	OF	REV

Description:

GENERAL INPUT AND OUTPUT:

"Leeward" or "Windward":	1.00	*Leeward*
Roof Slope:	8:12	*33.69 °*
County (State of Utah)	UTAH	
Elevation at Site	4700 ft	
p_g (SEAU Flat Roof Snow)	45 psf	________ *<---Manual Entry*
C_e (Exposure Factor):	1.0	
C_t (Thermal Factor):	1.1	
I_s (Importance Factor):	1.0	
L_u (Length of Roof):	0.00 feet	*Upper Roof*
Elevation Difference:	0.00 feet	
P_f (Roof Snow):	**34.5 psf**	
C_s (Roof Slope Factor):	1.0	
P_s (Sloped Roof Snow):	**34.5 psf**	

Snow Load Density:	19.83 pcf
h_b (Snow Depth):	1.74 feet
h_d (potential drift height):	-1.50 feet
h_c (Roof to Snow):	0.00 feet
Maximum Drift Height:	0.00 feet
Drift Width:	0.00 feet
Maximum Snow Load:	**34.50 psf**
Maximum Drift Weight:	**0.00 psf**
Drift Width:	**0.00 feet**

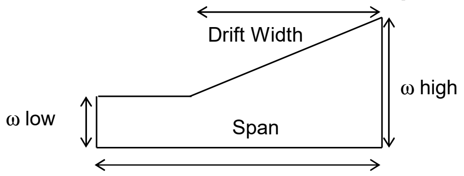


Diagram A

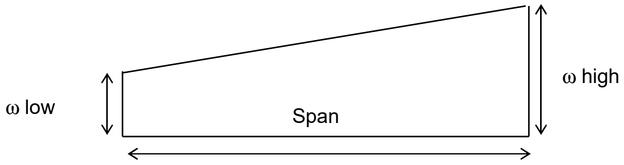


Diagram B

Reeve & Associates, Inc.
Land Planners · Civil Engineers · Land Surveyors
Traffic Engineers · Structural Engineers · Landscape Architects
5160 South 1500 West - Riverdale, Utah 84405
Phone: (801) 621-3100
Fax: (801) 621-2666

Date:	Sheet	Of
1/8/2020	1	1
Designed By: **JMG**	Project Number:	

Seismic Calculations

Earthquake Loads-Site Ground Motion

I= 1 — h_n= 28.00 ft (Building Height)
R= 6.5 Wood Brg Wall — Structure Type = Other
S_s= 1.139 — C_t= 0.02
S_1= 0.385 — x= 0.75
Site Class= D

Check Height for LFRS = 28.0ft > NP (per exception 12.2.5.6 where
DL = 6.5 psf (Estimated) DL <20psf allowed up to 65ft)

F_a= 1.04
S_{MS}= 1.190 — S_{MS}= F_a*S_S
S_{DS}= 0.793 — S_{DS}= 2*S_{MS}/3

F_v= 1.63
S_{M1}= 0.628 — S_{M1}= F_v*S_1
S_{D1}= 0.418 — S_{D1}= 2*S_{M1}/3

Earthquake Loads-Minimum Design Lateral Force

C_s= 0.122 — T= 0.243 s
C_s= 0.264 — Load Combinations that control lateral:
C_s= 0.035 — D+0.75L+0.75S+0.75(0.7*E)
ASD Load Factor = 0.7 — 0.6D+0.7E
USE — Rho = 1.3
C_s= 0.122
V=C_S*W — **V = ASD Load Factor*Rho*Cs*W = 0.11 *W**

Dead Load Effect

0.2*S_{DS}= 0.159
(+/-) 0.2*S_{DS}*D

Seismic Design Category

SDS => D

SD1 => D

Wind Design - ASCE 7-16 Chp 27

Risk Category =	II		
Basic Wind Speed V =	115	mph	
Exposure Category =	C		3
Wind Directionality Factor, Kd =	0.85		
Topographic Factor, Kzt =	1		
Gust Effect Factor, G =	0.85		
Total Stories =	2	(5 max)	
Internal Pressure Coefficient, Gcpi =	0.18 -0.18		

Enclosure Classification

	Length	Height	Ag	Ao	% open	Open	Partial 1	Partial 2	Partial Total
Wall 1 =	100	10	1000	800	80.0	Y	Y	N	N
Wall 2 =	100	10	1000	200	20.0	N	N	Y	N
Wall 3 =	25	10	250	30	12.0	N	N	Y	N
Wall 4 =	25	10	250	50	20.0	N	N	Y	N

Open Building: NO
Partially Open: NO
Enclosed: YES

Wall Pressure	Front to Back		Side to Side	
Windward Wall, Cp =	0.8		0.8	
Windward Wall Width, B =	28 ft		48 ft	
Side Wall Width, L =	48 ft		28 ft	
L/B =	1.714286		0.583333	
Leeward Wall, Cp =	-0.3		-0.5	
Side Wall, Cp =	-0.7		-0.7	
Roof Pressure				
Roof Type =	Gable 1		Gable 2	
Roof Pitch =	8/12	33.7 °	8/12	33.7 °
Ridge Height =	28 ft		28 ft	
Eave Height =	18 ft		18 ft	
Mean Roof Height, h =	22.8 ft		22.8 ft	
h/L =	0.47		0.81	
h/2 =	11 ft		11 ft	
Kh =	0.93		0.93	
qh =	26.7 psf		26.7 psf	

Parapet Wall Pressure

Parapet Wall Height =	0 ft
Building Height to top of parapet=	0 ft
Kz =	0.85
qp =	24.4 psf
WW GCpn =	1.50
LW GCpn+	-1.00
Pp =	61.1 psf
Adj. Pp =	36.6 psf
Parapet Load per foot =	0.0 plf

Roof Pressure Coefficient, Cp		WW Area: 480 ft²		LW Area: 480 ft²			WW Area: 228 ft²		LW Area: 228 ft²	
		Front to Back					Side to Side			
		Distance from Windward Edge, ft					Distance from Windward Edge, ft			
	Max/Min	0 ft	11 ft	23 ft	46 ft	Max/Min	0 ft	11 ft	23 ft	46 ft
Windward Normal to Ridge =	Max	0.28	0.28	0.28	0.28	Max	0.23	0.23	0.23	0.23
	Min	-0.18	-0.18	-0.18	-0.18	Min	-0.22	-0.22	-0.22	-0.22
Leeward Normal to Ridge =	Max	-0.60	-0.60	-0.60	-0.60	Max	-0.60	-0.60	-0.60	-0.60
	Min	-0.60	-0.60	-0.60	-0.60	Min	-0.60	-0.60	-0.60	-0.60
Parallel to Ridge =	Max	-0.18	-0.18	-0.18	-0.18	Max	-0.18	-0.18	-0.18	-0.18
	Min	-0.90	-0.90	-0.50	-0.30	Min	-1.15	-1.15	-0.63	-0.55

					Front to Back				Total	Shear	Adj. Shear	ASD Factor 0.6 Adj. Wall
Load Description	Overall Height	Wall Trib	Kz	qz	WW	LW	SW	Int +/-	WW+LW	Force, lbs	Force, lbs	Force
Roof	22.8 ft	-	-	max-->	6.4 psf	-13.6 psf	varies	4.8 psf	20.0 psf	5331 lbs	3199 lbs	
				min-->	-4.2 psf	-13.6 psf	varies	-4.8 psf	9.4 psf	2505 lbs	1503 lbs	
Wall 2	8 ft	4.5	0.85	24.4 psf	16.6 psf	-6.8 psf	-15.9 psf	4.8 psf	23.4 psf	2950 lbs	1770 lbs	
Wall 1	9 ft	8.5	0.85	24.4 psf	16.6 psf	-6.8 psf	-15.9 psf	4.8 psf	23.4 psf	5572 lbs	3343 lbs	
			0.85	24.4 psf	16.6 psf	-6.8 psf	-15.9 psf	4.8 psf	23.4 psf	0 lbs	0 lbs	
			0.85	24.4 psf	16.6 psf	-6.8 psf	-15.9 psf	4.8 psf	23.4 psf	0 lbs	0 lbs	
			0.85	24.4 psf	16.6 psf	-6.8 psf	-15.9 psf	4.8 psf	23.4 psf	0 lbs	0 lbs	
Other												
								Front to Back Total Shear:		13853 lbs	8312 lbs	

		Side to Side				Total	Shear	Adj. Shear	Adj. Wall
		WW	LW	SW	Int +/-	WW + LW	Force, lbs	Force, lbs	Force
Roof	max-->	5.2 psf	-13.6 psf	varies	4.8 psf	18.8 psf	2373 lbs	1424 lbs	3823 lbs
	min-->	-4.9 psf	-13.6 psf	varies	-4.8 psf	8.7 psf	1100 lbs	660 lbs	
Wall 2		16.6 psf	-11.3 psf	-15.9 psf	4.8 psf	27.9 psf	6036 lbs	3622 lbs	
Wall 1		16.6 psf	-11.3 psf	-15.9 psf	4.8 psf	27.9 psf	11402 lbs	6841 lbs	
		16.6 psf	-11.3 psf	-15.9 psf	4.8 psf	27.9 psf	0 lbs	0 lbs	
		16.6 psf	-11.3 psf	-15.9 psf	4.8 psf	27.9 psf	0 lbs	0 lbs	
		16.6 psf	-11.3 psf	-15.9 psf	4.8 psf	27.9 psf	0 lbs	0 lbs	
Other									
					Side to Side Total Shear:		19811 lbs	14286 lbs	

LATERAL ANALYSIS

Side-to-Side Dim:	28 ft		Roof Area =	1344 ft²
Front-to-Back Dim:	48 ft	Height	Floor Area =	1344
Roof Trib:	4.5 ft	18 ft	Floor Area =	
Floor Trib:	8.5 ft	9 ft	Floor Area =	
Floor Trib:				
Floor Trib:				
Roof Seismic DL:	15 psf			
Floor Seismic DL:	15 psf			
Wall Seismic DL:	12 psf			

Seismic: V = 0.11 *W

F-front-to-back:	V		W	WxHx	Cvx	Fx
Roof	2574 lbs	lb	23184	417312	0.64	3496 lbs
Floor	2872 lbs	lb	25872	232848	0.36	1951 lbs
Floor	0 lbs	lb	0	0	0.00	0 lbs
Floor	0 lbs	lb	0	0	0.00	0 lbs
	5447 lbs		49056	650160		5447 lbs
F-side-to-side:						
Roof	2814 lbs	lb	25344	456192	0.63	3859 lbs
Floor	3325 lbs	lb	29952	269568	0.37	2280 lbs
Floor	0 lbs	lb	0	0	0.00	0 lbs
Floor	0 lbs	lb	0	0	0.00	0 lbs
	6139 lbs		55296	725760		6139 lbs

Wind:

F-front-to-back:	
Roof	4969 lbs
Floor	3343 lbs
Floor	0 lbs
Floor	0 lbs

F-side-to-side:	
Roof	7445 lbs
Floor	6841 lbs
Floor	0 lbs
Floor	0 lbs

Use for Design:

F-front-to-back:			
Roof	4969 lbs	**Wind Governs**	1.4
Floor	3343 lbs	**Wind Governs**	1.4
Floor	0 lbs		1
Floor	0 lbs		1

F-side-to-side:			
Roof	7445 lbs	**Wind Governs**	1.4
Floor	6841 lbs	**Wind Governs**	1.4
Floor	0 lbs		1
Floor	0 lbs		1

SW capacities (plf):

	seismic	wind
SW-1	260	365
SW-2	380	532
SW-3	490	685
SW-4	640	896
SW-5	760	1065
SW-6	980	1370

Hold Down capacities (lb):

0	NONE		0	NONE	
200	LSTHD8	1610	200	MST37	1725
1610	STHD10	2175	1725	MST48	3215
2175	STHD14	3500	3215	MST60	5240
3500	HDU4	4565	5240	MST72	6730
4565	HDU5	5645	6730	(2) MST60	10480
5645	HDU8	7870	10480	(2) MST72	13460
7870	HDU11	9535	13460	NG	

SHEAR WALLS 14445 NG

Resisting DL: 10 psf

ROOF

Front-to-Back SW:	**Line 1**	**Line 2**	**Line 3**	**Line 4**	**Line 5**	**Line 6**	**Line 7**	**Line 8**	**Line 9**	**Line 10**
SW Height (ft):	9	8								
SW Trib (ft):	14	14								
SW Forces:	2484	2484	0	0	0	0	0	0	0	0
Total SW Length (ft):	32	42	0	0	0	0	0	0	0	0
Shear (lb/ft):	78	59	0	0	0	0	0	0	0	0
Uplift (lb):	699	473	0	0	0	0	0	0	0	0
SW Length (ft):	32	42								
Sum Perf Sgmts (ft):	32	42								
Area Openings (sf):	0	0								
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:	**SW-1**	**SW-1**								
Trib DL (ft):	8	8								
2/3 resisting DL (lb):	853.3333	1120	0	0	0	0	0	0	0	0
Net Uplift (lb):	-155	-647	0	0	0	0	0	0	0	0
Hold Down:	**#N/A**	**#N/A**	**NONE**							
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	699	473	0	0	0	0	0	0	0	0
Hold Down:										
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	699	473	0	0	0	0	0	0	0	0
Hold Down:										
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	699	473	0	0	0	0	0	0	0	0
Hold Down:										
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	699	473	0	0	0	0	0	0	0	0
Hold Down:										

FLOOR

Front-to-Back SW:	**Line 1**	**Line 2**	**Line 3**	**Line 4**	**Line 5**	**Line 6**	**Line 7**	**Line 8**	**Line 9**	**Line 10**
SW Height (ft):		9	9							
SW Trib (ft):		14	14							
SW Forces:	0	1672	1672	0	0	0	0	0	0	0
Total SW Length (ft):	0	42	21	0	0	0	0	0	0	0
Shear (lb/ft):	0	99	80	0	0	0	0	0	0	0
Uplift (lb):	0	1364	716	0	0	0	0	0	0	0
SW Length (ft):		42	21							
Sum Perf Sgmts (ft):		42	21							
Area Openings (sf):		0	0							
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:		**SW-1**	**SW-1**							
Trib DL (ft):		9	9							
2/3 resisting DL (lb):	853.3333	2380	630	0	0	0	0	0	0	0
Net Uplift (lb):	-853	-1016	86	0	0	0	0	0	0	0
Hold Down:		**#N/A**	**NONE**							
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	0	1364	716	0	0	0	0	0	0	0
Hold Down:										
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	0	1364	716	0	0	0	0	0	0	0
Hold Down:										
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	0	1364	716	0	0	0	0	0	0	0
Hold Down:										
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	0	1364	716	0	0	0	0	0	0	0
Hold Down:										

ROOF

split wall w cantilver

Side-to-Side SW:	**Line A**	**Line B**	**Line C**	**Line D**	**Line E**	**Line F**	**Line G**	**Line H**	**Line J**	**Line K**
SW Height (ft):	8	8			8					
SW Trib (ft):	24	24			24					
SW Forces:	3722	3722	0	0	3722	0	0	0	0	0
Total SW Length (ft):	20	15	0	0	20	0	0	0	0	0
Shear (lb/ft):	186	248	0	0	186	0	0	0	0	0
Uplift (lb):	1489	1985	0	0	1489	0	0	0	0	0
	FTAO	FTAO			FTAO					
SW Length (ft):	20	15			10					
Sum Perf Sgmts (ft):	20	15			10					
Area Openings (sf):	0	0			0					
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:	**SW-1**	**SW-4**			**SW-1**					
Trib DL (ft):	30	8	8		8					
2/3 resisting DL (lb):	2000	400	0	0	266.6667	0	0	0	0	0
Net Uplift (lb):	-511	1585	0	0	1222	0	0	0	0	0
Hold Down:	**#N/A**	**MST37**	**NONE**		**LSTHD8**					
					FTAO					
SW Length (ft):					10					
Sum Perf Sgmts (ft):					10					
Area Openings (sf):					0					
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:					**SW-1**					
Trib DL (ft):					8					
2/3 resisting DL (lb):	0	0	0	0	266.6667	0	0	0	0	0
Net Uplift (lb):	1489	1985	0	0	1222	0	0	0	0	0
Hold Down:	**MST37**				**LSTHD8**					
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	1489	1985	0	0	1489	0	0	0	0	0
Hold Down:										
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	1489	1985	0	0	1489	0	0	0	0	0
Hold Down:										
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	1489	1985	0	0	1489	0	0	0	0	0
Hold Down:										

FLOOR

Side-to-Side SW:	**Line A**	**Line B**	**Line C**	**Line D**	**Line E**	**Line F**	**Line G**	**Line H**	**Line J**	**Line K**
SW Height (ft):	9	9	9							
SW Trib (ft):	10.5	17	22							
SW Forces:	1496	2423	3135	0	0	0	0	0	0	0
Total SW Length (ft):	4	8	9.5	0	0	0	0	0	0	0
Shear (lb/ft):	1305	768	330	0	0	0	0	0	0	0
Uplift (lb):	19187	10636	2970	0	0	0	0	0	0	0
SW Length (ft):	2	8	12.5							
Sum Perf Sgmts (ft):	2	8	9.5							
Area Openings (sf):	0	0	20							
Co:	1.00	1.00	0.77	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:	**Pframe**	**SW-4**	**SW-2**							
Trib DL (ft):	18.5	20	22							
2/3 resisting DL (lb):	2123.333	933.3333	916.6667	0	266.6667	0	0	0	0	0
Net Uplift (lb):	17064	9702	2925	0	-267	0	0	0	0	0
Hold Down:	**STHD14**	**(2) MST60**	**STHD14**							
SW Length (ft):	2									
Sum Perf Sgmts (ft):	2									
Area Openings (sf):	0									
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:	**Pframe**									
Trib DL (ft):	18.5									
2/3 resisting DL (lb):	123.3333	0	0	0	266.6667	0	0	0	0	0
Net Uplift (lb):	19064	10636	2970	0	-267	0	0	0	0	0
Hold Down:	**STDH14**									
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	19187	10636	2970	0	0	0	0	0	0	0
Hold Down:										
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	19187	10636	2970	0	0	0	0	0	0	0
Hold Down:										
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	19187	10636	2970	0	0	0	0	0	0	0
Hold Down:										

FLOOR

Side-to-Side SW:	**Line A**	**Line B**	**Line C**	**Line D**	**Line E**	**Line F**	**Line G**	**Line H**	**Line J**	**Line K**
SW Height (ft):		4.3								
SW Trib (ft):		11								
SW Forces:	0	1568	0	0	0	0	0	0	0	0
Total SW Length (ft):	0	10.25	0	0	0	0	0	0	0	0
Shear (lb/ft):	0	753	0	0	0	0	0	0	0	0
Uplift (lb):	0	11537	0	0	0	0	0	0	0	0
SW Length (ft):		10.25								
Sum Perf Sgmts (ft):		10.25								
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:		**SW-4**								
Trib DL (ft):		20								
2/3 resisting DL (lb):	2123.333	1616.667	916.6667	0	266.6667	0	0	0	0	0
Net Uplift (lb):	-2123	9920	-917	0	-267	0	0	0	0	0
Hold Down:		**HDU14**								
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	123.3333	0	0	0	266.6667	0	0	0	0	0
Net Uplift (lb):	-123	11537	0	0	-267	0	0	0	0	0
Hold Down:										
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	0	11537	0	0	0	0	0	0	0	0
Hold Down:										
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	0	11537	0	0	0	0	0	0	0	0
Hold Down:										
SW Length (ft):										
Sum Perf Sgmts (ft):										
Area Openings (sf):										
Co:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SW Designation:										
Trib DL (ft):										
2/3 resisting DL (lb):	0	0	0	0	0	0	0	0	0	0
Net Uplift (lb):	0	11537	0	0	0	0	0	0	0	0
Hold Down:										

Reeve & Associates, Inc.

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Traffic Engineers · Structural Engineers · Landscape Architects
5160 South 1500 West -- Riverdale, Utah 84405
Phone: (801) 621-3100
Fax: (801) 621-2666

Spring Run 3-plex

Lehi, Utah

Date:	Sheet	Of
1/7/2020	1	1

Designed By:	Project Number:
JMG	**4899-AXX**

Force Transfer Around Openings - Diekmann Technique

Shear Line: Grid T main level - ASPEN

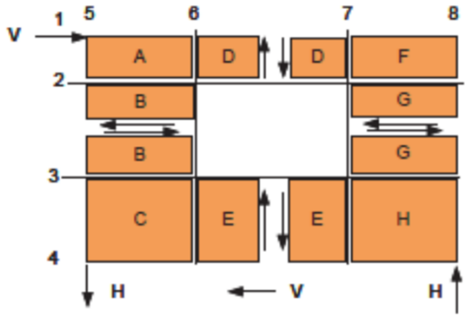
Horizontal Shear, V =	6050	lbs
Total Wall Length =	16	ft
Number of Openings =	1	
Wall Height =	9	ft
Total Pier Length =	10.0	ft
Controlling Lateral Force =	Wind	

	#	Pier Left	Pier Right	Opening W	Opening H	Top Dist	Bot Dist	Min H/W	Seismic Red. %	D-E Sum	B-G Sum	Max Strap
1	1	5	5	6	5	2	2	1.0	100	4	10	2552
		5	5								10	

Holdown Force, H =	3403	lbs
D,E Shear =	850.8	lb/ft
B,G Shear =	605	lb/ft
Total Tension, F =	5105	lbs
Min Strap =	**2552**	lbs
Max Strap =	**2552**	lbs
Check 1	510.5	lb/ft
Check 2	510.5	lb/ft
A,C,F,H Shear =	94.5	lb/ft

Results Summary

Level	Ht	V	Vt	SW	Adj.	SW'
-	ft	lbs	lbs	-	%	-
5	8	851	851	4	100	4
4			851			
3			851			
2			851			
1			851			



Shear Wall Capacities

		Seismic	Wind
SW-1	-	260 plf	365 plf
SW-2	-	380 plf	532 plf
SW-3	-	490 plf	685 plf
SW-4	-	640 plf	896 plf
SW-5	-	760 plf	1065 plf
SW-6	-	980 plf	1370 plf

Simple Span Beam Calculation

Adjustment Factors - ASD

Cd:	1.15	Cfu:	NA	
Cm:	1.00	Ci:	1.00	
Ct:	1.00	Cr:	1.00	
Cl:	1.00	Cv:	-	Glu-Lam & LVL Only
Cf:	-	Cc:	1.00	Glu-Lam Only

Roof DL	10	psf	Include Self Wt?	
Floor DL	15	psf	No	
Live	40	psf		
Snow	35	psf		

--->> Point Load distance must be >= midspan distance!

Active Member for Deflection Calc and Shear Diagram: RB-5

member ID	span ft	roof trib ft	floor trib ft	wall load plf	point load			dist from left, ft	left reaction			right reaction			applied moment lb-ft	% Str	applied shear lbs	% Str	Selected Member	Live/Total Deflection	actual Δ, in.	Δ limit, L/	Δ act, L/	check	Max Defl Location, ft	Min Bearing Length, in
					dead lbs	live lbs	snow lbs		dead lbs	live lbs	snow lbs	dead lbs	live lbs	snow lbs												
RB-1	4	16							320	0	1120	320	0	1120	1440	52.9	1440	48.0	(2) 2x8	Live	0.02	L/240	L/2268	Pass	2.0	0.8
RB-2	6	5							150	0	525	150	0	525	1013	37.2	675	22.5	(2) 2x8	Live	0.03	L/240	L/2151	Pass	3.0	0.4
RB-3	6	26							780	0	2730	780	0	2730	5265	64.4	3510	63.3	(2) 1-3/4"x7-1/4" LVL	Live	0.12	L/240	L/603	Pass	3.0	1.3
RB-4	8	8							320	0	1120	320	0	1120	2880	70.6	1440	32.0	(3) 2x8	Live	0.11	L/240	L/851	Pass	4.0	0.5
RB-5	3	27							405	0	1418	405	0	1418	1367	50.3	1823	60.7	(2) 2x8	Live	0.01	L/360	L/3186	Pass	1.5	1.0
RB-6									0	0	0	0	0	0	0		0			Live		L/360				
RB-7									0	0	0	0	0	0	0		0			Live		L/360				
RB-8									0	0	0	0	0	0	0		0			Live		L/360				
RB-9									0	0	0	0	0	0	0		0			Live		L/360				
RB-10									0	0	0	0	0	0	0		0			Live		L/360				
RB-11									0	0	0	0	0	0	0		0			Live		L/360				
RB-12									0	0	0	0	0	0	0		0			Live		L/360				
RB-13									0	0	0	0	0	0	0		0			Live		L/360				
RB-14									0	0	0	0	0	0	0		0			Live		L/360				
RB-15									0	0	0	0	0	0	0		0			Live		L/360				
RB-16									0	0	0	0	0	0	0		0			Live		L/360				
RB-17									0	0	0	0	0	0	0		0			Live		L/360				
RB-18									0	0	0	0	0	0	0		0			Live		L/360				
RB-19									0	0	0	0	0	0	0		0			Live		L/360				
RB-20									0	0	0	0	0	0	0		0			Live		L/360				
RB-21									0	0	0	0	0	0	0		0			Live		L/360				
RB-22									0	0	0	0	0	0	0		0			Live		L/360				
RB-23									0	0	0	0	0	0	0		0			Live		L/360				
RB-24									0	0	0	0	0	0	0		0			Live		L/360				
RB-25									0	0	0	0	0	0	0		0			Live		L/360				
RB-26									0	0	0	0	0	0	0		0			Live		L/360				
RB-27									0	0	0	0	0	0	0		0			Live		L/360				

Simple Span Beam Calculation

Adjustment Factors - ASD

Cd:	1.00	Cfu:	NA	
Cm:	1.00	Ci:	1.00	
Ct:	1.00	Cr:	1.15	
Cl:	1.00	Cv:	-	Glu-Lam & LVL Only
Cf:	-	Cc:	1.00	Glu-Lam Only

Roof DL	15	psf	Include Self Wt?
Floor DL	15	psf	No
Live	40	psf	
Snow	35	psf	

--->> Point Load distance must be >= midspan distance!

Active Member for Deflection Calc and Shear Diagram: FB-18

					point load				left reaction			right reaction														
member ID	span ft	roof trib ft	floor trib ft	wall load plf	dead lbs	live lbs	snow lbs	dist from left, ft	dead lbs	live lbs	snow lbs	dead lbs	live lbs	snow lbs	applied moment lb-ft	% Str	applied shear lbs	% Str	Selected Member	Live/Total Deflection	actual Δ, in.	Δ limit L/	Δ act L/	check	Max Defl Location, ft	Min Bearing Length, in
FB-1	4		16						480	1280	0	480	1280	0	1760	64.7	1760	67.4	(2) 2x8	Live	0.04	L/360	L/1227	Pass	3.2	0.9
FB-2	6		13						585	1560	0	585	1560	0	3218	78.9	2145	54.8	(3) 2x8	Live	0.07	L/360	L/1086	Pass	3.0	0.8
FB-3	6		13						585	1560	0	585	1560	0	3218	79.3	2145	64.4	(2) 2x10	Live	0.05	L/360	L/1503	Pass	3.0	1.1
FB-4	4		7						210	560	0	210	560	0	770	7.5	770	19.5	1-3/4"x11-7/8" LVL	Live	0.00	L/480	L/14536	Pass	2.0	0.6
FB-5	14	26	3	80					3605	840	6370	3605	840	6370	34913	83.4	9975	71.4	(3) 1-3/4"x14" LVL	Live	0.33	L/480	L/513	Pass	7.0	2.7
FB-6	15	2	3	80					1163	900	525	1163	900	525	8367	27.2	2231	18.8	(3) 1-3/4"x11-7/8" LVL	Live	0.11	L/480	L/1625	Pass	7.5	0.7
FB-7	7		11.5						604	1610	0	604	1610	0	3874	47.4	2214	45.9	(2) 1-3/4"x7-1/4" LVL	Live	0.11	L/480	L/751	Pass	3.5	0.8
FB-8	15		11.5						1294	3450	0	1294	3450	0	17789	57.8	4744	40.0	(3) 1-3/4"x11-7/8" LVL	Live	0.36	L/480	L/503	Pass	7.5	1.2
FB-9	16	26	11.5						4500	3680	7280	4500	3680	7280	50880	94.8	12720	79.7	(3) 1-3/4"x16" LVL	Live	0.42	L/360	L/454	Pass	8.0	3.9
FB-10	16		13.5						1620	4320	0	1620	4320	0	23760	56.8	5940	42.5	(3) 1-3/4"x14" LVL	Live	0.33	L/480	L/579	Pass	8.0	1.5
FB-11	16	12	2						1680	640	3360	1680	640	3360	20160	48.2	5040	36.1	(3) 1-3/4"x14" LVL	Live	0.26	L/480	L/744	Pass	8.0	1.4
FB-12	6	7	4	80					735	480	735	735	480	735	2469	60.5	1646	42.0	(3) 2x8	Live	0.04	L/480	L/1859	Pass	3.0	0.7
FB-13	5		22						825	2200	0	825	2200	0	3781	92.7	3025	77.3	(3) 2x8	Live	0.05	L/480	L/1109	Pass	2.5	1.1
FB-14	7		10.5						551	1470	0	551	1470	0	3537	86.7	2021	51.6	(3) 2x8	Live	0.10	L/480	L/846	Pass	3.5	0.7
FB-15	7		5	200					963	700	0	963	700	0	2909	14.2	1663	21.1	(2) 1-3/4"x11-7/8" LVL	Live	0.01	L/480	L/7594	Pass	3.5	0.6
FB-16	7			200	963	700		3.5	1182	350	0	1182	350	0	4135	20.1	1532	19.4	(2) 1-3/4"x11-7/8" LVL	Live	0.01	L/480	L/9493	Pass	3.5	0.6
FB-17	5		22						825	2200	0	825	2200	0	3781	51.6	3025	55.1	(3) 1-3/4"x5-1/2" LVL	Live	0.09	L/480	L/706	Pass	2.5	0.8
FB-18	13		8						780	2080	0	780	2080	0	9295	53.9	2860	43.2	3-1/8"x12" GLB	Live	0.25	L/480	L/614	Pass	6.5	1.4
FB-19									0	0	0	0	0	0	0		0			Live		L/480				
FB-20									0	0	0	0	0	0	0		0			Live		L/480				
FB-21									0	0	0	0	0	0	0		0			Live		L/480				
FB-22									0	0	0	0	0	0	0		0			Live		L/480				
FB-23									0	0	0	0	0	0	0		0			Live		L/480				
FB-24									0	0	0	0	0	0	0		0			Live		L/480				
FB-25									0	0	0	0	0	0	0		0			Live		L/480				
FB-26									0	0	0	0	0	0	0		0			Live		L/480				
FB-27									0	0	0	0	0	0	0		0			Live		L/480				

FOOTINGS:

ALLOWABLE BEARING PRESSURE = 1.5 KSF
Assumed Coefficient of Friction Soil to Foundation = 0.3

	Frame Line	GRAVITY DL	LL	SL	$Trib_{DL}$	$Trib_{LL}$	$Trib_{SL}$	Wall	$Trib_{Wall}$	DL	LL	Required FTG	Specified FTG
mid bear		15.0 psf	40.0 psf	35.0 psf	22.0ft	22.0ft	0.0ft	12.0 psf	25.0ft	0.6 k	0.9k	12.1 in	FC- 18
mid rear		15.0 psf	40.0 psf	35.0 psf	39.0ft	16.0ft	23.0ft	40.0 psf	25.0ft	1.6 k	1.4k	24.2 in	FC- 30
end rear		15.0 psf	40.0 psf	35.0 psf	21.0ft	18.0ft	3.0ft	40.0 psf	25.0ft	1.3 k	0.8k	17.1 in	FC- 20
side		15.0 psf	40.0 psf	35.0 psf	20.0ft	4.0ft	16.0ft	40.0 psf	25.0ft	1.3 k	0.7k	16.2 in	FC- 20
marriage		15.0 psf	40.0 psf	35.0 psf	21.0ft	4.0ft	17.0ft	15.0 psf	50.0ft	1.1 k	0.8k	14.6 in	FC- 20
										0.0 k	0.0k	0.0 in	FC- 22
		15.0 psf	40.0 psf	35.0 psf	33.0ft	28.0ft	21.0ft	51.0 psf	10.0ft	1.0 k	1.9k	22.9 in	FC- 24
SPOT FTGS													
R porch	B	15.0 psf	40.0 psf	35.0 psf	315.0sf	0.0sf	195.0sf	0.0 psf	0.0sf	4.7 k	6.8k	33.3 in	FS- 36
F porch	C	15.0 psf	40.0 psf	35.0 psf	50.0sf	0.0sf	25.0sf	0.0 psf	0.0sf	0.8 k	0.9k	12.5 in	FS- 24
1	D	15.0 psf	0.0 psf	35.0 psf	0.0sf	0.0sf	0.0sf	0.0 psf	0.0sf	0.0 k	0.0k	0.0 in	FS- 0

TYPICAL FOOTINGS AND REINFORCING

Footing Parameters

Soil Bearing Pressure = 1500 psf
f'c = 2500 psi
fy steel = 60 ksi
pmax = 0.016

Note: Not all footings were used on this project

Continuous Footings							Trial Reinf			
Callout	Typ Eccent	Allowable Load	Ftg Reqd	Nom Ftg	Asmin/ft	As Reqd/ft	Num Bar	Bar #	As Prov	√ As
FC-1.5	0.1%	*2.2 klf*	1.48'	*1.5'*	0.18 in^2	0.36 in^2	(2)	4	0.4	OK
FC-2.0	0.1%	*3.0 klf*	1.98'	*2.0'*	0.24 in^2	0.48 in^2	(3)	4	0.6	OK
FC-2.5	0.1%	*3.7 klf*	2.48'	*2.5'*	0.30 in^2	0.60 in^2	(3)	5	0.93	OK
FC-3.0	0.1%	*4.5 klf*	2.98'	*3.0'*	0.36 in^2	0.72 in^2	(3)	5	0.93	OK
FC-3.5	0.1%	*5.2 klf*	3.48'	*3.5'*	0.42 in^2	0.84 in^2	(3)	5	0.93	OK
FC-4.0	0.1%	*6.0 klf*	3.98'	*4.0'*	0.48 in^2	0.96 in^2	(4)	5	1.24	OK
FC-4.5	0.1%	*6.7 klf*	4.48'	*4.5'*	0.54 in^2	1.08 in^2	(4)	5	1.24	OK
FC-5.0	0.1%	*7.5 klf*	4.98'	*5.0'*	0.60 in^2	1.20 in^2	(5)	5	1.55	OK
FTS-1.5	0.1%	*2.2 klf*	1.48'	*1.5'*	0.18 in^2	0.36 in^2	(2)	4	0.4	OK
FTS-2.0	0.1%	*3.0 klf*	1.98'	*2.0'*	0.24 in^2	0.48 in^2	(3)	4	0.6	OK
FTS-2.5	0.1%	*3.7 klf*	2.48'	*2.5'*	0.30 in^2	0.60 in^2	(3)	5	0.93	OK
FTS-3.0	0.1%	*4.5 klf*	2.98'	*3.0'*	0.36 in^2	0.72 in^2	(3)	5	0.93	OK
FTS-3.5	0.1%	*5.2 klf*	3.48'	*3.5'*	0.42 in^2	0.84 in^2	(3)	5	0.93	OK

Spot Footings										Trial Reinf			
Callout	Typ Eccent	Allowable Load	Ftg Reqd	Nom Ftg	Mu	p	√ p	Asmin	As Reqd	Num Bar	Bar #	As Prov	√ As
FS-2.0	0.1%	*5.9 k*	1.99'	*2.0'*	1.02 k-ft	0.000	OK	0.43 in^2	0.05 in^2	(2)	5	0.62	OK
FS-2.5	0.1%	*9.2 k*	2.49'	*2.5'*	2.16 k-ft	0.000	OK	0.54 in^2	0.10 in^2	(3)	5	0.93	OK
FS-3.0	0.1%	*13.3 k*	2.99'	*3.0'*	3.95 k-ft	0.001	OK	0.65 in^2	0.18 in^2	(3)	5	0.93	OK
FS-3.5	0.1%	*18.2 k*	3.49'	*3.5'*	6.52 k-ft	0.000	OK	0.90 in^2	0.22 in^2	(3)	5	0.93	OK
FS-4.0	0.1%	*23.8 k*	3.99'	*4.0'*	10.02 k-ft	0.001	OK	1.03 in^2	0.33 in^2	(4)	5	1.24	OK
FS-4.5	0.1%	*30.1 k*	4.49'	*4.5'*	14.58 k-ft	0.001	OK	1.16 in^2	0.48 in^2	(4)	5	1.24	OK
FS-5.0	0.1%	*37.2 k*	4.99'	*5.0'*	19.63 k-ft	0.001	OK	1.29 in^2	0.65 in^2	(5)	5	1.55	OK
FS-5.5	0.1%	*45.0 k*	5.50'	*5.5'*	26.59 k-ft	0.001	OK	1.42 in^2	0.89 in^2	(5)	5	1.55	OK
FS-6.0	0.1%	*53.5 k*	5.99'	*6.0'*	33.81 k-ft	0.001	OK	1.60 in^2	1.07 in^2	(6)	5	1.86	OK

PUNCHING SHEAR CHECK

Note: Not all footings were used on this project

Callout	Factored Load	Min Col. Dim	factored qu		Assumed depth	d	bo	Vu	Vc	√ Capacity
FS-2.0	8.5 k	4"	2.12 ksf		10"	7.0"	44"	6.7 k	52.4 k	OK
FS-2.5	13.3 k	4"	2.13 ksf		10"	7.0"	44"	11.5 k	52.4 k	OK
FS-3.0	19.2 k	4"	2.13 ksf		10"	7.0"	44"	17.4 k	52.4 k	OK
FS-3.5	26.2 k	4"	2.14 ksf		12"	9.0"	52"	23.7 k	79.6 k	OK
FS-4.0	34.2 k	4"	2.14 ksf		12"	9.0"	52"	31.7 k	79.6 k	OK
FS-4.5	43.4 k	4"	2.14 ksf		12"	9.0"	52"	40.8 k	79.6 k	OK
FS-5.0	53.6 k	5"	2.14 ksf		12"	9.0"	56"	50.7 k	85.7 k	OK
FS-5.5	64.9 k	5"	2.14 ksf		12"	9.0"	56"	61.9 k	85.7 k	OK
FS-6.0	77.0 k	6"	2.14 ksf		12"	9.4"	62"	73.5 k	98.4 k	OK

Solutions you can build on

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