

civil & structural engineering & planning

STRUCTURAL CALCULATIONS

Rudolf Residence

8253 W. Mercer Way Mercer Island, WA



05/11/2018

250 4th Ave S Ste 200 Edmonds, WA 98020 Phone: (425) 778-8500 Fax: (425) 778-5536

CG Project No.: 15227.10

Project Location 8253 W. Mercer Way Mercer Island, WA

Project Description

This project involves the construction of a new 3-story single family residence. The house will be framed with premanufactured roof and floor trusses. The walls will be light wood framed shear walls. The foundation will be concrete auger cast piles and grade beams.

Scope of Work

Provide structural calculations and construction documents in accordance with current building code.

Basis of Design

Roof Loads	Dead	15 psf
	Snow	25 psf
Floor Loads	Dead	15 psf
	Garage	55 psf
	Live	40 psf
	Deck	60 psf

Wind Parameters

110 MPH Wind Speed, 3-Sec Gust Exposure Category C Kzt = 1.3

Seismic Parameters

Sds = 0.961 $I_E = 1.0$ Light Wood Framed Shearwalls R= 6.5

	Description	^{By} DTR	Date 5/10/2018
	Project Summary	Checked	Date
ENGINEERING 250 4th Ave South		Scale NTS	Sheet No.
Suite 200 Edmonds, WA 98020	Project Rudolf Res.	Job No. 15227.10	0-1
Lumonus, WA 90020			

Gravity Design Loads

<u>Roof DL</u>

Roofing Mate	rial	2.5	psf
1/2 Sheathing	[1.5	psf
Insulation		1.0	psf
1/2 Gypsum		2.0	psf
Trusses @ 24'	' OC	3.0	psf
M/E		1.2	psf
Misc		1.5	psf
		12.7	psf
	USE	15.0	psf

Floor DL

Flooring Ma	iterial	2.0	psf	
3/4 Sheathi	ng	2.3	psf	
Insulation		1.0	psf	
1/2 Gypsum	า	2.0	psf	
Truss @ 16'	' OC	4.2	psf	
M/E		1.0	psf	
Misc		1.5	psf	
		14.0	psf	
	USE	15.0	psf	

Exterior Walls

Siding		2.0	psf	
1/2 Sheathin	g	1.5	psf	
Insulation		1.0	psf	
5/8 Gypsum		2.8	psf	
2x6 @ 16" O	С	1.7	psf	
Misc		1.0	psf	
		10.0	psf	
	USE	10.0	psf	

Roof LL (Snow)	25.0	psf	
Floor LL	40.0	psf	
Deck LL	60	psf	



Description	Gravity Design Loads	^{By} MBB	Date 03/05/18
		Checked	Date
		Scale	Sheet No.
Project	Rudolf Residence	Job No.	1-2
		15227.10	

	Span Length in Feet																
Beam	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
4x6 HF #2	815	522	362	266	204	160	117	•	I	1	-		-	-	-	-	-
3 1/2 x 5 1/2 LSL	1340	858	546	344	230	162	118	-		-	- 1995 - 1995 - 1995	1	ł	-	1		-
4x8 HF #2	1270	902	627	460	353	279	226	186	155	122	-		-	-	-	-	-
3 1/2 x 7 1/4 LSL	2275	1456	1011	743	522	367	267	201	155	122	-	-		•	-	-	-
6x8 DF #2	1880	1203	836	614	470	371	301	249	209	178	153	134	114		-	-	
2 11/16 x 9 1/4 PSL	2405	1924	1603	1374	1193	889	648	487	375	295	236	192	158	132	111	-	-
4x10 HF #2	1620	1296	942	692	530	419	339	280	236	201	173	151	133	113	1	-	-
3 1/2 x 9 1/4 PSL	3130	2504	2087	1789	1553	1169	852	640	493	388	310	252	208	173	146	124	106
5 1/4 x 9 1/4 PSL	4695	3756	3130	2683	2328	1753	1278	960	739	582	466	379	312	260	219	186	160
2 11/16 x 9 1/2 PSL	2470	1976	1647	1411	1235	965	704	529	407	320	256	209	172	143	121	103	-
3 1/2 x 9 1/2 LSL	3160	2528	2107	1646	1260	953	694	522	402	316	253	206	170	141	119	101	-
3 1/2 x 9 1/2 PSL	3215	2572	2143	1837	1608	1270	926	696	536	421	337	274	226	188	159	135	116
6x10 DF #2	2960	1930	1340	984	754	596	482	399	335	285	246	214	188	167	149	134	118
5 1/4 x 9 1/2 PSL	4825	3860	3217	2757	2413	1905	1389	1043	804	632	506	412	339	283	238	202	174
7 x 9 1/2 PSL	6430	5144	4287	3674	3215	2540	1852	1391	1072	843	675	549	452	377	318	270	231
2 11/16 x 11 1/4 PSL	2925	2340	1950	1671	1463	1300	1104	890	686	539	432	351	289	241	203	173	148
3 1/2 x 11 1/4 LSL	3740	2992	2493	2137	1740	1375	1114	866	667	525	420	342	281	235	198	168	144
3 1/2 x 11 1/4 PSL	3810	3048	2540	2177	1905	1693	1438	1155	889	700	560	455	375	313	264	224	192
6x12 DF #2	3585	2829	1964	1443	1105	873	707	584	491	418	361	314	276	245	218	196	177
5 1/4 x 11 1/4 PSL	5710	4568	3807	3263	2855	2538	2157	1739	1340	1054	844	686	565	471	397	337	289
2 11/16 x 11 7/8 PSL	3085	2468	2057	1763	1543	1371	1222	1010	804	632	506	412	339	283	238	202	174
3 1/2 x 11 7/8 LSL	3950	3160	2633	2257	1930	1525	1235	1018	784	617	494	402	331	276	232	198	169
3 1/2 x 11 7/8 PSL	4020	3216	2680	2297	2010	1787	1592	1316	1050	826	661	538	443	369	311	265	227
5 1/4 x 11 7/8 PSL	-	4824	4020	3446	3015	2680	2389	1974	1575	1239	992	807	665	554	467	397	340
7 x 11 7/8 PSL	-	-	5357	4591	4018	3571	3185	2632	2090	1644	1316	1070	882	735	619	526	451

Beam Span Table - Floor Beams

Notes:

1. This table is applicable for Simple Span beams with uniformly distributed loads (no point loads)

2. Table values are based on the limiting beam shear & moment capacities, as well as deflection

3. The deflection limit used in the above table is (L/240 Total Load) and (L/360 Live Load)

4. This table is applicable for $W_{LL}/W_{DL} \le 4.0$

5. Table values include the Size Factor (C_F)



Description	Beam Span Table	Ву	DTR	Date	03/05/18
		Checked		Date	
		Scale		Sheet No.	
Project	Rudolf Res.	Job No.	15227.10	1-3	•

								Span L	.ength	in Fee	t						
Beam	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
4x6 HF #2	937	600	417	306	234	185	150	124	104				-	-	•	-	-
3 1/2 x 5 1/2 LSL	1541	986	685	503	369	259	189	142	109	-	-	-	-	-	•	1	-
4x8 HF #2	1461	1038	721	529	405	320	259	214	180	154	132	115	101		•		-
3 1/2 x 7 1/4 LSL	2616	1674	1163	854	654	517	419	321	247	195	156	127	104	-	-	-	-
6x8 DF #2	2162	1384	961	706	541	427	346	286	240	205	176	154	135	120	107		I
2 11/16 x 9 1/4 PSL	2405	1924	1603	1374	1193	942	763	631	530	452	378	307	253	211	178	151	130
4x10 HF #2	1863	1490	1084	796	610	482	390	322	271	231	199	173	152	135	120	108	-
3 1/2 x 9 1/4 PSL	3600	2880	2400	2057	1785	1411	1143	944	789	620	497	404	333	277	234	199	170
5 1/4 x 9 1/4 PSL	5399	4319	3600	3085	2677	2115	1713	1416	1183	931	745	606	499	416	351	298	256
2 11/16 x 9 1/2 PSL	2470	1976	1647	1411	1235	991	802	663	557	475	409	334	275	229	193	164	141
3 1/2 x 9 1/2 LSL	3634	2907	2423	1893	1449	1145	927	766	643	506	405	329	271	226	191	162	139
3 1/2 x 9 1/2 PSL	3700	2960	2467	2114	1850	1482	1201	992	834	674	540	439	362	302	254	216	185
6x10 DF #2	3404	2219	1541	1132	867	685	555	458	385	328	283	247	217	192	171	154	139
5 1/4 x 9 1/2 PSL	5545	4436	3697	3169	2773	2224	1802	1489	1251	1011	810	658	543	452	381	324	278
7 x 9 1/2 PSL	7390	5912	4927	4223	3695	2966	2402	1985	1668	1349	1080	878	723	603	508	432	370
2 11/16 x 11 1/4 PSL	2925	2340	1950	1671	1463	1300	1104	912	767	653	563	491	431	382	325	276	237
3 1/2 x 11 1/4 LSL	4301	3441	2867	2458	2001	1581	1281	1058	889	758	653	547	450	375	316	269	231
3 1/2 x 11 1/4 PSL	4382	3505	2921	2504	2191	1947	1653	1366	1148	978	843	729	600	501	422	359	307
6x12 DF #2	4123	3253	2259	1660	1271	1004	813	672	565	481	415	361	318	281	251	225	203
5 1/4 x 11 1/4 PSL	6567	5253	4378	3752	3283	2918	2480	2050	1722	1468	1265	1097	904	754	635	540	463
2 11/16 x 11 7/8 PSL	3085	2468	2057	1763	1543	1371	1222	1010	849	723	624	543	478	423	377	324	278
3 1/2 x 11 7/8 LSL	4543	3634	3028	2596	2220	1754	1420	1174	986	841	725	631	530	441	372	316	271
3 1/2 x 11 7/8 PSL	4623	3698	3082	2642	2312	2055	1831	1513	1271	1083	934	814	709	591	498	423	363
5 1/4 x 11 7/8 PSL	-	5548	4623	3963	3467	3082	2747	2270	1908	1626	1402	1221	1063	887	747	635	544
7 x 11 7/8 PSL	-	-	6160	5280	4620	4107	3663	3027	2543	2167	1869	1628	1411	1176	991	842	722

Beam Span Table - Roof Beams

Notes:

1. This table is applicable for Simple Span beams with uniformly distributed loads (no point loads)

2. Table values are based on the limiting beam shear & moment capacities, as well as deflection

3. The deflection limit used in the above table is (L/180 Total Load) and (L/240 Snow Load)

4. This table is applicable for $W_{LL}/W_{DL} \le 3.0$

5. Table values include the Size Factor (C_F) and the Load Duration Factor (C_D)



Description	Beam Span Table	By	DTR	Date 03/05/1
		Checked		Date
		Scale		Sheet No.
Project	Rudolf Res.	Job No.	15227.10	1-4

HF Column & HF Sill Plate Capacity TABLE

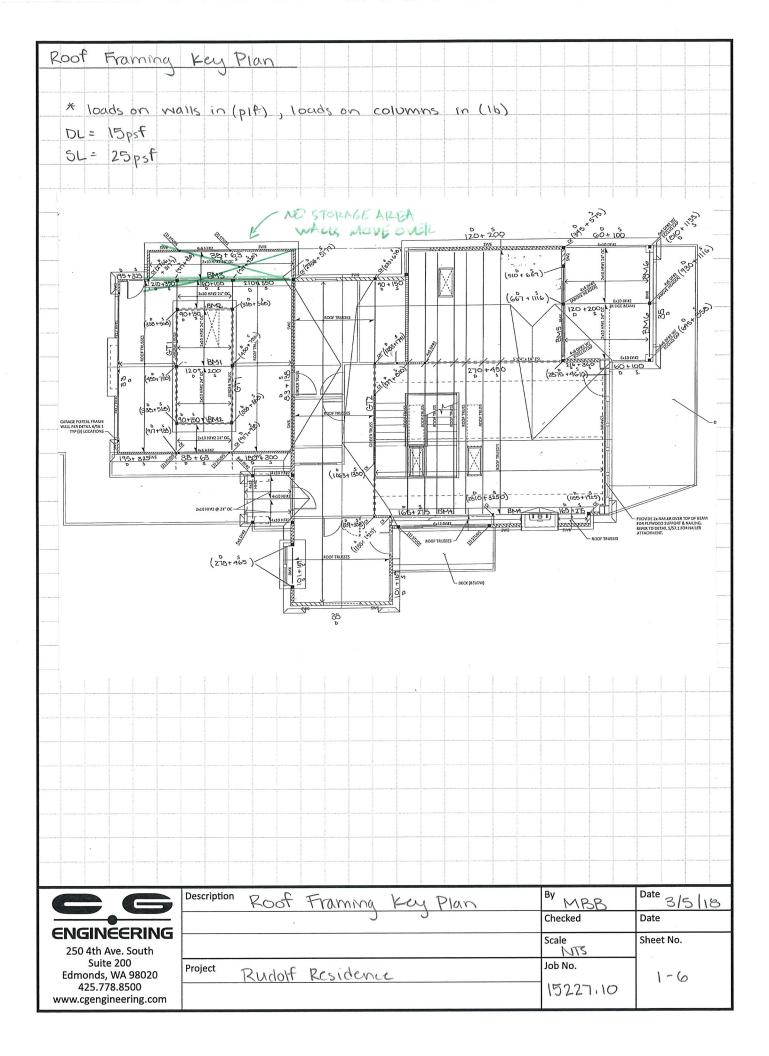
IBC 2015, NDS 2015

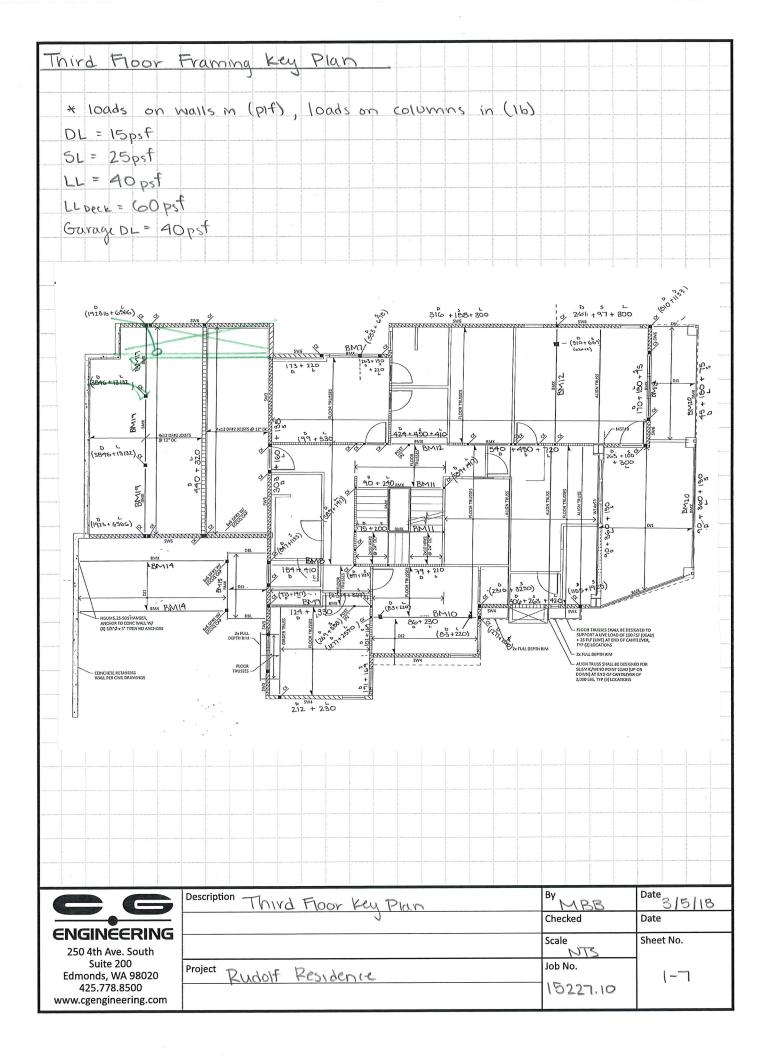
	6	7	$\left(8 \right)$	9	10	11	12	13	14	15	16
(2) 2x4 HF Stud	5,149	4,121	3,311	2,693	2,224	1,862	1,579	1,355	1,175	1,028	906
P _{SILL}	4,784	,	-			-	-	-	-	-	
(3) 2x4 HF Stud	9,220	7,723	6,382	5,281	4,406	3,715	3,166	2,726	2,369	2,076	1,834
P _{SILL}	6,910	6,910	-	_		_			,000		-
(4) 2x4 HF Stud	12,294	10,298	8,510	7,041	5,875	4,953	4,221	3,635	3,159	2,769	2,445
P _{SILL}	8,505	8,505	8,505	-	-	-	-	-	-		_,
(2) 3x4 HF Stud	10,245	8,581	7,091	5,868	4,896	4,128	3,518	3,029	2,632	2,307	2,038
P _{SILL}	7,619	7,619	-	-	-	-	-	-	-	-	-
(3) 3x4 HF Stud	15,367	12,872	10,637	8,802	7,343	6,191	5,277	4,543	3,948	3,461	3,057
P _{SILL}	10,631	10,631	10,631	-	-	-	-	-	-	-	-
(2) 2x6 HF Stud	7,951	6,405	5,164	4,210	3,481	2,917	2,476	2,125	1,843	1,613	1,42
P _{SILL}	7,518	-	-	-	-	-	-	-	-	-	-
(3) 2x6 HF Stud	16,730	15,297	13,636	11,927	10,333	8,934	7,746	6,750	5,918	5,221	4,63
P _{SILL}	10,859	10,859	10,859	10,859	-	-	-	-	-	-	-
(4) 2x6 HF Stud	23,902	22,755	21,314	19,614	17,764	15,903	14,146	12,558	11,158	9,942	8,89
P _{SILL}	13,365	13,365	13,365	13,365	13,365	13,365	13,365	-	-	-	-
4x6 HF #2	14,409	11,327	9,009	7,286	5,993	5,006	4,239	3,633	3,147	2,751	2,42
P _{SILL}	8,328	8,328	8,328	-	-	-	-	-	-	-	-
4x8 HF #2	18,744	14,808	11,809	9,566	7,876	6,583	5,577	4,782	4,142	3,622	3,193
P _{SILL}	10,277	10,277	10,277	-	-	-	-	-	-	-	-
4x10 HF #2	23,562	18,717	14,972	12,150	10,015	8,377	7,101	6,090	5,277	4,615	4,069
P _{SILL}	13,112	13,112	13,112	-	-	-	-	-	-	-	-
6x6 DF #2	19,595	18,889	17,995	16,908	15,659	14,315	12,960	11,665	10,475	9,407	8,463
P _{SILL}	13,087	13,087	13,087	13,087	13,087	13,087	-	-	-	-	-
6x8 DF #2	25,830	24,899	23,721	22,288	20,642	18,870	17,083	15,377	13,808	12,400	11,15
P _{SILL}	16,149	16,149	16,149	16,149	16,149	16,149	16,149	-	-	-	-
6x10 DF #2	28,621	27,790	26,739	25,450	23,929	22,224	20,420	18,614	16,885	15,285	13,83
P _{SILL}	20,604	20,604	20,604	20,604	20,604	20,604	-	-	-	-	-

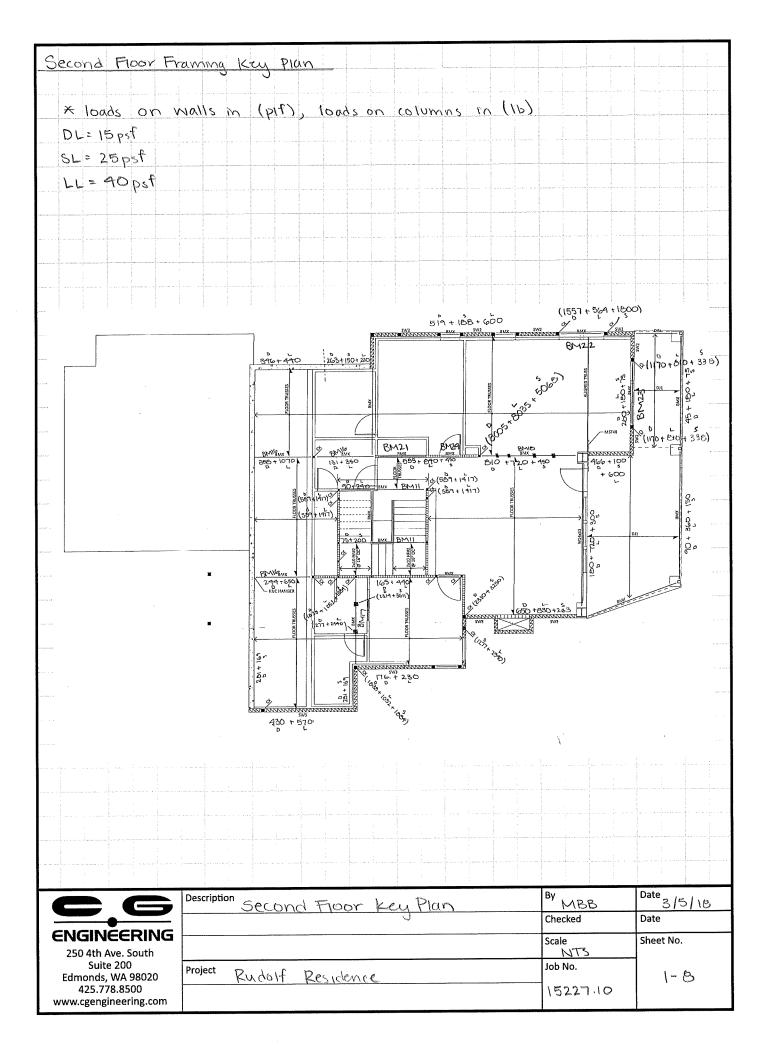
* columns designed per column Table

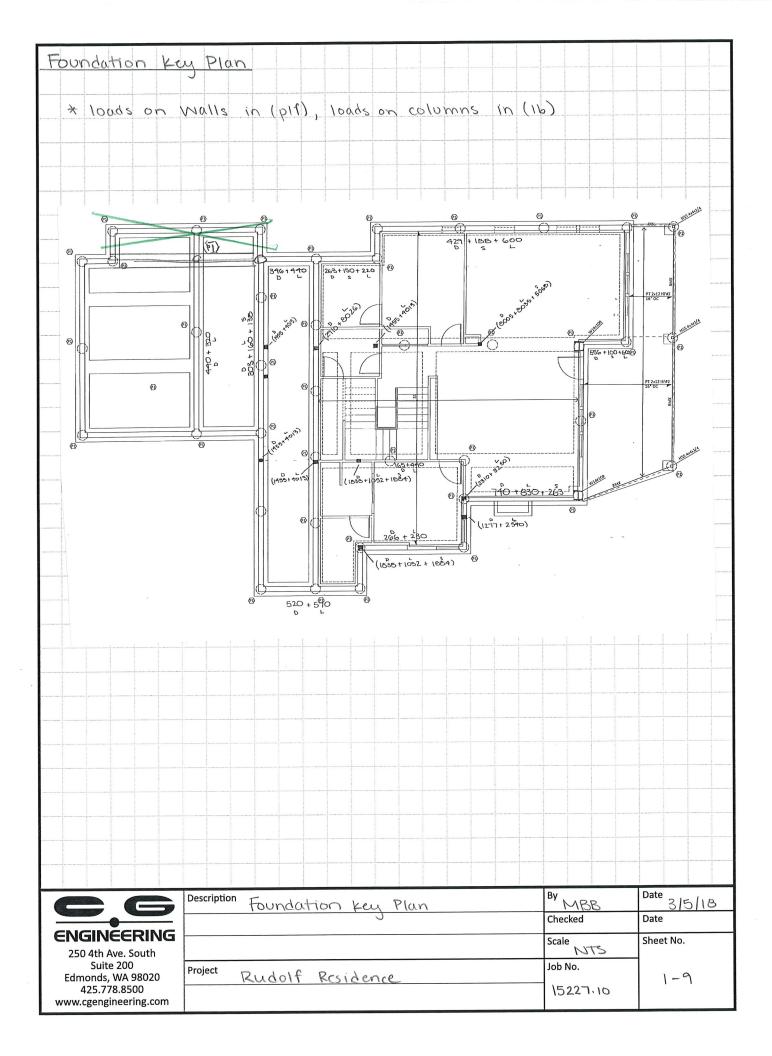


Ľ	Description		Ву	DTR	Date	03/05/18
Γ		Wood Column Capacity Table	Checked		Date	
Γ			Scale		Sheet No.	
Р	Project	Rudolf Res.	Job No.		1-5	z.
Γ			15227.1	0		J









(1) $P_{BMI} = (\frac{1.5}{2})(120pif + 200pif) \quad @.12'$ = 450 14 - 750 16 PBIME Rin2 PBIN $B_{BM2} = \left(\frac{1.5}{2}\right) \left(90_{p} + 150_{p} \right) (0, 1)^{2}, 20^{2}$ 24) - 338 15 + 563 15 917 16 + 39:15 * Only music reactions 91716 + 92316 BM $W = (\frac{16}{2})(15 \text{ psf} + 25 \text{ psf})$ = 120 plf + 200 plf Ň Å = 320 pif 7,5) Wallow = 405 plf (79%) (450 + 750)16 (4E0 - 750)16 Per Roof Brinn Spin Table, 4×8 H= 12 is adequate (miniman) BM2 W = (2)(1505f + 2505f)Vmax = 91516 (36%) W-= 90 - 4 + 150 ptf Mimay = 171516 ft (92%) = 240 Dif 7.51 Per MODINNIES, AX6HF#2 15 adequate 0 5 225-567)16 (355+567)14 $W_{1} = \left(\frac{4^{2} + 14^{2}}{2}\right) \left(15^{2} + 15^{2} + 25^{2} + 25^{2} + 5^{2}\right)$ 0->4, 11.5 - 19.75 BM3 = 210 ptf = 330 ptf $= \left(\frac{4^{2} + 4^{2}}{2}\right) (15 \text{ ps} + 25 \text{ ps} + 25 \text{ ps} + 4^{2} \rightarrow 11.5^{2}$ 141 Δ 60,11 + 100p1f 19 - 9) <u>(</u>a) 7.51 BASS P= 917 16 + 938 15 Q 9' 11.5' Vinax = 6425 16 (30%) Mmax = 3012218-1-(5370) 276616 + 311116 276616 . 317716 5/4×16" 208 PSL Per Mondinior 1-5 USC BY MBR Date 2/28/13 Description Gravity Design Checked Date ENGINEERING Scale NTS Sheet No. 250 4th Ave. South Suite 200 Job No. Project RUNDONF Residence Edmonds, WA 98020 1-10 425,778,8500 15227.15 www.cgengineering.com

GT2				
		$w = (\frac{11}{2})(15)p_{s}f + 25p_{s}f + 25p_{s}f + 138p_{s}f$	st)	
	W	- 00 plt + 130 p	»\\T	
Δ΄Δ΄Δ	<u> </u>	* only need re	actions	
	9.2" T+ 1"		<u> </u>	• • • • • • • • • • • • • • • • • • •
$\uparrow \uparrow \uparrow$	\uparrow \uparrow \uparrow			
533 16 1283 16 379 +174 16 + B	916 106316 269 53016 +135016 +31	Belb S		
+ 678 1b = 1211 1b = 30291b =				
C , , ,				
BMA		$w = (\frac{22}{2})(15psf + 25psf)$		
W		$W = \left(2 \left(1000000000000000000000000000000000000$		
X X X		= 165 plf + 275 plf = 440 plf		
* 19, *		Wallow = 570 plf (81 %)		
$\uparrow \qquad \uparrow$				
(1155+1925) (1155+1°	19 ² 5)	Per Roof Beam Span Table, 3'	12 × 91/2 2.0E	PSL
		is adequate		
BM5		D S		· · · · · · · · · · · · · · · · · · ·
		P = 667 116 + 1116 16		
		Vmax = 1156 16 (9%)		
Δ	Δ	$M_{max} = 5699 \text{ lb} (17\%)$		
12.5)y				
1.5 15) 1	Per Wood Works, Use 31/2"	X16" 2.0E	PSL
377 16 + 417 5	510 16 + 669 16			
			· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·
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	Description Gro	wity Design	BY MBB	Date 3/1/18
ENGINEERING		J. P == 31.	Checked	Date
250 4th Ave. South			Scale NTS	Sheet No.
Suite 200 Edmonds, WA 98020 425.778.8500	Project Rudo	If Residence	Job No.	1-12
425.778.8500 www.cgengineering.com			15227.15	1 1 2000

	- T	
Wood Works [®]	COMPANY Mar. 1, 2018 16:09	PROJECT BM5
SOFTWARE FOR WOOD DESIGN		
	Calculation She	et
Loads: Load Type Distribution Pat- Location [ft] Magnitude Unit	1	
Pd Dead Point 7.54 667 lbs Ps Snow Point 7.54 1116 lbs Self-weight Dead Full UDL 7.55 plf		
Maximum Reactions (Ibs), Bearing Capacities (Ibs) and Bearing Lengths (in) :		
	12.583'	
Ř. V.		人 12.542'
Unfactored: Dead 377		510 669
Show 447 Factored: Total 824		1179
Bearing: Capacity Beam 1313		1313 1211
Support 1211 Destatio Beam 0.63		0.90
Support 0.68 Load comb #2 Length 0.50*		#2 0.50+ 0.50+
Min req'd 0.50* Cb 1.00 Cb min 1.00		1.00 1.00 1.11
Cb support 1.11 Fcp sup 625 *Minimum bearing length setting used: 1/2* for end supports		625
	BM5	
PSL, PSL,	2.0E, 3-1/2"x16" er-soft Bearn, D.Fir-L No r span: 12.5'; volume =	4.9 cu.ft.
Analysis vs. Allowable Stress and Deflection using NDS 2015 :		
$ \begin{array}{c cccc} Criterion & Analysis Value & Design Value & Unit & Analysis/Design \\ Shear & fv = 31 & Fv' = 334 & psi. & fv/Fv' = 0.09 \\ Bending(+) & fb = 458 & Fb' = 2689 & psi & fb/Fb' = 0.17 \\ \end{array} $		
Live Defl'n 0.03 = <l 999<="" th=""> 0.42 = L/360 in 0.08 Total Defl'n 0.07 = <l 999<="" td=""> 0.63 = L/240 in 0.10</l></l>		
Additional Data: FACTORS: F/F(psi)CD CM Ct CL CV Cfu Cr Cfrt Ci Cn LC# FV' 290 1.15 - 1.00 1.00 - 1.00 2		
Fb'+ 2900 1.15 - 1.00 0.806 1.00 - 1.00 1.00 2 Fcp' 750 1.00 1.00		
E' 2.0 million - 1.00 1.00 2 Eminy' 1.04 million - 1.00 1.00 2 CRTICAL LOAD COMBINATIONS:		
Shear : LC #2 = D+S, V max = 1156, V design = 1156 lbs Bending(+): LC #2 = D+S, M = 5699 lbs-ft Deflection: LC #2 = D+S (live)		
LC #2 = D+S (total) D=dead L=live S=snow W=wind I=impact Lr=roof live Lc=concentrated E=earthquake All LC's are listed in the Analysis output		
Lead combinations: ASCE 7-10 / IBC 2015 CALCULATIONS: Deflection: EI = 2389e06 lb-in2		
"Live" deflection = Deflection from all non-dead loads (live, wind, snow) Total Deflection = 1.50(Dead Load Deflection) + Live Load Deflection. Lateral stability(+): Lu = 12.56' Le = 24.44' RB = 19.6		
Design Notes:		
 WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2015), the Nat 2. Please verify that the default deflection limits are appropriate for your application. SCL-BEAMS (Structural Composite Lumber): the attached SCL selection is for preliminary design only. For final 4. Size factors vary from one manufacturer to another for SCL materials. They can be changed in the database edit 	member design contac	

5. FIRE RATING: LVL, PSL and LSL are not rated for fire endurance.

BMG	P = 66-1 115 + 1116	11	
P		6/	
\downarrow	Vmax = 99916(0	9(6)	
A Y	A Mmax=717B16.ft	- (29%)	19 2.10 10 1 10 1 10 10 10 10 10 10 10 10 10
15)			
h	Per woodworks 3	0/2 × 16" PSI	- adequate
465 16 + 558 16 5 5	A65 16 + 558 16 D S		
BM1			
P	W1 = (73 pif + 220 pif		
w_1	$W_2 = 263 pif + 150 pif + 220 pif$		
	P= 533 16 + 67816)		
- ∕ - ∕ - ∕	Vmax = 2-271 16 (50%)		
\uparrow \uparrow	Mmax= 4501 16-17 (97%)		
606+483 606+	\$ 483		sentimud name of
	Perwood works, 4×10 HF#2	15 adequat	
BMB .	$W = \left(\frac{15.5^{\circ} + 5^{\circ}}{2}\right) \left(15 \text{ psf} + 40 \text{ ps}\right)$	f)	
w			
	W = 154pif + 410pif		
	W = 564 plf		
0 897+1133 897+	USE 31/2 × 16 2.0E PSL		
	1123		
	Description Gravity Design	By MBB	Date 3/1/18
ENGINEERING		Checked	Date
250 4th Ave. South		Scale MTS	Sheet No.
Edmonds, WA 98020 425.778.8500 www.cgengineering.com	Project Rudolf Residence	Job No. 15227.15	1 - 14

				- 1mm - 1,	COMPANY	PROJECT	
6	D V	Vood	Work	KS [®]	Mar. 1, 2018 16:10	BM6	
				Design Check C	alculation She	pet	
Loads:							
Load Pd Ps Self-weight	Type Dead Snow Dead	Distribution Pat- tern Point Full UDL	Location [ft] Mag. Start End Sta 7.52 66 7.52 111 17. 17. 17.	7 1bs 6 1bs		·	
Maximum Re	actions (lbs),	Bearing Capacities	(lbs) and Bearing	Lengths (in) :		· ·	
	<u>}</u>				15.042'		† 1
							F
	ð.					1	<u>х</u> 5'
Unfactored: Dead Snow Factored: Total	465 558 1023						465 558 1023
Bearing: Capacity Beam Support	1313 1211						1313 1211
Des ratio Beam Support	0.78						0.78 0.84 #2
Min req'd C Cb Cb min	#2 9.50* 9.50* 1.00 1.00 1.11						.50* .50* 1.00 1.00
Fcp sup	625	: 1/2" for end supports					625
					an: 14.958'; volume =	= 5.8 cu.ft.	
		ess and Deflection		s/Design			
Criterion Shear Bending(+) Live Defl'n Total Defl'n	Analysis Va fv = 27 fb = 577 0.06 = <l 9<br="">0.12 = <l 9<="" td=""><td>Fv' = 334 Fb' = 2451 0.50 = L/360</td><td>psi fv/F</td><td>b' = 0.24 0.11 0.16</td><td></td><td></td><td></td></l></l>	Fv' = 334 Fb' = 2451 0.50 = L/360	psi fv/F	b' = 0.24 0.11 0.16			
Fv' 290 Fb'+ 2900 Fcp' 750 E' 2.0 Eminy' 1.04 CRITICAL LOAD C	psi)CD CM 1.15 - 1.15 - million - million - OMBINATIONS:	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	1.00 - 1.00 1.00 1.00 1.00 1.00	Ci Cn LC# - 1.00 2 2 2 2 2			
Bending(+): LC Deflection: LC LC D=dead L=live	: #2 = D+S (1 : #2 = D+S (t S=snow W=wind	= 7178 lbs-ft ive) otal) I=impact Lr=roof live		earthquake			
All LC's are 1 Load combinati CALCULATIONS: Deflection: E "Live" deflect Total Deflecti	<pre>isted in the A ons: ASCE 7-10 I = 2389e06 tion = Deflecti on = 1.50(Dead</pre>	nalysis output / IBC 2015	loads (live, wind, sive Load Deflection	snow)			
Design Notes 1. WoodWorks anal 2. Please verify that 3. SCL-BEAMS (Str	; ysis and design are the default deflecti uctural Composite	in accordance with the ICC	International Building Cod your application. selection is for preliminary	design only. For final m	ember design contact	ion (NDS 2015), and NDS Design Supplement. t your local SCL manufacturer.	

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5. FIRE RATING: LVL, PSL and LSL are not rated for fire endurance.



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Mar. 2, 2018 12:15 BM7

					····	
				Design		Calculation Sheet Vorks Sizer 11.1
Loads:						
Load	Туре	Distribution Pa		Magnitude Etert Fo	Unit	
d1	Dead	Partial UDL	ern Start End 0.11 4.11	Start En 173.0 173.0	plf	-
11 d2	Dead	Partial UDL Partial UDL	0.11 4.11 4.11 4.11 7.11	220.0 220.0 263.0 263.0	plf	
12 s2	Live Snow	Partial UDL Partial UDL	4.11 7.11 4.11 7.11	220.0 220.0 150.0 150.0	plf	
d3 s3	Snow	Point Point	4.11 4.11	533 678	lbs lbs	
Self-weight		Full UDL		6.7	plf	
Maximum Rea	actions (lbs), B	earing Capac	ities (Ibs) and B	earing Lengtr	ns (in) :	
	ł					7.239'
	ka					×
	Š.					7.119
Unfactored:						1110
Dead Live	919 771					1142 769 737
Snow Factored:	391					2271
Bearing:	1791					
	1791 3061					2271 3881
Des ratio	1.00					1.00
	0.59					0.59 #3
Length	1.26					1.60
Cb	1.00					1.00 1.00
	1.11 625					1.11 625
				1 comb or a sft	Ham E	BM8
				Supports:	: All - Tim	r, No.2, 4x10 (3-1/2"x9-1/4") ber-soft Beam, D.Fir-L No.2
				Total length: Lateral suppo	7.24'; Cle ort: top= a	ar span: 7.0'; volume = 1.6 cu.ft. supports, bottom= at supports;
Analysis vs. A	llowable Stres	s and Deflect	ion using NDS 2015			
Criterion Shear	Analysis Valu fv = 86	e Design Val Fv' = 172		nalysis/Design fv/Fv' = 0.		
Bending(+) Live Defl'n	fb = 1082 0.06 = <l 999<="" th=""><th>Fb' = 1153</th><th>3 psi</th><th>fb/Fb' = 0.</th><th>94</th><th></th></l>	Fb' = 1153	3 psi	fb/Fb' = 0.	94	
Total Defl'n	0.16 = L/542			0.		
Additional Da		at at a		frt Ci Cn	1.0#	
Fv' 150	1.15 1.00 1	Ct CL CI 00	1	frt Ci Cn .00 1.00 1.0 .00 1.00 -		
Fb'+ 850 Fcp' 405	- 1.00 1	.00	1	.00 1.00 -	- 3	
E' 1.3 Emin' 0.47 CRITICAL LOAD CO	million 1.00 1	00		.00 1.00 -	3	
Shear : LC	#3 = D+.75(L+s) #3 = D+.75(L+s)			1859 lbs		
Deflection: LC	#3 = D+.75(L+s) #3 = D+.75(L+s) #3 = D+.75(L+s)	S) (live)				
D=dead L=live	S=snow W=wind I= isted in the Ana	impact Lr=roof	live Lc=concentra	ted E=earthqua	ke	
Load combinati CALCULATIONS:	ons: ASCE 7-10 /	'IBC 2015				
Deflection: E	I = 300e06 lb	-in2 from all non-	dead loads (live,	wind, snow)		
Total Deflecti		oad Deflection) + Live Load Defl			
Design Notes 1. WoodWorks anal	ysis and design are ir	accordance with th	e ICC International Buil	ding Code (IBC 201	15), the N	tional Design Specification (NDS 2015), and NDS Design Supplement.
2. Please verify that	the default deflection	n limits are appropria	te for your application.			

BM9	δ		
	P=269 16 + 388 16		
	$W = \left(\frac{5' + 11.5'}{2}\right) (15psf + 15)$	40 ost)	
	2)		
$\frac{13}{1}$	= 124 pif + 330 pif		
$\begin{array}{c c} n & n \\ \hline \end{array} $			
(977+2181+61)16 (1162+2182+32	7) 16 Vmax = 3318 16 (25	\$%)	
	Mmax = 10411 b ft	, i i i i i i i i i i i i i i i i i i i	
	Per Moodworks, 31/2 x (6 PSL is ad	equate
BMIO			
JPI JP2 W	W = 86 pif + 230 pif		
	$P_1 = P_2 = (G)(15_{psf} + 25_{psf})(\frac{12}{2}) = 5$	$\frac{D}{40} + \frac{s}{400}$	
X 197 X	11 - 12 - (0) (10ps1 + 20ps1) (2) = 2		, (, 1, 1)
$\uparrow \qquad \uparrow \qquad \uparrow$	Vmax = 3796 16(24 %)		
(1277+2590)16 (1277+2590)16	$M_{Max} = 9859164(31\%)$		
	Per Woodworks, 31/2×16 2.0E	PSL is adequ	<u>ate 1</u>
BMII * USE WOYST CUSE	stair loading		
P	W= 90 pif + 240 pif		
<u>↓</u> w	$P = (\frac{1}{2})(\frac{5.5}{2})(15ps1 + 90ps1)$		
\times \times \times \times	= 83 16 + 220 16)	
	Vmax = 207716(28%)	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·
(612+1477) 16 (589+1417) 16	Mmax = 5899 16.17 (98%)	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·
	Per Woodworks, 31/2 x 91/2	2.0 E PSL	is adequate
			· · · · · · · · · · · · · · · · · · ·
C C Description Grav	ity Design	By MBB	Date 3/1/18
ENGINEERING		Checked Scale	Date Sheet No.
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WoodWorks®	Mar. 1, 2

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			SOFIWARE	FOR WOOD DESIG	SN .					
				De		eck Calculation §	Sheet			
Londor					Wo	oodWorks Sizer 11.1				
Loads:	Туре	Distribution H	Pat- Location			it				
Pd	Dead	Point	11.11	End Start 269	End 1b					
Ps d	Snow Dead	Point Full UDL	11.11	388 124.0	1b p1	f				
l Self-weight	Live Dead	Full UDL Full UDL		330.0 17.5	pl pl					
Maximum Rea	ctions (lbs), E	Bearing Capa	cities (lbs) and	Bearing Lei	ngths (i	n) :				
						13.224'				ł
	X 3:									Ř
	δ [.]		A							13.112
Unfactored: Dead	977									1162 2182
Live Snow Factored:	2181 61									327
	3158									3344
Capacity	3423									3625
Des ratio	3158									0.92
Support	0.92									1.00
	#2. 1.30 30**									1.38 1.38**
Cb	1.00									1.00 1.00
Cb support Fcp sup	1.11 625									1.11 625
**Minimum bearing	length governed by	the required width	of the supporting me	mber.						
						BM9				
					ports: All -	SL, 2.0E, 3-1/2"x16 Timber-soft Beam, D.Fir-	-L No.2			
						'; Clear span: 13'; volume p= at supports, bottom= a				
Analysis vs. A	llowable Stres	ss and Deflec	tion using NDS 2	015 :					,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
Criterion Shear	Analysis Val	ue Design Va Fv' = 29		Analysis/De fv/Fv' =	sign 0.25					
Bending(+) Live Defl'n	fb = 837 0.09 = <l 99<="" th=""><th>Fb' = 245</th><th>54 psi</th><th>fb/Fb' =</th><th>0.34</th><th></th><th></th><th></th><th></th><th></th></l>	Fb' = 245	54 psi	fb/Fb' =	0.34					
Total Defl'n	0.16 = <l 99<="" th=""><th>9 0.66 = L/</th><th>/240 in</th><th>1</th><th>0.24</th><th></th><th></th><th></th><th></th><th></th></l>	9 0.66 = L/	/240 in	1	0.24					
Additional Dat FACTORS: F/E(a: psi)CD CM	Ct CL (CV Cfu Cr	Cfrt Ci	Cn L	C#				
Fv' 290 Fb'+ 2900	1.00 - 1.00 -	1.00 - 1.00 0.846 1	1.00 - 1.0	1.00 - 0 1.00 -	-	2 2				
	million -	1.00 - 1.00 -		1.00 - 1.00 -	-	2				
CRITICAL LOAD CO	MBINATIONS:	1.00 -		1.00 ~	-	2				
Bending(+): LC	#2 = D+L, V m #2 = D+L, M = #2 = D+L (li	10411 lbs-ft	design = 266	2 lbs						
LC	#2 = D+B (11 #2 = D+L (to S=snow W=wind I	tal)	f live Lc=conce	ntrated E=eart	hquake					
All LC's are l: Load Patterns: Load combination	isted in the An	alvsis output								
CALCULATIONS:										
"Live" deflect	I = 2389e06 1 ion = Deflectio	n from all non-	dead loads (li	ve, wind, snow)					
Total Deflecti Lateral stabil	on = 1.50(Dead ity(+): Lu = 1	Load Deflection 3.13' Le = 25	.38' RB = 19.9	Deflection.						
Design Notes:			he ICC let	Building Orde (ID	2 2015	Notional Dealer Cool	fication (NIDE 2015)	NDS Design Supplement	at .	
2. Please verify that	the default deflectio ictural Composite Li	n limits are appropr umber): the attache	tate for your applica d SCL selection is fo	tion. Ir preliminary desig	n only. Foi	r final member design co		nd NDS Design Supplemer nanufacturer.	n.	

 Size factors vary from one manufacturer to another for SCL materials. They of S. FIRE RATING: LVL, PSL and LSL are not rated for fire endurance.

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Mar. 1, 2018 16:44 BM10

		SOF	WARE FOR WOOD DESIGN						
			Desigr		Calculation She	eet			
Loads:				WoodWor	ks Sizer 11.1				
Load	Туре		tion [ft] Magnitude	Unit					
d	Dead	Full UDL	86.0	plf					
s d1	Snow Dead	Full UDL Point 1.1		plf lbs					
d2 s1	Dead Snow	Point 13.1 Point 1.1	3 900	lbs lbs					
s2 Self-weight	Snow Dead	Point 13.1 Full UDL	3 900 17.5	lbs plf					
Maximum Re	eactions (I	bs), Bearing Capacities (Ib	s) and Bearing Length	ns (in) :					
	ł				14.263'				
	X						~~~~		×
	X Aro								14.131'
Unfactored:	1277								1277
Dead Snow Factored:	2540								2540
Total Bearing:	3817								3817
Capacity Beam	4137								4137
Support Des ratio	3817								3817
Beam Support	0.92								0.92
Load comb Length	#2 1.58								#2 1.58 1.58**
Cb	1.00								1.00
Cb min Cb support	1.00								1.00 1.11 625
Fcp_sup **Minimum bearin	625 ng length gove	med by the required width of the suppo	ting member.						
				D	M10				
				SL, PSL, 2	.0E, 3-1/2"x16"				
			Total length:	14.26'; Clear	-soft Bearn, D.Fir-L N span: 14'; volume = 5	5.5 cu.ft.			
			Lateral suppo	nt: top= at su	ipports, bottom= at su	ipports;			
		Stress and Deflection using							
Criterion Shear	fv =		i fv/Fv' = 0.	24					
Bending(+) Live Defl'n		<l 0.47="L/360" 999="" ir<="" th=""><th>0.</th><th>22</th><th></th><th></th><th></th><th></th><th></th></l>	0.	22					
Total Defl'n		L/956 0.71 = L/240 in		25					
Additional Da FACTORS: F/E	ata: E(psi)CD	CM Ct CL CV Cfu	Cr Cfrt Ci Cn						
Fv' 290 Fb'+ 2900) 1.15	- 1.00 - 1.00 0.760 1.00 -	- 1.00 - 1.0 1.00 1.00	2					
Fcp' 750		- 1.00	- 1.00	2					
CRITICAL LOAD C	i million COMBINATION	- 1.00 IS:	- 1.00	2					
Bending(+): L	LC #2 = D+3	, M = 9859 lbs-ft	2970 lbs						
Deflection: L	LC #2 ≃ D+5	(total)							
All LC's are	listed in 1	ind I=impact Lr=roof live Lc= he Analysis output	concentrated E=earthqua	ke					
CALCULATIONS:		7-10 / IBC 2015							
Deflection: "Live" deflect	tion = Def	ection from all non-dead load	s (live, wind, snow)						
		Dead Load Deflection) + Live au = 14.13' Le = 27.06' RB =							
Design Note	s:								
1. WoodWorks and	alysis and desi	gn are in accordance with the ICC Inter eflection limits are appropriate for your		5), the Natio	nal Design Specificat	ion (NDS 2015), an	id NDS Design Suppleme	nt.	
3. SCL-BEAMS (S	tructural Comp	osite Lumber): the attached SCL select nufacturer to another for SCL materials	ion is for preliminary design on	y. For final n atabase edito	nember design contac or.	t your local SCL m	anufacturer.		

5. FIRE RATING: LVL, PSL and LSL are not rated for fire endurance.

	WoodWorks [®]
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COMPANY PROJECT

Mar. 1, 2018 16:44 BM11

			_	SOFTWARE FOR	WOOD DESIGN			
	dand -				Design		Vorks Sizer 11.1	
Loads:						WOODV		
Load	Type	Distribution		Location [ft]	Magnitude	Unit]	
dl	Dead	Full UDL	tern	Start End	Start En 90.0	plf		
11 Pd1	Live Dead	Full UDL Point		4.07	240.0 83	plf lbs		
Pl1 Self-weight	Live Dead	Point Full UDL		4.07	220 10.4	lbs plf		
Maximum Re	eactions (lb	s), Bearing Cap	acitie	es (lbs) and Be	aring Length	s (in) :		
	, ,			· · ·			11.141'	
	X							Q
	277°							11.07'
Unfactored: Dead	612							589
Live Factored:	612 1477							1417
Total Bearing:	2089							2006
Capacity Beam	2264							2174
Support Des ratio	2089							2000
Beam Support	0.92							0.92 1.00 #2
Load comb Length	#2 0.86							0.83 0.83
Cb	1.00							1.00
Cb min Cb support	1.00							1.11 625
**Minimum beari	625 ng length govern	ed by the required widt	h of the	e supporting member	r.			
							BM11	
					PSI Supports	., PSL,	2.0E, 3-1/2"x9-1/2" ber-soft Beam, D.Fir-L No.2	
x					Total length:	11.14'; Cle	ear span: 11'; volume = 2.6 cu.ft. t supports, bottom= at supports;	
Analysis vs	Allowable	Stress and Defle	ctior	using NDS 2015 :				
Criterion	Analysis	Value Design	Value	Unit A	nalysis/Design			
Shear Bending(+)	fv = fb = 1	.332 Fb' = 2	796	psi psi	fv/Fv' = 0. fb/Fb' = 0.	48		
Live Defl'r Total Defl'r	0.18 = 0.29 =		L/360 L/240		0. 0.			
Additional D								
Fv' 290	0 1.00 -		cv -	1	frt Ci Cn .00 - 1.0	02		
Fb'+ 2900 Fcp' 750)	1.00 -	1.00	1	.00	2		
Eminy' 1.04) million - 4 million -	1.00	-		.00	2 2		
CRITICAL LOAD G Shear : J	LC #2 = D+L,	V max = 2077,	V des	ign = 1795 lb	s			
Deflection: I	LC #2 = D+L	M = 5844 lbs-f (live)	t					
D=dead L=live		nd I=impact Lr=ro	of li	ve Lc=concentra	ted E=earthqua	ke		
Load combinat	cions: ASCE 7	ne Analysis output 7-10 / IBC 2015						
CALCULATIONS: Deflection:	EI = 500e	e06 lb-in2		d loodo (lirro -	wind show)			
Total Deflect	tion = 1.50(D)	ection from all no Dead Load Deflecti 1 = 11.06' Le = 2	on) +	Live Load Defl	ection.			
				2010				
Design Note 1. WoodWorks an	alysis and desigr	n are in accordance with	the IC	C International Build	ling Code (IBC 201	5), the N	ational Design Specification (NDS 2015), and NDS Design Supplement.	
3. SCL-BEAMS (S	tructural Compo	flection limits are appro site Lumber): the attach	ed SC	L selection is for pre	liminary design onl	y. For fina	al member design contact your local SCL manufacturer.	
 Size factors var FIRE RATING: 	y from one manu LVL, PSL and LS	ufacturer to another for SL are not rated for fire	SCL m endura	atenais. They can be ince.	e changed in the da	napase e	лют.	

BM:12	2		
	P=510164 66916	@ 12.5)	ni 1. 1. Anna ann an Anna an
P			· · · · · · · · · · · · · · · · · · ·
	Numer 7 1090 10 19 %		i Linna a scart and a scart a
	Minn = 2750 16 ft (9%)	
, <u>p</u> 5 , <u>p</u> 5 ,	Per modernorta 31/2	V. 16" 2.0E	<u>1954</u>
(217+112)16 (553+557)11) is adjust from the second	ger Jannersport,	n - Antonio Alexandra (1994) A - Antonio Alexandra (1994)
PINAID			
<u>RIMI3</u>			
	W= 170 + 180 + 75 =	4215 mit	· · · · · · · · · · · · · · · · · · ·
	Per Rost Bern Spr. Table, 3	12 x 71/4 LS	2
3)	is adequate.		
$\uparrow \qquad \uparrow \qquad \qquad \uparrow$		-	
(600+720+300) (620 (720 1305	• • • • • • • • • • • • • • • • • • •	, , , , , , , , , , , , , , , , , , ,	
······································		r 19. 1993 y propagalanga samanaga angka sabah saban danamani sabad Mi	27 . Level and a second se
		ti na na n	a maria ana ara ara
BMIG	$W = \left(\frac{(0.5)}{2}\right) (15 \text{ psf} + (0.2) p$	s s	1
v	W= (2 1/15 pst + 62 pst +	[20 ps1]	1
	Name - March (2, 2)	nga - namak dang planak kalanda di 1 156 dang 11 dang 11 dang 18 199 199 199 1 d	,
- X	Vmay = 1795 16 (26%) Mmay = 9876 15 17 (75%)	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	· · · · · · · · · · · · · · · · · · ·
<u> </u>	101000 (016151) (10%)	
	Per woodwort-s, 5/2×18	20F-1.5E C-	stulo in
(877 + 2586 + 1078) 145	Western Breeter is ada		
P 6 5		and an	
BM15	D 1	·····	
	(555+1230+731)11 Q 1 1 B	\	
	- (72 X 15+ 60+ 25) psf		
	ax = 339316(47%)		
manufacture and an and a second se	nai = 9778511577(27%)		
(793+2100+996) (793-21(20+995)		lev .	Date
Description Gin	wity Design	By MBB Checked	Date 3/1/(B)
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250 4th Ave. South Suite 200 Project Duda		Job No.	-
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WoodWorks [®]	Mar. 1, 2018 16:45 BM12
	Calculation Sheet
	ks Sizer 11.1
Loads: Load Type Distribution Pat- Location (ft) Magnitude Unit	
tern Start End Start End Pd Dead Point 12.54 510 Ibs Ps Snow Point 12.54 669 Ibs Self-weight Dead Full UDL 17.5 plf	
Maximum Reactions (Ibs), Bearing Capacities (Ibs) and Bearing Lengths (in) :	
k	15.083'
	ی 15.042'
Unfactored: Dead 217	556
Dead 217 Snow 112 Factored:	557
Total 329 Bearing:	1113
Capacity Beam 1313 Support 1211	1313 1211
Des ratio Beam 0.25	0.85
Support 0.27 Load comb #2 Length 0.50* Kin req'd 0.50* Cb 1.00 Cb min 1.00 Cb support 1.11	#2 0.50* 0.50* 1.00 1.100 1.11 625
Fcp_sup625] *Minimum bearing length setting used: 1/2" for end supports	
PSL, PSL, 2 Supports: All - Timber Total length: 15.06°; Clear Lateral support: top= at su	M12 .0E, 3-1/2"x16" -soft Beam, D.Fir-L No.2 span: 15°; volume = 5.9 cu.ft. upports, bottom= at supports;
Analysis vs. Allowable Stress and Deflection using NDS 2015 : Criterion Analysis Value Design Value Unit Analysis/Design	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	
Additional Data: FACTORS: F/E(psi)CD CM Ct CL CV Cfu Cr Cfrt Ci Cn LC# Fv' 290 1.15 - 1.00 1.00 - 1.00 2 Eb'+ 2900 1.15 - 1.00 0.734 1.00 - 1.00 1.00 2 Ecp' 750 1.00 1.00 2 Ergy' 2.0 million - 1.00 1.00 2 Eminy' 1.04 million - 1.00 1.00 2 Eminy' 1.04 million - 1.00 1.00 2 Eminy' 1.04 million - 1.00 1.00 2 CRITICAL LOAD COMBUNATIONS: Shear : LC #2 = D+5, V max = 1090, V design = 1090 lbs Bending(+): LC #2 = D+5, N max = 1090, V design = 1090 lbs Bending(+): LC #2 = D+5 (live) LC #2 = D+5 (live) Eded L=live S=snow W=wind I=impact L==roof live Lc=concentrated E=earthquake All LC's are listed in the Analysis output Load combinations: ASCE 7-10 / IBC 2015 CALCULATIONS: Deflection = Deflection from all non-dead loads (live, wind, snow) Total Deflection = 1.50(Dead Load Deflection) + Live Load Deflection. Lateral stability(+): Lu = 15.06' Le = 28.50' RB = 21.1	
Design Notes: 1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2015), the Natio 2. Please verify that the default deflection limits are appropriate for your application. 3. SCL-BEAMS (Structural Composite Lumber): the attached SCL selection is for preliminary design only. For final n 4. Size factors vary from one manufacturer to another for SCL materials. They can be changed in the database edite	nember design contact your local SCL manufacturer.

5. FIRE RATING: LVL, PSL and LSL are not rated for fire endurance.

		© () 	COMPANY	٨	PROJECT	ECT	
Ð	AVOUL VULKS						
			May 4, 2	May 4, 2018 10:31	BM14-B	ņ	
a.	Desi	Design Check Calculation Sheet WoodWorks Sizer 11.1	Sizer 11	on Sheet			
Loads:							
Load	Type	Distribution	Pat- tern	Location Start	[ft] End	Magnitude Start End	Unit
D N						15.00(3.25') 25.00(3.25')	bsf psf
Load4 Self-weight	Live Dead	Full Area Full UDL				60.00(3.25°) 17.6	pst plf
Maximum Rea	Maximum Reactions (Ibs), Bearing Capacities (Ibs) and Bearing Lengths (in) :	g Capacities	s (Ibs) a	nd Bearir	ng Len	igths (in) :	
			26.523'	3,			+
	0,∞⊠						8 26.262
Unfactored: Dead Live Snow	877 2586 1078						877 2586 1078
ractored: Total	3625						3625
Capacity Beam Support	3625 7232						3625 7232
Des ratio Beam Support	1.00						1.00
Length Min rea'd	3.14 3.14 3.14						3.14 8.14 1.4
	1.00						1.00
Ecp sup	1.U/ 625						1.0/ 625
	Glulam-Bal., 12 l	BM14 Glulam-Bal., West Species, 20F-1.5E WS, 5-1/8"x18" 12 laminations. 5-1/8" maximum width.	114 5, 20F-1. 8" maxim	5E WS, 5- turn width,	1/8"×18		
	Supports: Al - Imber-soft Beam, D.F.r.L. No.2 Total length: 26.52', Clear span: 26'; volume = 17.0 cu.ft. Service: wet; Lateral support: top= at supports, bottom= at supports.	Supports: All - Imber-soft Beam, D.Fri-L No.2 Total length: 26.52'; Clear span: 26'; volume = 17.0 cu.ft. ce: wet; Lateral support: top= at supports, bottom= at supp	soft bean an: 26'; \ at suppo	n, D.Fir-L No /olume = 17 orts, bottom=		, ports;	
Analysis vs. /	Allowable Stress and Deflection using NDS 2015	d Deflection	using N	DS 2015 :			
Criterion	Analysis Value fv = 49	Design Fv' =	Value 171	Unit psi	An	Analysis/Design fv/Fv' = 0.2	6
Bending(+) Live Defl'n	fb = 0.71 =	ED'= 0.88 =	1301 L/360	isd in			
[Total Defl'	-	۱H	L/240	lin	_	0.8	6

	WoodWorks® Sizer	Vorks	® Size	5	ŭ	SOFTWARE FOR WOOD DESIGN	RE FO	R WOO		SIGN	
BM14-B			Ŵ	WoodWorks® Sizer 11.1	s® Sizer	11.1					Page 2
Additional Data:	il Data:										
FACTORS:	F/E(psi)CD	Ð	ť	IJ	S	Cfu	ч	Cfrt	Notes	Cfrt Notes Cn*Cvr LC#	LC#
Ev'	195 1.00		1.00	1	ı	1	•	1.00	1.00	1.00	0
Fb'+	2000 1.00	0.80	1.00	0.813	0.939 1.00	1.00	1.00	1.00	1.00	1.00 -	~
Fcp'	425 -	0.53	1.00	1	1	1	1	1.00	ł	ı	I
, E	1.5 million		1.00	ī	ī	ł	ı	1.00	ı	1	ო
Eminy'	0.63 million		1.00	ī	ł	1	1	1.00	ı	ı	m
Only the CRITICAL L	Only the lesser of CL and CV is applied, CRITICAL LOAD COMBINATIONS:	and CV IONS:	is app.	lied, a	as per NDS 5.3.6	DS 5.3	.6				
Shear	: LC #2 =	= D+L. V max = 3431. V design	= xem	3431.	V desi	≡ B	3005	lbs			
Bendina(D+L, M	= 2252	29 lbs-	ft						
Deflecti		= D+.75(L+S)	+S) (S+	(live)							
		= D+.75(L+S)		(total)							
D=dead L	D=dead L=live S=snow W=wind I=impact Lr=roof live Lc=concentrated E=earthquake	W=wind	I=ímpa(ot Lr=r	oof liv	e Lc=c	oncent	rated	E-eart	chquake	
All LC's	All LC's are listed in the Analysis output	n the A	nalysis	s outpu	ų						
Load com	Load combinations: ASCE 7-10 / IBC 2015	CE 7-10	/ IBC	2015							
CALCULATIONS:	IONS:										
Deflecti	Deflection: EI = 3	3736e06 lb-in2	1b-in2								
"Live" d	"Live" deflection = Deflection from all non-dead loads (live, wind, snow)	eflecti	on fro	n all n	on-deac	loads	(live	, wind	I, snow	<i>()</i>	
Total De	Total Deflection = 2.00(Dead Load Deflection) + Live Load Deflection.	00 (Dead	Load I	Deflect.	ion) +	Live L	oad De	flecti	.no.		
Lateral	Lateral stability(+): Lu = 26.25' Le = 48.31'	Lu =	26.25'	Le =	48.31'	RB = 19.9	19.9				
Design Notes:	otes:										
1. WoodWo	1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2015), the Misional Design Society (IBC 2015), and NIDS Design Society Society (IBC 2015).	lesign are	in accol	rdance wi	ith the IC	C Internation	ational E	suilding	Code (II	BC 2015	, the
2 Diozeo ve	Mational Design Openingtion (MDO 2013), and MDO Design Supplement. O Disses verify that the default defection limite are anonopeide for vour analization.		i u, anu		orgin oup,		oplication	ç			
2. Ghilam de	2. Flease vering lists are for materials conforming or experiment or your approximation.	or materis		mind to	ANSI 117	-2015 a	philodulu	u. Ifacture	d in acc	ordance	with
	coldii valueo are i			S Ruun		3 2 2 2 4		ומרוייים			1111

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National Design Specification (NDS 2015), and NDS Design Supplement.
2. Please verify that the default deflection limits are appropriate for your application
3. Glulam design values are for materials conforming to ANSI 117-2015 and manuf
ANSI A190.1-2012

A. C. M. S. M. S.



COMPANY PROJECT

1. 2018 16:46 BM1

Mar. 1, 2018 16:46 BM15 **Design Check Calculation Sheet** WoodWorks Sizer 11.1 Loads: Location [ft] Start End Load Distribution Unit Magnitude Туре Pat
 Start
 End

 15.00(2.50')
 60.00(2.50')

 25.00(2.50')
 25.00(2.50')
 teri psf Full Area di 11 9d Pd2 P11 P12 Ps1 Ps2 Selfpsf psf lbs lbs lbs lbs Live Snow Full Area Full Area Dead Dead Live Live 555 555 1250 Point Point Point 1.00 8.00 1.00 8.00 Point Point 1250 Snow Live 1.00 8.00 781 lbs Point 781 lbs Full UDI weigh Maximum Reactions (Ibs), Bearing Capacities (Ibs) and Bearing Lengths (in) : 9.361 9.181 Å Unfactored: Dead Live Snow Factored: Total Bearing: Capacity Beam Support Des ratio Beam 79 750 2108 2577 370 3121 3328 3328 5418 3121 5082 1.00 0.61 #2 2.24 2.24 1.00 1.00 1.11 1.00 0.61 Beam Support Load comb #3 #3 2.10 2.10 1.00 1.00 Length Min req'd Cb Cb min Cb suppor Fcp sup 1.11 625 625 **BM15** Glulam-Bal., West Species, 20F-1.5E WS, 3-1/2" x13-1/2" 9 laminations, 3-1/2" maximum width, Supports: All - Timber-soft Beam, D. Fir-L No.2 Total length: 9.36'; Clear span: 9'; volume = 3.1 cu.ft. Lateral support: top= at supports, bottom= at supports; Analysis vs. Allowable Stress and Deflection using NDS 2015 :
 Analysis Value
 Design Value

 fv = 97
 Fv' = 195

 fb = 521
 Fb' = 1862

 0.05 = <L/999</td>
 0.31 = L/360
 Unit Analysis/Design fv/Fv' = 0. fb/Fb' = 0. Criterion Shear 0.50 0.28 0.17 fv = 97fb = 521 0.05 = <L/999 0.08 = <L/999 psi psi in Bending(+) Live Defl'n Total Defl'n 0.46 L/240 in 0.17 Additional Data:
 Additional Data:

 FACTORS:
 F/E(psi)CD
 CM
 Ct
 CL
 CV
 Cfu
 Cr
 Cfr
 Notes Cn*Cvr

 Fv'
 195
 1.00
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 1.00
 1.00
 1.00

 Fb'
 2000
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 -</td Cfrt Notes Cn*Cvr LC# 2 22 Load combinations: ASCE 7-10 / IBC 2015 CALCULATIONS: Deflection: EI = 1076e06 lb-in2 "Live" deflection = Deflection from all non-dead loads (live, wind, s) Total Deflection = 1.50(Dead Load Deflection) + Live Load Deflection. Lateral stability(+): Lu = 9.19' Le = 18.31' RB = 15.6 wind, snow ...) Society in 100003
 Additional design are in accordance with the ICC International Building Code (IBC 2015), the National Design Specification (NDS 2015), and NDS Design Supplement.
 Z. Please verify that the default deflection limits are appropriate for your application.
 Gulam design values are for materials conforming to ANSI 117-2015 and manufactured in accordance with ANSI A190.1-2012
 GLULAM: bad = actual breadth x actual depth.
 Gulam Beams shall be laterally supported according to the provisions of NDS Clause 3.3.3.
 GLULAM: bearing length based on smaller of Fcp(tension), Fcp(comp'n). Design Notes:

BMIG tuse worst case	W= 338 pIF + 1070p11		
	Vmax = 5681 16 (33%)		
Ă Ă	Mmax = 10937 16, A (32"	/6)	
7.5'	Per moodworks, 31/2 x		5-
\uparrow \uparrow	15 adequate		
$(1455 + 4013)_{1b}$ $(1455 + 4013)_{1b}$			ionnetiationaincheanna f
			· · · · · · · · · · · · · · · · · · ·
BMM	D		
	P1= 1277 16 + 2590 16	@ 4'-9	" (4,75')
Pi P2		
	P2 = 23191,+ 361116 @	હે	
		· · · · · · · · · · · · · · · · · · ·	
	Vmax = 4367 16 (35%)		
	Mmax = 2223 3 16. ft (69%)	Σ	
(1957+ 1908+1727)15 (1838+1052 + 1834)			
	Per woodworks, 31/2×162.0	DE PSLIS	adequate
RN 410			
BMIB	W = 810 pf + 720 plf +	150 .F	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	W- OLU PILI ILU PILI F	Тари	
	P1 = 1755 16 + 1350 16 + 25		22)
Ž Ž	(BM21)		
12	$P_2 = B10 + 675 + 10$	250 IL R.	1,83)
\uparrow \uparrow			
B128 0 6105 D	P3 = 810 16 + 675 16 +	1080 16 Q	F .83)
8359 L 5496L			
5071 S 3972 S	P4 = 217 16 + 112 16 @	- <u>`</u> `	
	(BMIZ)		
			••••••••••••••••••••••••••••••••••••••
Provide the second s	er moodworks, 51/4 × 16"	2 OE PSL	
	is adequate		
		Тры	Data
Bescription Grav	ity Design	By MBB Checked	Date 3/5/18
ENGINEERING		Scale	Sheet No.
250 4th Ave. South Suite 200 Preject		Job No.	
Edmonds, WA 98020 425.778.8500	Residence	15227.10	1-25
www.cgengineering.com			

		Т	Γ
Servivat FOR WOOD DELIGY Design Check Calculation Sheet WoodWate Steer 11.8 Loads:		COMPANY	PROJECT
WoodWinks Bizer 11.1 Loads: Loads: Loads: Loads: Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) : Table in the interview inte		Mar. 1, 2018 16:48	BM16
Lods: The set of the			et
Image: Section of the sectio	Loads:		
Imate counts Init upt IT.3 Ipt Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) : 7.001 Imate counts 7.001 Imate counts 1.00 Imate counts 1.	tern Start End d Dead Full UDL 388.0 plf		
7.001 Vinfactoredi 1000<			·
Indicate bred: 100 Indidre	Maximum Reactions (Ibs), Bearing Capacities (Ibs) and Bearing Lengths (in) :		
Unfactored: 1600 Dead 1600 Pactored: 1227 Pactored: 5227 Bearing: 6316 Bearing: 6316 Bearing: 6316 Bearing: 6316 Bearing: 6316 Bearing: 6316 Descritus: 6316 Bearing: 6316 Descritus: 6316 Bearing: 6316 Stateored: 100 Cob and 02.2 1.00 Cob and 02.2 1.00 Cob and 1.00 1.01 PSL, PSL, 20.6, 3-1/2*x16" 2.41+ Support: All - Tindereon State Deal Cob 2.41+ Lateringith	k	7.901'	
$\frac{\left \begin{array}{c} \text{Unfactored} \\ \text{Dead} \\ \text{Total} \\ \text{Total} \\ \text{Total} \\ \text{Searing} \\ \text{Capacity} \\ \text{Bearing} \\ \text{Capacity} \\ Capacit$			
Unfactored: 1600 Dead 1600 Pactored: 1227 Pactored: 5227 Bearing: 6316 Bearing: 6316 Bearing: 6316 Bearing: 6316 Bearing: 6316 Bearing: 6316 Descritus: 6316 Bearing: 6316 Descritus: 6316 Bearing: 6316 Stateored: 100 Cob and 02.2 1.00 Cob and 02.2 1.00 Cob and 1.00 1.01 PSL, PSL, 20.6, 3-1/2*x16" 2.41+ Support: All - Tindereon State Deal Cob 2.41+ Lateringith			
Unfactored: 1600 Dead 1600 Pactored: 1227 Pactored: 5227 Bearing: 6316 Bearing: 6316 Bearing: 6316 Bearing: 6316 Bearing: 6316 Bearing: 6316 Descritus: 6316 Bearing: 6316 Descritus: 6316 Bearing: 6316 Stateored: 100 Cob and 02.2 1.00 Cob and 02.2 1.00 Cob and 1.00 1.01 PSL, PSL, 20.6, 3-1/2*x16" 2.41+ Support: All - Tindereon State Deal Cob 2.41+ Lateringith			
Unfactored: 1600 Dead 1600 Pactored: 1227 Pactored: 5227 Bearing: 6316 Bearing: 6316 Bearing: 6316 Bearing: 6316 Bearing: 6316 Bearing: 6316 Descritus: 6316 Bearing: 6316 Descritus: 6316 Bearing: 6316 Stateored: 100 Cob and 02.2 1.00 Cob and 02.2 1.00 Cob and 1.00 1.01 PSL, PSL, 20.6, 3-1/2*x16" 2.41+ Support: All - Tindereon State Deal Cob 2.41+ Lateringith			
Unfactored: 1600 Dead 1600 Pactored: 1227 Pactored: 5227 Bearing: 6316 Bearing: 6316 Bearing: 6316 Bearing: 6316 Bearing: 6316 Bearing: 6316 Descritus: 6316 Bearing: 6316 Descritus: 6316 Bearing: 6316 Stateored: 100 Cob and 02.2 1.00 Cob and 02.2 1.00 Cob and 1.00 1.01 PSL, PSL, 20.6, 3-1/2*x16" 2.41+ Support: All - Tindereon State Deal Cob 2.41+ Lateringith	*		X
bead Live 1600 4227 Factored: 5827 Total 5827 Bearing: 6316 5827 Bean 0.92 Support Support 0.92 Load comb Support 2.41 Loo Cb min 1.00 Load comb Fer sup 625 **Minimum bearing length governed by the required width of the supporting member. *** Support: All - Timber-soft Bean, DFicL No.2 Total length: 7.9'Clear spar. 7.5' volume = 3.1 cu.t. Lateral support: botom: at supports; Analysis vs. Allowable Stress and Deflection using NDS 2016 : Ctitorion Analysis vs. Allowable Stress and Deflection using NDS 2016 : Live bot1'n 0.04 ect//s99 0.33 = L/240 Phazi Cole Log Spin 0.14 <td></td> <td></td> <td>7.701'</td>			7.701'
Total 5827 Bearlisy 5316 Support 5326 Support 0.32 Support 0.32 Support 2.41+ Load comb 82 Length 2.41+ Cb 1.00 Cb at not 2.41+ Cb 1.00 Cb at not 1.00 Cb at not <td>Dead 1600 Live 4227</td> <td></td> <td></td>	Dead 1600 Live 4227		
Beam 6316 5827 Support 1.00 0.92 Support 1.00 1.00 Load camb 2.1 2.1 Light 2.41 2.41 Light 2.41 2.41 Cb min 1.00 1.00 Cb win 523 2.41 **Minimum bearing length governed by the required width of the supporting member. 1.00 Supports 1.01 2.5 **Minimum bearing length governed by the required width of the supporting member. 525 Supports 1.01 2.5 Supports 1.02 2.5 Total length: 7.9°; Clerer spar. 7.5°; Youtome 3.1 cuft. 2.41 Live berl: n 0.04 = CL/93 0.26 = L/93 D.26 = L/93 D.26 = L/93<	Total 5827 Bearing:		5827
Bean 0.92 1.00 0.92 Support 1.01 1.00 1.02 Length 2.41 2.41 Min req'd 2.41** 2.41 Cb 1.00 1.00 Cb min 1.00 1.00 Cb min 1.00 1.01 Cb min 1.00 1.01 Cb support 625 1.00 **Minimum bearing length governed by the required width of the supporting member. 1.00 BM16 PSL, PSL, 2.0E, 3-1/2"x16" 1.00 Supports: All - Timber-soft Beam, D.Fir-L No.2 Total length: 7.9'; Clear span, 7.5'; volume = 3.1 cu.ft. Lateral support: top= at supports; bottom= at supports; Lateral support: top= at supports; Analysis vs. Allowable Stress and Deflection using NDS 2016 : Image: Stress and Deflection using NDS 2016 : Criterion Analysis value Design Shear fb = 975 psi I we beil 'n 0.04 = cL/999 0.25 = L/250 I we beil 'n 0.04 = cL/999 0.39 = L/240 Total befl'n 0.04 = cL/999 0.39 = L/240 Total befl 'n 0.04 = cL/999 0.39 =	Beam 6316 Support 5827		
Length Min req'd Cb min Cb min Fop sup **Minimum bearing length governed by the required width of the supporting member. 2.41 1.00 1.00 1.11 2.41** 2.41 1.00 1.00 1.11 625 **Minimum bearing length governed by the required width of the supporting member. 8M16 PSL, PSL, 2.0E, 3.1/2"x16" Supports: All - Timber-soft Beam, D.Fir-L No.2 Total length: 7.9'; Clear spar: 7.5'; volume = 3.1 cu.ft. Lateral supports; boltom= at supports; Analysis vs. Allowable Stress and Deflection using NDS 2015 : Criterion Shear Bending(+) Total Defl'n Design Value Value Unit Min fb/Fb' = 0.32 in fb/Fb' = 0.32 in fb/	Beam 0.92 Support 1.00		1.00
Ch min Cb support Prop sup **Minimum bearing length governed by the required width of the supporting member. 1.00 1.01 623 **Minimum bearing length governed by the required width of the supporting member. BM16 PSL, PSL, 2.0E, 3-1/2"x16" Supports: All - Timber-soft Beam, D.Fir-L No.2 Total length: 7.9'; Clear span: 7.5'; Volume = 3.1 cu.ft. Lateral supports: top= at supports; bottom= at supports; It is possible Stress and Deflection using NDS 2016 : Analysis vs. Allowable Stress and Deflection using NDS 2016 : Criterion Analysis Value Design Value Stress fb/Fb ⁺ = 0.32 It is post. Stress of the support in the support is th	Length 2.41 Min reg'd 2.41**		2.41** 1.00
BM16 PSL, PSL, 2.0E, 3-1/2"x16" Supports: All - Timber-soft Beam, D.Fir-L No.2 Total length: 7.9; Clear span: 7.5; volume = 3.1 cu.ft. Lateral supports: top= at supports, bottom= at supports; Analysis vs. Allowable Stress and Deflection using NDS 2015 :	Cb min 1.00 Cb support 1.11		1.11
PSL, PSL, 2.0E, 3-1/2"x16" Supports: All - Timber-soft Beam, D.Fir-L No.2 Total length: 7.9; Clear span: 7.5; volume = 3.1 ou.ft. Lateral supports: top= at supports, bottom= at supports; Analysis vs. Allowable Stress and Deflection using NDS 2015 : Criterion Analysis Value Design Value Of the stress and Deflection using NDS 2015 : Criterion Analysis Value Design Value Unit Analysis/Design Shear fv = 96 Fv' = 290 psi fv/Fv' = 0.32 Bending(+) fb = 879 Fb' = 2735 psi fb/Fb' = 0.32 Live Defl'n 0.04 = <l 999<="" td=""> 0.26 = L/240 in 0.14 Additional Data: F/ACTORS: F/E(psi)CD CM Ct CL CV Cfu Cfrt Ci Cn LC#</l>	**Minimum bearing length governed by the required width of the supporting member.		
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	PSL, PSL, 2 Supports: All - Timbe Total length: 7:9; Ctear -	2.0E, 3-1/2"x16" r-soft Beam, D.Fir-L No span: 7.5'; volume = 3.	1 cu.ft.
Shear fv = 96 Fv' = 290 psi fv/Fv' = 0.33 Bending(+) fb = 879 Fb' = 2735 psi fb/Fb' = 0.32 Live Defl'n 0.04 = cL/999 0.26 = L/360 in 0.14 Total Defl'n 0.06 = cL/999 0.39 = L/240 in 0.14 Additional Data: F/ACTORS: F/E(psi)CD CM Ct CL CV Cfrt Ci Cn LC#			
Total Defl'n 0.06 = <l 999<="" th=""> 0.39 = L/240 in 0.14 Additional Data: F/E(psi)CD CM Ct CL CV Cfrt Ci Cn LC#</l>	Shear $fv = 96$ $Fv' = 290$ psi $fv/Fv' = 0.33$ Bending(+) fb = 879 Fb' = 2735 psi $fb/Fb' = 0.32$		
FACTORS: F/E(psi)CD CM Ct CL CV Cfu Cr Cfrt Ci Cn LC#			
Fv' 290 1.00 - 1.00 1.00 - 1.00 2	FACTORS: F/E(psi)CD CM Ct CL CV Cfu Cr Cfrt Ci Cn LC#		
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Eb'+ 2900 1.00 - 1.00 0.943 1.00 - 1.00 1.00 - - 2 Fcp' 750 - - 1.00 - - - 1.00 - - - - - 2		
Eminy' 1.04 million - 1.00 1.00 2 CRITICAL LOAD COMBINATIONS:	Eminy' 1.04 million - 1.00 1.00 2 CRITICAL LOAD COMBINATIONS:		
Bending(+): LC #2 = D+L, M = 10937 lbs-ft Deflection: LC #2 = D+L (live)	Bending(+): LC #2 = D+L, M = 10937 lbs-ft Deflection: LC #2 = D+L (live)		
LC #2 = D+L (total) D=dead L=live S=snow W=wind I=impact Lr=roof live Lc=concentrated E=earthquake All LC's are listed in the Analysis output Load combinations: ASCE 7-10 / IBC 2015	D=dead L=live S=snow W=wind I=impact Lr=roof live Lc=concentrated E=earthquake All LC's are listed in the Analysis output		
CALCULATIONS: Deflection: EI = 2389e06 lb-in2	CALCULATIONS: Deflection: EI = 2389e06 lb-in2		
"Live" deflection = Deflection from all non-dead loads (live, wind, snow…) Total Deflection = 1.50(Dead Load Deflection) + Live Load Deflection. Lateral stability(+): Lu = 7.69' Le = 15.88' RB = 15.8	Total Deflection = 1.50(Dead Load Deflection) + Live Load Deflection.		
Design Notes: 1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2015), the National Design Specification (NDS 2015), and NDS Design Supplement.	1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2015), the Natio	onal Design Specificati	on (NDS 2015), and NDS Design Supplement.
1. Transarrona analysis and design are in accordance minime too international balance too zoro), the reaconal besign operination (red zoro), and too besign opprenent.	 Please verify that the default deflection limits are appropriate for your application. SCL-BEAMS (Structural Composite Lumber): the attached SCL selection is for preliminary design only. For final r 		



COMPANY PROJECT

Mar. 1. 2018 16:48 BM17

4				SOFTWARE FOR V	YOOD DESIGN		Mai. 1, 2010 10.40			
					Design	Check	Calculation She	eet		
Loads:										
Load	Туре	Distributio	h Pat- tern	Location [ft] Start End	Magnitude Start End	Unit				
Pd1 P11	Dead Live	Point Point	1021	4.90 4.90	1277 2540	lbs lbs				
Pd2 Ps2	Dead Snow	Point Point		6.15 6.15	2314 3611	lbs lbs				
Self-weight	Dead	Full UDL			17.5	plf				
Maximum R	eactions (lb	s), Bearing Cap	acitie	es (lbs) and Be	aring Length	s (in) :				
	ł						11.789'			
	X									X
	× v									11.645
Unfactored: Dead	1957									1836
Live Snow	1488									1052
Factored: Total	4367									4041
Bearing: Capacity									•	
Beam Support	4734 4367									4379
Des ratio Beam	0.92						~			0.92
Support Load comb	1.00 #3									1.00 #3 1.67
Length Min req'd Cb	1.80 1.80** 1.00									1.67**
Cb min Cb support	1.00									1.00
Fcp sup	625	ed by the required wid	th of the	supporting member						625
		· · ·								
					Supports: . Total length: 11	L, PSL, 2 All - Timbe .79'; Clear	3M17 2.0E, 3-1/2"x16" er-soft Beam, D.Fir-L No span: 11.5"; volume = 4 supports, bottom= at sup	4.6 cu.ft.		
Analysis vs.	Allowable S	Stress and Defle	ection	using NDS 2015 :			·			
Criterion Shear	Analysis fv =	116 Fv' =	334	Unit Ar psi	alysis/Design fv/Fv' = 0.3	5				
Bending(+) Live Defl'ı	fb = 1 0.11 = <	787 Fb' = 2 L/999 0.39 =	2772 L/360	psi in	fb/Fb' = 0.6 0.2	8				
Total Defl'ı	n 0.24 =	L/586 0.58 =	L/240	in	0.4	1				
Additional D FACTORS: F/1	a ta: E(psi)CD C	M Ct CL	cv	Cfu Cr Cf	irt Ci Cn	LC#				
Fv' 290 Fb'+ 2900	0 1.15 -	1.00 - 1.00 0.831	 1.00	1.	00 - 1.00					
	0 ~ - 0 million -	1.00 -	-	1.	00 00	3				
CRITICAL LOAD		:	-		00	3				
Bending(+): 1	LC #3 = D+.7	5(L+S), V max = 5(L+S), M = 2223			343 lbs					
1	LC #3 = D+.7	5(L+S) (live) 5(L+S) (total) nd I=impact Lr=rc	of 11		ed Freethousk	•				
All LC's are	listed in th	e Analysis output -10 / IBC 2015	:	No concerctat		-				
CALCULATIONS:										
"Live" defle	ction = Defle	ction from all no ead Load Deflecti	on-dead	d loads (live, w Live Load Defle	vind, snow)					
Lateral stab	ility(+): Lu	= 11.63' Le = 2	3.00'	RB = 19.0						
Design Note	S:		h 4h - 1m	C Internetional D. 11	an Code (100 001)	the No.	anal Dagian Cooplignet	ion (NDS 2015) and NDS Design Survey	mont	
2. Please verify th	at the default def	lection limits are appro	priate f	or your application.				ion (NDS 2015), and NDS Design Supple t your local SCL manufacturer.		

SUC-BEAMS (SURGURA) Composite Lumber): the attached SCL selection is for preliminary design only. For final menergy of the selection one manufacturer to another for SCL materials. They can be changed in the database editor.
 FIRE RATING: LVL, PSL and LSL are not rated for fire endurance.



COMPANY PROJECT

Mar. 6, 2018 13:34 BM18

, V	Y				FOR WOOD						
						Design Check	Calculation Sh	neet		 	
Loads:						AA00dAAC	rxs Sizer 11.1				
Load d1 d2 d3 d4	Type Dead Dead Dead Dead	Distribution Full UDL Point Point Point	tern Start 1.76 2.26 5.26	810.0 1755 810 810	plf lbs lbs lbs						
d1 d3 d4 d5 11 12 13 14 s2 s3 s4 s5	Dead Live Live Live Snow Snow	Point Full UDL Point Point Full UDL Point	7.43 1.76 2.26 5.26 1.76	217 720.0 2520 1080 1080 450.0 1350	lbs plf lbs lbs lbs plf lbs						
s3 s4 s5	Snow Snow Snow	Point Point Point	2.26 5.26 7.43	675 675 112	lbs lbs lbs						
Self-veight	eactions (lbs)	Bearing C	apacities (lb	s) and Bearin	g Lengths	i s (in) :				 	 i
	· · · · · · · · · · · · · · · · · · ·	,					12.735'			 	
	\searrow									 	 12.366'
Unfactored:										 	
Dead Live Snow	8126 8354 5071										6105 5496 3472
Bearing:	18196								i		 12831
Capacity Beam	20380 18196										14371 12031
Des ratio Bean	0.89										0.89
Load comb Length	#3 5.18 .18**										#3 3.65 3.65**
Cb Cb nin	1.00										1.00
Cb support Fcp sup **Minimum bearing	1.07 625 length governed by th	ne required width o	the supporting men	ber.						 .,	 625
							M18 .0E, 5-1/4"x16"				
						Supports: All - Timbe Total length: 12.74'; Clea Lateral support: lop= at s	r-soft Beam, D.Fir-L No r span: 12'; volume = 7.	.4 cu.ft.		 	
Criterion Shear Bending(+) Live Defl'n Total Defl'n *The effect of	Allowable St Analysis Val fv* = 245 fb = 2200 0.19 = L/79 0.43 = L/73 f point loads wi luded as per HOS	ue Design FV' = Fb' = 2 0.41 = 0.62 = thin a distan	Value Unit	Analysis/Dea	0.85 0.78 0.45 0.69						
Additional D FACTORS: F/E Fv' 2900 Fcp' 750 E' 2.0	(psi)CD CM 1.00 - 1.00 - - rillion -	1.00 -		1.00 -	Cn LCN 1.00 2 - 2 - 3 - 3						
CRITICAL LOAD C Shear : LO Bending(+): LO Deflection: LO	OMBINATIONS: C #2 = D+L, V r C #2 = D+L, M * C #3 = D+.75(L+ C #3 = D+.75(L+	1.00 - ax = 16151, 41070 lbs-f (live) (live) (total) =irpact Lr=ro	V design* = 13 t	1.00 - 743 lbs entrated E=earth							
Load corbinat:	ions: ASCE 7-10	/ IBC 2015									
Deflection: "Live" deflect Total Deflect: Lateral stabi	EI == 3584e06 1 tion = Deflectio ion = 1.50(Dead lity(+): Lu = 1	b-in2 on from all no Load Deflecti 2.38' Le = 2	n-dead loads (1 on) + Live Load 4.19' RB = 13.	ive, wind, snow. Deflection. 0	.)					 	
Design Note	vsis and design are in	accordance with the	ne ICC International i	Building Code (IBC 20	15), the National	Design Specification (NDS 201	5), and NDS Design St	upplement.	ŧ.		
3. SCL-BEAMS (Str 4. Size factors vary 5. FIRE RATING: L	ructural Composite Lu from one manufacture VL. PSL and LSL are	mber): the attached r to another for SC not rated for fire en	I SCL selection is for L materials. They can durance.	preliminary design only be changed in the da	ly. For final mem labase editor.	ber design contact your local S	CL manufacturer.				

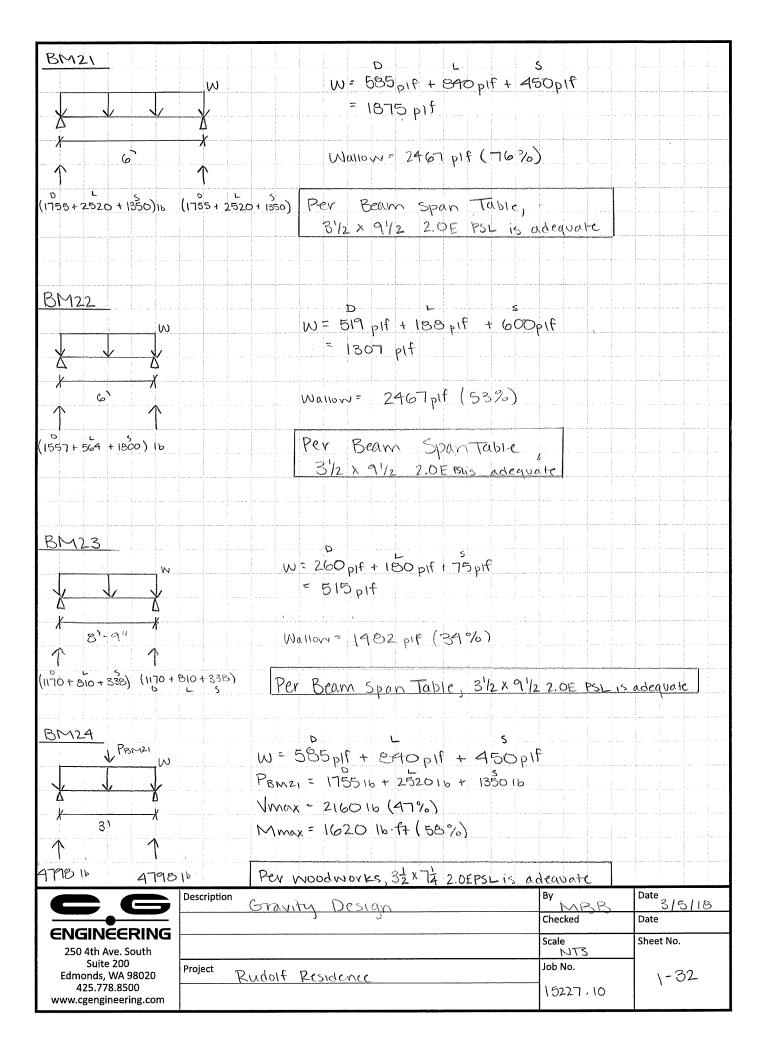
<u>Gownal</u> C Lab W= (55 + 90) plf 1 LL PLTLI D = 2000 IL 7,5 Bu instantion Pt load controls Per modulorks 4×12 DFFZ jorsta Concrete TODDIVG 311 and anesticer 10.5" $W = \left(\frac{15}{2}\right)\left(55\right) + 40 \text{ port} + 20001\text{ bs}$ BMI9 1 11 Per Mood Mories, 51/4 × 117/5" 2.0 11,000161 is adequate Deck FILMED HUMONICO W = (90 + 360) = 430 stN. Vmax = 4263 15 (41 %) (MINNEY = 19519 15-77 (81%) : 3 Der MINDAMOYES, 5/BX 15" 20F-1SE Glulana (use glastia Creater Glulana) 433415 423415 Date 3/5/13 BY MBR Description Gravity Design Checked Date ENGINEERING Scale NTS Sheet No. 250 4th Ave. South Suite 200 Job No. Project Edmonds, WA 98020 Rudolf Residence 1-27 425.778.8500 15227.10 www.cgengineering.com

Ē					
	DOM	Wood Works®			
			May 10, 2018 10:34	BM19 - continuous	
		Design Check Calculation Sheet WoodWorks Sizer 11.1	alculation Sheet Sizer 11.1		
Loads:					
Load	Type	Distribution	Pat- Location tern Start F	[ft] Magnitude End Start End	Unit
Load1 Load2 Load3 Self-weight	Dead Live Líve Dead	Full Area Full Area Point Full UDL	5.50	55.00(7.50') 40.00(7.50') 2000 19.5	psf psf 1bs plf
aximum Re	actions (Maximum Reactions (Ibs), Bearing Capacities (Ibs) and Bearing Lengths (in)	(Ibs) and Bearin	g Lengths (in) :	
	<u> </u>		— 11.242' ———		Ť
	∞.0				11.121'
Unfactored: Dead Live	2427 2708				2427 2664
ractored: Total	5136				5091
Bearing: Capacity Beam Support	5752 5136				5703 5091
Beam Support Load comb	ы				0.89 1.00 #2
Ъд	i				1.45
Cb min Cb support FCD support	1.00				1.00
Minimum bea	rring length	**Minimum bearing length governed by the required width of the supporting member	of the supporting me	mber.	C70
		BM19 PSL, PSL, 2.2E, 5-1/4"x11-7/8" Supports: All - Timber-soft Beam, D.Fir-L No.2 Total length: 11.24; Clear span: 11°; volume = 4.9 cu.ft. Lateral support: top= at supports, bottom= at supports;	BM19 .2E, 5-1/4"x11-7/8" ber-soft Beam, D.Fir-L Nc aar span: 11': volume = 4 supports, bottom= at su	.2 9 cu.ft. ports;	
nalysis vs.	Allowabl	Analysis vs. Allowable Stress and Deflection using NDS 2015	ising NDS 2015 :		
Criterion	Ana	Analysis Value Design V	Value Unit		
Bending(+) Live Defl'n	0.	= 1641 Fb' = 1641 Fb' = -1641 Fb' = -1641 Fb' = -1640 Fb' = -164	2861 psi 1/360 in	$fb/Fb^{+} = 0.56$ $fb/Fb^{+} = 0.57$ 0.34	

WoodWorks® Sizer	8 Size		ō	OFTW	ARE F	SOFTWARE FOR WOOD DESIGN	OD DE	SIGN	
BM19 - continuous	Ň	WoodWorks® Sizer 11.1	® Sizer	11.1					Page 2
Additional Data: PACTORS: P/R(nei)CD CM	t		AL NO	Lf1	Ł	Cfrt	Ë	£	#J'1
290 1.00 -	-			5 	, (1.00	; ;	1.00	
- no - T	1.00		C		р 	1.00			41
2.2 million -	1.00	ı	,	ī	ı	1.00	ı	ı	7
Eminy' 1.14 million - CRITICAL LOAD COMBINATIONS:	1.00	ı	ı	ı	ī	1.00	ı	ı.	7
Shear : $LC #2 = D+L$, V max =	ax =	5092, V design =	' desig	# #	4323	lbs			
<pre>Bending(+): LC #2 = D+L, M = 16869 lbs-ft Deflection: LC #2 = D+L (live)</pre>	- 16865 (ve)	lbs-ft							
	otal)								
D=dead L=live S=snow W=wind I=impact Lr=roof live Lc=concentrated E=earthquake	[=impact	: Lr=roc	f live	LC=CC	ncent	rated]	3=eart	hquake	
All LC's are listed in the Analysis output	alysis or Lill	output	natte	10	ц. С	this s	neus		
Load combinations: ASCE 7-10 / IBC 2015	/ IBC 2	015	1						
CALCULATIONS:									
Deflection: EI = 1612e06 lb-in2	b-in2								
"Live" deflection = Deflection from all non-dead loads (live, wind, snow)	n from	all nor	I-dead	loads	(live)	, wind flacti,	wous ,	5	
Lateral stability(+): Lu = 11.13' Le = 21.13'	1.13	Le = 21		RB = 10.4	0.4				
Design Notes:									
1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2015), the National Design Specification (NDS 2015), and NDS Design Supplement.	in accord [5), and N	ance with IDS Desic	the ICC In Suppl	Interna ement.	tional E	uilding (Code (IE	3C 2015), the
 Please verify that the default deflection limits are appropriate for your application. SCL-BEAMS (Structural Composite Lumber): the attached SCL selection is for preliminary design only. For final 	on limits a umber): 1	re approphe attach	briate for ed SCL	your ap selectio	plication n is for	n. prelimin:	ary desi	ign only.	For final
member design contact your local SCL manufacturer. 4. Size factors vany from one manufacturer to another for SCL materials. They can be changed in the database editor. 5. FIRE RATING: 1.VI PSI and 1SI and reading the fine noningnose	manufact urer to and e not rate	urer. other for S d for fire (SCL mat	erials. T	hey car	ו be cha	nged in	the data	base editor
D. LINE NALING. LVL, FOL AND LOL AND				ų.					

	COMPANY	PROJECT
WoodWorks®	Mar. 5, 2018 16:00	BM20
Design Check C		et
WoodWork	ks Sizer 11.1	
Load Type Distribution Pat- tern Location [ft] Magnitude Unit d Dead Full UDL Start End Start End Plf l Live Full UDL 360.0 plf Self-weight Dead Full UDL 14.6 plf		
Maximum Reactions (Ibs), Bearing Capacities (Ibs) and Bearing Lengths (in) :		
k	18.624'	
		18.312'
Unfactored: Dead 972		972 3352
Live 3352 Factored: Total 4325		4325
Bearing: Capacity Beam 4325		4325
Support 0628 Des ratio		8628
Beam 1.00 Support 0.50 Load comb #2		1.001 0.50 #2
Length 3.75 Nin req'd 3.75		3.75 3.75 1.00
Cb 1.00 Cb min 1.00 Cb support 1.07		1.00
Fcp sup 625		625
Glulam-Bal., West Specie	I/8" maximum width, -soft Beam, D.Fir-L N :pan: 18'; volume = _ S	o.2 .9 cu.ft.
Analysis vs. Allowable Stress and Deflection using NDS 2015 : Criterion Analysis Value Design Value Unit Analysis/Design		
Additional Data: FACTORS: F/E(psi)CD CM Ct CL CV Cfu Cr Cfrt Notes Cn*Cvr LC#		
FV' 195 1.00 0.88 1.00 1.00 1.00 1.00 2 FD'+ 2000 1.00 0.80 1.00 0.942 0.991 1.00 1.00 1.00 1.00 - 2		
Fcp' 425 - 0.53 1.00 - - - 1.00 - - - - 2 E' 1.5 million 0.83 1.00 - - - 1.00 - 2 Eniny' 0.63 million 0.83 1.00 - - 1.00 - 2		
Only the lesser of CL and CV is applied, as per NDS 5.3.6 CRITICAL LOAD COMBINATIONS:		
Shear : LC #2 = D+L, V max = 4254, V design = 3601 lbs Bending(+): LC #2 = D+L, M = 19477 lbs-ft Deflection: LC #2 = D+L (live)		
LC #2 = D+L (total) D=dead L=live S=snow W=wind I=impact Lr=roof live Lc=concentrated E=earthquake		
All LC's are listed in the Analysis output Load combinations: ASCE 7-10 / IBC 2015 CALCULATIONS:		
Deflection: EI = 2162e06 lb-in2 "Live" deflection = Deflection from all non-dead loads (live, wind, snow)		
Total Deflection = 2.00(Dead Load Deflection) + Live Load Deflection. Lateral stability(+): Lu = 18.31' Le = 33.69' RB = 15.2		
Design Notes: 1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2015), the Nation 2. Please verify that the default deflection limits are appropriate for your application. 3. Glular design values are for materials conforming to ANSI 117-2015 and manufactured in accordance with ANSI 4. GLULAM: bxd = actual breadth x actual depth. 5. Glular Bearms shall be laterally supported according to the provisions of NDS Clause 3.3.3.		on (NDS 2015), and NDS Design Supplement.

6. GLULAM: bearing length based on smaller of Fcp(tension), Fcp(comp'n).



WoodWorks	ß
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PROJECT

COMPANY

		W	00		VVC OFTWARE FOI				Mar. 6, 2018 13:31	BM24			
								n Check C	alculation Sh	eet	 	 	
Loads:								WoodWork					
Load	Type Dead	Distributio	on Pat- Loca tern Sta	tion [ft] rt End	Magnitude Start Eng 585.0	Unit i plf]						
1 s Pd	Live Snow Dead	Full UDL Full UDL Point	1.5		840.0 450.0 1755	plf plf lba							
Pl Pa Self-weight	Live Snow Dead	Point Point Full UDL	1.5	9 8	2520 1350 7.9	lbs lbs plf							
Maximum F	Reactions (Ibs	s), Bearing	Capacities	(lbs) and	d Bearing L	ength:	s (in) :						
	ł								3.165'		 	 	{
Unfactored:	¥											 	3'
Dead Live Snow Factored:	1815 2589 1387										 	 	1815 2589 1387
Total Bearing: Capacity	4798		,								 	 	4798
Bean Support Des ratio	5200 4798												5200 4798 0.92
Bean Support Load corb Length	0.92 1.00 #3 1.98												1.00 #3 1.98
Min req'd Cb Cb min	1.99** 1.00 1.00												1.98** 1.00 1.00
Cb support	1.11 625 ing length governed by	the required width	of the supporting	member.							 		1.11 625
									123		 	 	
							Suppo Total length	rts: All - Timber- 1; 3.17; Clear spi	E, 3-1/2"x7-1/4" soft Beam, D.Fir-L No n: 2.835'; volume = 0 ports, bottom= at sup	6 cu.ft.	 	 	
Analysis ve	s. Allowable S				15: alysis/Design								
Shear Bending(+) Live Defl' Total Defl'	fv = 195 fb = 1886 n 0.02 = <l 5<="" td=""><td>5 Fv' = 5 Fb' = 999 0.10 =</td><td>290 ps 2884 ps</td><td>1</td><td>fv/fv' = 0.4 fb/fb' = 0.4 0.1 0.1</td><td>67 65 21</td><td></td><td></td><td></td><td></td><td> </td><td> </td><td></td></l>	5 Fv' = 5 Fb' = 999 0.10 =	290 ps 2884 ps	1	fv/fv' = 0.4 fb/fb' = 0.4 0.1 0.1	67 65 21					 	 	
Additional FACTORS: F/	E(psi)CD CM	Ct CL 1.00 -	CV Cfu	Cr Cf.	rt Ci Cn 00 - 1.0	LC# 0 2							
Fb'+ 290 Fcp' 75	30 1.00 -	1.00 0.994 1.00 - 1.00 -	1.00 -	1.00 1.0	00 00	2 - 3							
Eminy' 1.0	4 million -	1.00 -	 , V design ⇒	- 1. 3303 lbs		3							i.
Bending(+): Deflection:	LC #2 = D+L, V LC #2 = D+L, M LC #3 = D+.75(I LC #3 = D+.75(I LC #3 = D+.75(I ve S=snow W=wind	= 4818 lbs- L+S) (live) L+S) (total)	-ft		d Feasthaus								
All LC's are	: listed in the A stions: ASCE 7→10	Analysis outpu	it 1001 11Ve LCm	concentrat	o, p∼estroqua								
Deflection: "Live" defle	EI = 222e06 action = Deflecti tion = 1.50(Deac pility[+): Lu =	ion from all r	non-dead load tion) + Live 5.19' RB = 6	is (live, w Load Defle .6	ind, snow_) ction.						 		
 Please verify the SCL-BEAMS (\$ 	tes: halysis and design are at the default deflection Structural Composite L ry from one manufactur	n limits are approp umber): the attach	riate for your appl ed SCL selection	ication. Is for prelimina	ary design only. Fo	r final men				pplement.			

4. Size factors vary from one manufacturer to another for SCL materials. They can be 5. FIRE RATING; LVL, PSL and LSL are not rated for fire endurance.

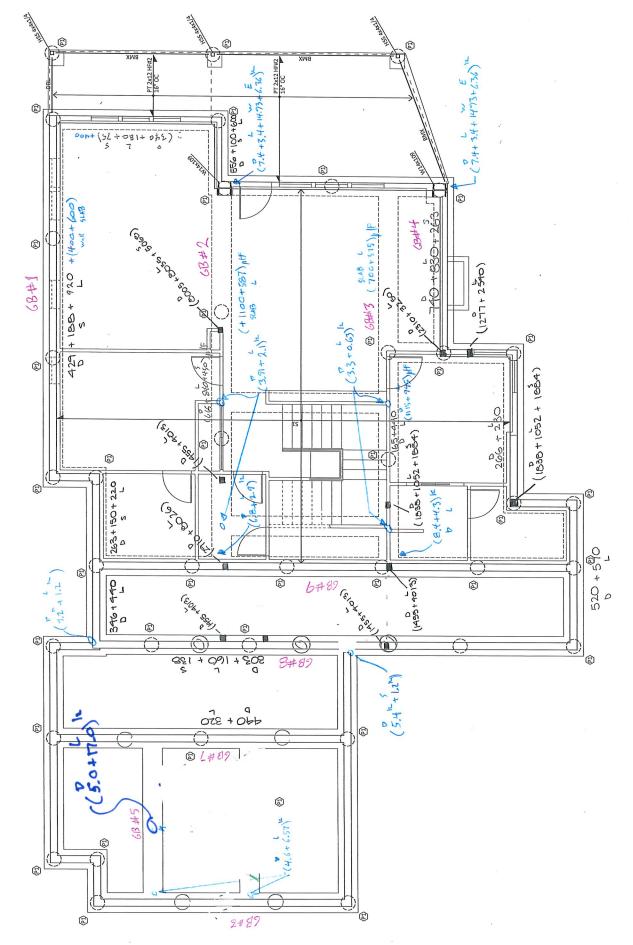
Typical Grade Beam Hun = 4-0 (conservative accomption) er 8 mall 14 Foundation weight = 24 × 18 6B (130 pcf) (=x+1+ 2x1.5] = 850 / (F 8 pile Note: O some lections wall height is over 4'-e". Extra weight is included n/ specific beam cale. Per Following cales -> 18 PEER × 22 WINE BEAM W(4)#6 burs TBB Stirrups @ Te.C. 5 = 4000 psi Typical Pile Per Gestech : = 16¢ Pile Capacity = 40 "15 · Assume point at fixity to below greate 14000 Note: 1) Refer to additional cales For lateral capacity of pile. Added axial level increases leteral capacity p | this it was excluded From lateral cale. 2.) 40" loud is assume line land For worst cure loud Factor Per Enerele -> 16 \$ Pile w (6)#6 bars 5 = 4cec psi Date Description Ferndutien BY PTIZ 3/2/18 Checked Date ENGINEERING Sheet No. Scale 250 4th Ave. South Suite 200 Job No. Project Ruddf Res. Edmonds, WA 98020 1-34 15227.15 425.778.8500 www.cgengineering.com

Lite dick title o Contraction of the contract		-	Period 243	NAMACE NEED SAME
	12015	Projects (15227.20 Rudolf Residence GA	12015 Projecuti 2277.20 Rudel Residence CM Design_StructuralEngimening/GmMygrade beam (NEM) e BIERCALC, INC: 1933-2017, Biald: 01.71.21.01.Ver B1.71.72.1 LICansce : CO ENGINEERIN	oms (NEW).e 66:10:17.12:1 GINEERING
Code References Calculations per ACI 318-14, IBC 2015, CBC 2016, ASCE 7-10 Load Combinations Used : ASCE 7-10 General Information	015, CBC 2016, ASCE 7-10 -10			
ength =	4 ksi	Overall Column Height	= 10.0 ft	
E= 3,1 Densitv = 1	3,122.0 ksi 150.0 pcf	End Pixity Brace condition for deflecti	End Fixity I op Free, Bottom Fixed Brace condition for deflection for deflection along columns	
H	0.850	X-X (width) axis :	סוווניה אממעוניו או שומים אייניין אממעוניין אממעוניין	
fy - Main Rebar = 29.0 F - Main Rehar = 29.0	60.0 ksi 29.000.0 ksi	Unbraced Length for	Unbraced Length for X-X Axis buckling = 10.0 ft, K = 1.0	
ig Limits =	ASTM A615 Bars Used 1.0 % 8.0 %	Unbraced Length for	Unbraced Length for X-X Axis buckling = 10.0 ft, K = 1.0	
Column Cross Section				
	16.0in Diarneter, Column Edge to Rebar Edge Cover = 2.50in			
Column Reinforcing : 6 - #6 bars				
Applied Loads		Entered loads are f	Entered loads are factored per load combinations specified by user.	ied by user.
Column self weight included : 2,094.40 lbs * Dead Load Factor AXIAL LOADS Avial LOADS	lbs * Dead Load Factor = 40.0 k			
Load Combination	+1.20D+1.60L	Maximum SERVICE Load Reactions		
Maximum Stress Ratio		Top along X-X	0.0k Bottom along X-X	0.0 k
Ratio = (Pu^2+Mu^2)^.5 / (PhiPn^2+P) Pu = 66.513 k	hiMn^2)^.5 (р * Pn = 531.06 k		:	
Ми-х = 0.0 k-ft Ми-у = 0.0 k-ft	φ • Mn-x = 0.0 k-ft φ • Mn-y = 0.0 k-ft	Maximum SERVICE Load Deflections Along Y-Y 0.0 in at for load combination	I Deflections 0.0 in at 0.0 ft above base	
Mu Angle = 0.0 deg Mu at Angle = 0.0 k-ft 00	0,0 k-ft	Along X-X for load combination	0.0 in at 0.0 ft above base n	
cated at Pu-Mu ve	r intersection with capacity curve	General Section Information . m	tion $.m = 0.750$ $R = 0.850$	θ = 0.850
Column Capacities Primax : Nominal Max. Compressive Axial Capacity Primi : Nominal Min. Tension Axial Capacity	cial Capacity 833.03 k pacity k I Capacity 531.06 k acity k	p : % Reinforcing Reinforcing Area Concrete Area	3 % Rebar % 0 0 in^2 2 in^2	
Governing Load Combination Results				
Governing Factored Mo Load Combination X-X	ant Dist. from Axial Y-Y base ft Pu o	8x 8x*Mux 8)	Bending Analysis k-ft ŕ 8y * Muy Alpha (deg) 8 Mu o	φ Mn Ration
+1,40D +1,20D+1.60L	9.93 2.93 5 9.93 66.51 5		0.000	0.006

Project ID:	Prenda 2009: 17:00-00 Mil Designi, Shuchanal Exploreminglocanelyphone basers (NEW) e Buercoulo, INC. 1985-2017, Ballet 10, 17:22 (b) Ver-10.17:22 (b) Lifeantsoos-100 FRV6INEFERING
Project Descr: Project Descr:	The 12015 Project 15227 20 Prudel Residence CM Design, Structural Englishmenting Structural Sector (NEW) o EURCOLIC, INC. 1863-0017, Build of 17, 21, 04, Var 17, 21, 04, Var 17, 21, 04, Var 17, 21, 17, 17, 17, 17, 17, 17, 17, 17, 17, 1
Tille Block Line 1 You can change this area using then Settings menu titem and then using the Printing & and then using the Printing &	Tile Block Unactorn Concrete Column Lec.#1 (WP05005155 Description: Typical Concrete Column

Governing Load Combination Results

Governing Factored Moment Dist. from A	Moment	Dist. from	Axial L	oad		Bendi	ng Analysis	Moment Dist from Avial Load	Ufilization
	X-X Y-Y bz	1 est	Pu o	P	Sx Sx*Mux	8 8y	* Muy Ap	oha (deg) S Mu o	Mn Ratio
+1.20D		9.93	2.51 5	31.06				0.000	0.005
		9.93	1.89 5	31.06				0.000	0.004
Maximum Deflections for Load Combinations	Combinations								
Load Combination	Max. X-X Deflection	eflection	Distance		Max, Y-Y Deflection	ection	Distance		
D Only	00000	. <u> </u>	000.0	#	0.000	. <u>e</u>	0.000	ų	
-1+0-	0.0000	.⊆	0000	#	0:00	.≘	0.000	ŧ	
+D+0'150L	0,0000	.⊑	0.000	¥	0.000	. <u>=</u>	0.000	¥	
+0,60D	0,000	. <u></u>	0.000	ŧ	0.000	.⊑	0,000	Ħ	
L Only	0.0000	. <u>c</u>	0.000	ŧ	0.000	.⊑	0,000	¥.	





1-36

Title Block Line 1 Project Title: Engineer: You can change this area Project ID: Project Descr: using the "Settings" menu item and then using the "Printing & Title Block" selection. Title Block Line 6 Printed: 2 MAR 2018, 10:39AM R:\2015 Projects\15227.20 Rudolf Residence Civil Design_Structural\Engineering\Gravity\grade beams (NEW).ec6 **Concrete Beam** ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10 Lic. # : KW-06005155 Licensee : CG ENGINEERING Grade Beam #1 Description : CODE REFERENCES Calculations per ACI 318-14, IBC 2015, ASCE 7-10 Load Combination Set : ASCE 7-10 **Material Properties** 4.0 ksi 0.90 Phi Values
 Flexure : fс $fr = fc^{1/2} * 7.50$ 474.342 psi = Shear : 0.750 145.0 pcf β_1 0.850 Ψ Density = λ LtWt Factor 1.0 = 3,122.0 ksi 60.0 ksi Fy - Stirrups Elastic Modulus = 29,000.0 ksi E - Stirrups = 60.0 ksi fy - Main Rebar = Stirrup Bar Size # 3 29,000.0 ksi E - Main Rebar = 2 Number of Resisting Legs Per Stirrup = a D(1.429) L(0.920) S(0.1880) 11.10 ft 11.10 ft 11.10 ft <u>wx 18 "</u> 22 w x 18" w x 18 **Cross Section & Reinforcing Details** Rectangular Section, Width = 22.0 in, Height = 18.0 in Span #1 Reinforcing 4#6 at 3.0 in from Top, from 0.0 to 11.10 ft in this span 4-#6 at 3.0 in from Bottom, from 0.0 to 11.10 ft in this span Span #2 Reinforcing 4-#6 at 3.0 in from Top, from 0.0 to 11.10 ft in this span 4-#6 at 3.0 in from Bottom, from 0.0 to 11.10 ft in this span Span #3 Reinforcing.... 4-#6 at 3.0 in from Top, from 0.0 to 11.10 ft in this span 4-#6 at 3.0 in from Bottom, from 0.0 to 11.10 ft in this span

Applied Loads

Beam self weight calculated and added to loads Loads on all spans...

D = 1.429, L = 0.920, S = 0.1880

Uniform Load on ALL spans : D = 1.429, L = 0.920, S = 0.1880 k/ft

Maximum Bending Stress Ratio = Section used for this span Mu : Applied Mn * Phi : Allowable Location of maximum on span	0.394:1 Typical Section -46.318 k-ft 117.418 k-ft 0.000 ft	Maximum Deflection Max Downward Transient Deflection Max Upward Transient Deflection Max Downward Total Deflection Max Upward Total Deflection	0.005 in Ratio = 0.000 in Ratio = 0.015 in Ratio = 0.000 in Ratio =	0 <360 8990 >=18
Span # where maximum occurs	Span # 3			

Service loads entered. Load Factors will be applied for calculations.

Shear Stirrup Requirements

Between 0.00 to 0.00 ft, PhiVc/2 < Vu <= PhiVc, Req'd Vs = Min 9.6.3.3, use stirrups spaced at 7.000 in Between 0.07 to 8.81 ft, Vu < PhiVc/2, Req'd Vs = Not Reqd 9.6.3.1, use stirrups spaced at 0.000 in Between 8.88 to 12.28 ft, PhiVc/2 < Vu <= PhiVc, Req'd Vs = Min 9.6.3.3, use stirrups spaced at 7.000 in Between 12.36 to 20.94 ft, Vu < PhiVc/2, Req'd Vs = Not Reqd 9.6.3.1, use stirrups spaced at 0.000 in Between 21.02 to 24.42 ft, PhiVc/2 < Vu <= PhiVc, Req'd Vs = Min 9.6.3.3, use stirrups spaced at 7.000 in Between 24.49 to 33.23 ft, Vu < PhiVc/2, Req'd Vs = Not Reqd 9.6.3.1, use stirrups spaced at 0.000 in

Time Block Line 3 Concrete Barrow Conconconcrete Barrow Concrete Barrow Concrete Bar	Bern #2 SEE 2-10 2-10 SE 7-10 S 2-10 S 3-10 F) 1-10 1-10 S 4-10 B 1 1-10 1-10 S 3-10.0 Fy - Stirrups a 5-10 3-12.0 1-10	Reinforce Crid Draph, ShruchulEnjeerengtorath James REINA BRENALG, INC. 1993-2017, Bank 10, 77, 210, James REINA BRENALG, INC. 1993-2017, James REINA BRENALG, INC. 10, 77, 70, 77, 70, 77, 70, 77, 70, 77, 70, 77, 70, 77, 70, 77, 70,
E 7-10 Phi Values Flexure : 0.90 Phi Values Flexure : 0.90 Shear : 0.756 Shear : 0.7567 Shear : 0.7567 Shear : 0.7567 Shear : 0.7567 Shear : 0.7567	ss Flexure : 0.90 = Shear : 0.750 = Shear : 0.750 = 0.850 = 0.850 = 29,000.0 ks 30 s = 2 Struy = 2 = 29,000.0 ks = 29,000.0 ks = 2,000.0 ks = 2,0	• •
Phi Values Flexure: 0.96 Phi Values Flexure: 0.96 Stimups = 20,000.0 ksi climps = 20,000.0 ksi arup Bar Stra# = 29,000.0 ksi arup Bar Stra# = 2 egs Per Strinuj = 2 egs Pe	4.0 ksi 6 Phi Values Flexure: 0.90 74.342 psi β_1 = 0.850 145.0 pcf β_1 = 0.850 145.0 pcf β_1 = 0.850 115.0 psi Fy Stirups = 0.850 112.0 ksi Fy Stirups = 29,000.0 ksi 0.000.0 ksi Er. Stirups = 20,000.0 ksi 0.000.0 ksi Er. Stirups = 20,000.0 ksi 0.000.0 ksi Firup Dar Stiruy = 2 3 0.000.0 ksi Firup Stars For Stiruy = 2 3 0.000.0 ksi Firup Stars For Stiruy = 2 3 0.000.0 ksi Firup Stars For Stiruy = 2 3 0.000.0 ksi Firup Stars For Stiruy = 2 2 0.000.0 ksi Firup Stars For Stiruy = 2 2 0.000.0 ksi Firup Stars For Stiruy = 2 2 1.1 - - 2 2 1.1 - - 2 3 3 1.1 - - - <t< td=""><td>• •</td></t<>	• •
Click and the second se	0.0 in this span 446 a349,5(5.068)	
s. B. Din 50 ft in this span 20 ft in this span 0 ft in this span 1 ft in this span 1 ft in this span 20 k/ft	1.0 in 1.0 in 1.1 in this span 1.1 in this span 1.1 in this span	D(7.42) L(3.4) W(14.93)(46339) L(1.215) S(0.5)
s0 ft in this span 50 ft in this span 1 ft in this span 1 ft in this span 1 ft in this span 1 ft in this span 10 ktf	Bottom, from 0.0 to 11.250 ft in this span Bottom, from 0.0 to 11.750 ft in this span Bottom, from 0.0 to 11.50 ft in this span	
At in this span At in this span At in this span A MA	Bottom, from 0.0 to 11.50 ft in this span	.0 in from Top, from 0.0 to 11.250 ft in this span .0 in from Top, from 0.0 to 11.750 ft in this span
1 ft in this span 1 ft in this span 20 kM	#4 Reinforcina	.0 in from Top, from 0.0 to 11.50 ft in this span
10 kit	from Boltom, from 0.0 to 11.50 ft in this span from Boltom, from 0.0 to 6.250 ft in this span from Boltom, from 0.0 to 6.250 ft in this span	.0 in from Top, from 0.0 to 11.50 ft in this span .0 in from Top, from 0.0 to 6.250 ft in this span .adds entered. Load Factors will be applied for calcutations.
vm load on ALL spans:D = 1.10, L = 0.5870 k/R	culated and added to loads 70	
	Unitorm Load on ALL spans:D = 1.10, L = 0.5870 k/ft	

allEngineering/Gravity/grade beam 2.0015 Projects/15227.20 Rudoil Residence Civil DesignL.Str ENERCALC./ Project Title: Engineer: Project Descr:

Project ID:

Service loads entered. Load Factors will be applied for calculations. Licensee : CG ENGINEER a Block Line 1 Lean change this area of the "Setting" menu item then using the "Printing & 1 Block taelection. 1 Block Line 6 Lat KW-050005155 setption : Grade Beam Setption : olied Loads

int Load : D = 8.005, L = 8.035, S = 5.068 k @ 4.20 ft

int Load : D = 7.420, L = 3.40, W = 14.930, E = 6.360 k @ 0.0 ft

int Load : D = 8.035, L = 1.215, S = 0.50 k @ 6.250 ft

form Load : D = 0.10, L = 0.320 k/ft, Tributary Width = 1.0 ft

Actimum Booding Strace Datio -	0 ANT · 1	Mavimum Deflaction		
Section used for this span	Typical Section	Max Downward Transient Deflection	0.003 in Ratio = 31574 >=36	31574 >=36
Mu : Applied	-47.769 k-ft	Max Upward Transient Deflection	0.000 in Ratio = 0 <360	0<360
Mn * Phi : Allowable	117.418 k-ft	Max Downward Total Deflection	0.007 in Ratio = 13667 >=18	13667 >=18
Location of maximum on span	0.000 ft		-0.001 1 1.0400-	
Span # where maximum occurs	Span #3			

ween 7321 to 101211, Philo22 Vu caPhile, Red Vis = Mino32 was strange spaced at 7000 in ween 7031 to 14881, Vu caPhilo2, Red Vis = Mino3 Red 955.31, use stimups spaced at 7000 in ween 1031 to 14881, Vu caPhilo2, Red Vis = Mino3 Red 955.31, use stimups spaced at 7000 in ween 10321 to 21661; Philo22 Vu caPhilo2, Red Vis = Mino3 Red 955.31, use stimups spaced at 7000 in ween 20321 to 21761; Philo22 Vu caPhilo2, Red Vis = Mino3 Sa, use stimups spaced at 7000 in ween 20321 to 21761; Philo22 Vu caPhilo2, Red Vis = Mino3 Sa, use stimups spaced at 7000 in ween 2032 to 21261; Philo22 Vu caPhilo2, Red Vis = Mino3 Sa, use stimups spaced at 7000 in ween 2520 to 3341 ft. Vu caPhilo25, Red Vis = Mino3 Red 95.31, use stimups spaced at 7000 in ween 3321 dt. 29271 ft, Vu caPhilo27, Red Vis = Mino3 Red 95.31, use stimups spaced at 7000 in ween 3374 to 3371 ft, Vu caPhilo27, Red Vis = Mino3 Red 95.31, use stimups spaced at 0000 in ween 3374 to 3371 ft, Vu caPhilo27, Red Vis = Mino3 Red 95.31, use stimups spaced at 0000 in ween 3374 to 3371 ft, Vu caPhilo27, Red Vis = Mino3 Red 95.31, use stimups spaced at 0000 in ween 3374 to 3371 ft, Vu caPhilo27, Red Vis = Mino3 Red 95.31, use stimups spaced at 0000 in

Point Load : D = 3.910, L = 2.10 k @ 3.080 ft Load for Span Number 1 Point Load : D = 1,455, L = 4.013 k @ 8.0 ft

Load for Span Number 3

Tille Block Line 1 You can change this area using the "Settings" menu item and then using the Printing & Tille Block" selection.		Project Title: Engineer: Project Descr:	Project ID:
Itile Block Line b Concrete Beam Lic. #. 1XV255003155 Description : Grade Beam #3	4:2015 P	ojects/1527.20 Rudolf Residence CIVI De ENE	X2015 Projecto15227.20 Redof Residence Civil Desjint, StructuralEspineeningGrandypate heart RePRIV or RepRIV of Redof Residence Civil Desjint, Structural RepRIV of Redof Residence Civil Despint, Structural RepRIV of Redof Residence Civil Despint, Structural Redof Redof Redof Residence Civil Despint, Structural Redof Red
CODE REFERENCES Calculations per ACI 318-14, IBC 2015, ASCE 7-10 Load Combination Set : ASCE 7-10 Material Properties	5, ASCE 7-10		
	4.0 ksi Φ Phi Values Flaxure: 1.32 psi Φ Phi Values Shear: 145.0 pof β = Shear: 145.0 pof β = 2 1.0 β = 2 1.0 β = 2 1.0 β = 2 1.0 β F Stimups 4 60.0 ksi E Stimups = 29,00 000.0 ksi Stimups # 29,00 1 000.0 ksi Number of Resisting Legs Per Stimu; = Number of Resisting Legs Per Stimu; =	0.90 0.750 0.750 0.850 0.880 0.0 ksi 3 2 2 2	• • •
D(3.8%BIC.03052) S(1.884)	D(3.3) L(0.63)		
22****18*1	DCI 115) L0 045)	×	Dio 71 (0 375)
Cross Section & Reinforcing Details Retangular Section , Wdth = 22.0 in, Height = 18.0 in Span #1 Reinforcing 4.45 at 3.0 in from Boltom, from 0.0 to 11.750 ft in this span 4.45 at 3.0 in from Boltom, from 0.0 to 11.750 ft in this span Span #3 Reinforcing 4.45 at 3.0 in from Boltom, from 0.0 to 14.570 ft in this span	etails ight = 18.0 in to 11.250 ft in this span to 11.750 ft in this span to 14.570 ft in this span	4.#6 at 3.0 in from Top. 4.#6 at 3.0 in from Top. 4.#6 at 3.0 in from Top. 4.#6 at 3.0 in from Top.	4#6 at 3.0 in from Top, from 0.0 to 11.260 ft in this span 4#6 at 3.0 in from Top, from 0.0 to 11.750 ft in this span 4.46 at 3.0 in from Top, from 0.0 to 14.570 ft in this span
Applied Loads Applied Loads Load for Shan Number 1 Load for Shan Number 1 Unitom Load : D = 1.115, L = 0.9450 km, Tribulary Wdth = 1.0 ft) loads 1. Tributary Width = 1.0 ft	Service loads entered.	Service loads entered. Load Factors will be applied for calculations.
Point Load; D = 3.30, L = 0.630 k @ 2.80 ft	0 ft		
Point Load: D = 1.838,	S = 1.884 k @ 4.50 ft		
Load for Span Number 2 Uniform Load : D = 1.115, L = 0.9450 k/ft, Tributary Width = 1.0 ft	t, Tributary Width = 1.0 ft		
Point Load: D = 3.30, L = 0.630 k @ 4.670 ft	70 ft		
l oad for Snan Niimher 3			

Description: Concrete Beam Remon 2045 Streture could preprint Streture finder Annual 2045 Streture Concrete Beam Concrete Beam Reference on Descriptions Reference on Descriptions Concrete Beam Reference on Descriptions: Reference on Descriptions Reference on Descriptions Description: Grade Beam #3 Reference on Descriptions Reference on Descriptions Description: Grade Beam #3 Reference on Descriptions Reference on Brade 0.72:10, went 0.71:11, went 0.71:10, we	3.2015 Projectal 1527.20 Ruad/ Readence Cuil Derign Structurate ENERGALC, INC. 19 ENERGALC,	You can change this area using the "Settings" menu item and then using the "Printing &		Project Title: Engineer: Project Descr:	Project ID:
0.359 1 Maximum Deflection 0.359 1 Maximum Deflection Typical Section Max Downward Transient Deflection 43.328 k-ft Max Upward Transient Deflection 117.418 k-ft Max Upward Total Deflection 0.000 ft Max Upward Total Deflection	0.359 11 Maximum Deflection 1ypical Section Maximum Deflection 43.328 kft Max Upward Transient Deflection 117.418 kft Max Upward Transient Deflection 0.000 ft Max Upward Total Deflection 5pan # 3 Span # 3	litte Block Line 6 Concrete Beam	310233	Projects/1522/.20 Rudolf Residence Civil Design_Structure Extended C NAC	Printed 2 MAR 2018, 10:465M Printed Deams (NEW) e 1983-2017 Build-10 17 13 10. Vierth 17 23 2
October 1 Maximum Deflection O.359 :1 Maximum Deflection O.359 :1 Max Downward Transient Deflection O.005 in Aax Upward Transient Deflection O.000 in 117.418 k-tt Max Upward Total Deflection O.000 if 0.000 ft Span # 3	O.369 Maximum Deflection 0.369 Maximum Deflection Typical Section Max Downward Transient Deflection 0.005 in Max Upward Transient Deflection 117.418 k-ft 0.000 ft Max Upward Total Deflection 0.000 ft Max Upward Total Deflection 0.000 in 117.418 Max Upward Total Deflection 0.000 in 0.000 ft Max Upward Total Deflection 0.000 in 8pan # 3 Span # 3 0.000 in	LIC: #: KW-95005155 Description ; Grade Beam #3			Licensee KCG ENGINEERIN
0.365 :1 Maximum Deflection 0.005 in Typical Section Max Uownward Transient Deflection 0.006 in 1.17,418 k-ft Max Uownward Transient Deflection 0.000 in 1.17,418 k-ft Max Uownward Transient Deflection 0.002 in 0.000 ft Max Uoward Total Deflection 0.001 in	Ratio = 0.353 :1 Maximum Deflection 0.005 in Typical Section Max Ubward Transient Deflection 0.000 in wable 117,418 k-ft Max Ubward Transient Deflection 0.000 in wable 117,418 k-ft Max Ubward Total Deflection 0.001 in urs Span # 3 0.000 ft 0.000 ft	SIGN SUMMARY			Design OK
	ear Stirrup Requirements	-	0.369 : 1 ypical Section -43.328 k-ft 117.418 k-ft 0.000 ft Span #3	Maximum Deflection Max Dowmead Transient Deflection Max Upward Transient Deflection Max Upward Total Deflection Max Upward Total Deflection	0.005 in Ratio = 32076.>=3 0.000 in Ratio = 0.46 0.023 in Ratio = 7545>=1 0.021 in Ratio = 104257.>=1

Load for Span Number 3 Uniform Load : D = 0.70, L = 0.3750 k/ft, Tributary Width = 1.0 ft

Title Block Line 1 You can change this area using the "Settings" menu item and then using the "Printing & Title Block" selection. Title Block Line 6

Concrete Beam

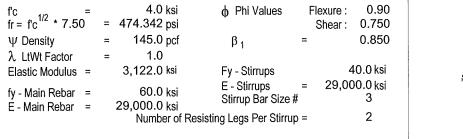
R:\2015 Projects\15227.20 Rudolf Residence Civil Design_Structural\Engineering\Gravity\grade beams (NEW).ec6 ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:10.17.12.10 Licensee : CG ENGINEERING

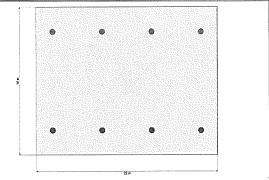
Lic. # : KW-06005155 Grade Beam #4 Description :

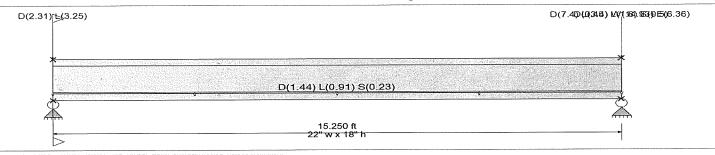
CODE REFERENCES

Calculations per ACI 318-14, IBC 2015, ASCE 7-10 Load Combination Set : ASCE 7-10

Material Properties







Project Title:

Engineer: Project Descr:

Cross Section & Reinforcing Details

Rectangular Section, Width = 22.0 in, Height = 18.0 in Span #1 Reinforcing....

4-#6 at 3.0 in from Bottom, from 0.0 to 15.250 ft in this span

4-#6 at 3.0 in from Top, from 0.0 to 15.250 ft in this span Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads

Applied Loads

Load for Span Number 1 Uniform Load : D = 1.440, L = 0.910, S = 0.230 k/ft, Tributary Width = 1.0 ft

Point Load : D = 7.40, L = 3.40, W = 14.930, E = 6.360 k @ 15.250 ft

Point Load : D = 2.310, L = 3.250 k @ 0.0 ft

Point Load : D = 0.450, L = 1.80, S = 0.50 k @ 15.250 ft

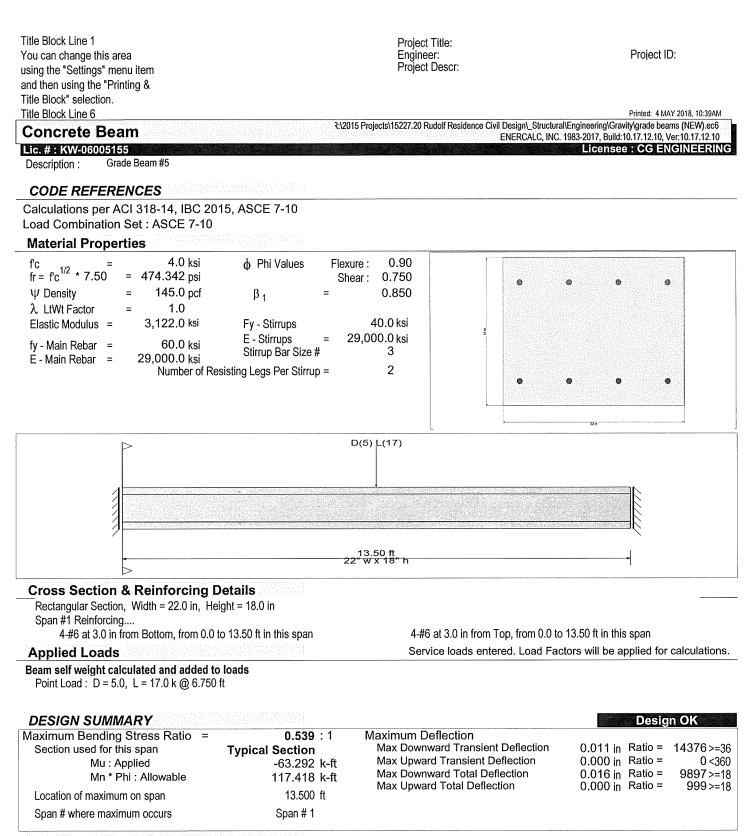
DESIGN SUMMARY

DESIGN SUMMARY			Desig	n OK
Maximum Bending Stress Ratio = Section used for this span Mu : Applied Mn * Phi : Allowable Location of maximum on span Span # where maximum occurs	0.935:1 Typical Section 109.824 k-ft 117.418 k-ft 7.639 ft Span # 1	Maximum Deflection Max Downward Transient Deflection Max Upward Transient Deflection Max Downward Total Deflection Max Upward Total Deflection	0.033 in Ratio = 0.000 in Ratio = 0.259 in Ratio = 0.000 in Ratio =	5517 >=36 0 <360 705 >=18 999 >=18

Shear Stirrup Requirements

Between 0.00 to 3.56 ft, PhiVc/2 < Vu <= PhiVc, Reg'd Vs = Min 9.6.3.3, use stirrups spaced at 7.000 in Between 3.58 to 11.67 ft, Vu < PhiVc/2, Req'd Vs = Not Reqd 9.6.3.1, use stirrups spaced at 0.000 in Between 11.69 to 15.22 ft, PhiVc/2 < Vu <= PhiVc, Req'd Vs = Min 9.6.3.3, use stirrups spaced at 7.000 in Project ID:

Printed: 2 MAR 2018, 10:45AM



Shear Stirrup Requirements

Entire Beam Span Length : PhiVc/2 < Vu <= PhiVc, Req'd Vs = Min 9.6.3.3, use stirrups spaced at 7.000 in

e: Project ID: sor: Preed 2 Met 2014, 11 2004	12015 Projects152222 Rodol Residence Civil Design Careadonalizignenting/Careadoverde Jamma (PRM) e Electrol.c. No.: 1953-2017 State 2017 23: 40 Nor: 1723-10 Nor: 1723-10 Nor: 1723-10 Nor: 1723-10 Nor: 1723-10 No Literationers: COE Electrol.com			-(6.57.) 	22 worlds in	4 #6 at 3.0 in from Top, from 0.0 to 13.50 ft in this span	4.#6 at 3.0 in from Top, from 0.0 to 13.50 ft in this span 4.#8 at 3.0 in from Top, from 0.0 to 13.50 ft in this span	Service loads entered. Load r'actors will be applied for carculators.		
Project Title: Engineer: Project Descr:	12015 Projecti 15227.20 Rudolf	SCE 7-10	$\begin{array}{llllllllllllllllllllllllllllllllllll$	D(4.6) L(6.57)	22-wx18-1	1.0 in 1.1 this span			30 k/ft	
Title Block Line 1 You can change this area using the "Settings" menu item and then using the "Printing & Title Block" selection.	Concrete Beam Lic. #: (Web0013165 Description: Grade Beam #6	CODE REFERENCES Calculations per ACI 318-14. IBC 2015, ASCE 7-10 Load Combination Set : ASCE 7-10 Material Properties	4.0 ksi 145.0 pcf 145.0 pcf 1.0 3.122.0 ksi 60.0 ksi 9.000.0 ksi Number of Resisti	D(4.6) L(6.57)		Cross Section & Reinforcing Details Rectanguar Section, Wdth = 22.0 in, Height = 18.0 in Span #1 Reinfording 4.#5 at 3.0 in from Bottom, from 0.0 to 13.50 ft in this span	Shart #2 Hondrong Shart #2 Hondrong Span #3 Reinfording 4 ## at 3.0 in from Bolton, from 0.0 to 13.50 ft in this span 	Applied Loads Beam self weight calculated and added to loads Loads on all spans D = 0.70, L = 0.30	Uniform Load on ALL spans : $D = 0.70$, $L = 0.30$ k/ft	Load for Span Number 1 Point Load ; D = 4.60, L = 6.570 k @ 5.0 ft

Project ID:	Ander 1 2005 Andread 2 and 2 a	
Project Tritle: Engineer: Project Descr:	20015 Projectol 5227.20 Rudoif Residence Clui Desprit, Strock mullichpreschigtGambrach samma R. 2004 2014 2014 ENERCALC: NC. 1983-2017, Bank 10, 172-20, Variel 1, 172-20, Variel 1, 172-20, Variel 1, 172-20, Variel 1, 172-20 Littenssee 9: OGE ENGINEERIN	
Title Block Line 1 You can change this area using the "Settings" menu item and then using the "Phinting &	Title Block Line 6 Concrete Beam Liter#1xtWo50051515 Description : Grade Beam #6	Shear Stirrun Reduirements

STREAT SUTTUP Requirements Between 100 16 560 ft, Vic FPN/cZ, Red'Vs Flox Req29.6.3.1, use stimups spaced at 0.000 in Between 505 10 15 561, PhN/cZ Red'Vs Flox Req2 Vs = Min 96.3.3, use stimups spaced at 7.000 in Between 500 to 17.7 ft, Vic FPN/cZ, Red'Vs Flox Red20 Sta3, use stimups spaced at 7.000 in Between 15.810 15.56 ft, Vic FPN/cZ, Red2 Vis = Min 95.6.3, use stimups spaced at 7.000 in Between 16.00 to 23.95 ft, Vic FPN/cZ, Red2 Vis = Min 96.6.3, use stimups spaced at 7.000 in Between 16.00 to 23.95 ft, Vic FPN/cZ, Red2 Vis = Min 96.6.3, use stimups spaced at 7.000 in

0.002 in Ratio = 41531 >=36 0.000 in Ratio = 0 <360 0.005 in Ratio = 18450 >=18 0.000 in Ratio = 999 >=18

Maximum Deflection Max Downward Transient Deflection Max Upward Transient Deflection Max Downward Total Deflection Max Upward Total Deflection

0.242 : 1 Typical Section -28.363 k-ft 117.418 k-ft 0.000 ft

DESIGN SUMMARY Maximum Bending Stress Ratio = Section used for this span Mu - Applied Mn - Phi : Allowable

Load for Span Number 2 Point Load : D = 4.60, L = 6.570 k 0 6.50 ft

Span # 2

Location of maximum on span Span # where maximum occurs

Design OK

Project ID: Present 2 MAR 2018, 11 354M	Stavity/grade beams (NEW) e d-10.17.12.10, Ver.10.17.12.1 d-20.17.12.10, Ver.10.17.12.1			•••		1.0 L	his span this span this span this span applied for calculations.
	3.2015 Projects15227 20 Rudolf Residence Civil Designi, ShructuralEngineering/Gravity/grade beams (NEW) e ENERCALC, INC. 1983-2017, Build 17, 221 ENERCALC, INC. 1983-2017, Build 17, 221 (2017) (2			• •	6 57) X	3°11 - 22-	4 #6 at 3.0 in from Tep, from 0.0 to 13.50 ft in this span 4 #6 at 3.0 in from Tep, from 0.0 to 13.50 ft in this span 4 #6 at 3.0 in from Tep, from 0.0 to 13.50 ft in this span 4 #6 at 3.0 in from Tep, from 0.0 to 13.50 ft in this span Service loads entered. Load Factors will be applied for calculations
Project Title: Engineer: Project Descr	3.12015 Projects/15227.20 Rudolf Resid			Flexure: 0.90 Shear: 0.750 = 0.850 = 29,000,0ks = 29,000,0ks	D(0.880) L(0.320) L(0.57)	7.0 H	4 #6 at 30 ir 4 #6 at 30 ir 4 #6 at 30 ir 4 #6 at 30 ir Service load
			C 2015, ASCE 7-10 10	 Φ Phi Values β 1 Fy - Stimps Fy - Stimps E - Stimps Stimp Bar Size # f Resisting Legs Per Stimul 	D(4.6) 1(6.57)	22 WX 18" h	s Section & Reinforcing Details mguar Section, Widh = 22.0 in, Height = 18.0 in # Reinforcing #
Itile Block Line 1 You can change this area using the "Settings" menu item Tillet Block' selection. Title Block' check	Concrete Beam	Description : Grade Beam #7 CONE DEEEDEANDES	Calculations per ACI 318-14, IBC 2015, ASCE 7-10 Calculations per ACI 318-14, IBC 2015, ASCE 7-10 Load Combination Set : ASCE 7-10 Material Properties				Cross Section & Reinforcing Details Rectangular Section, Width = 22.0 in, Height = 18.0 in Span #7 Reinforcing 4.46 at 3.0 in from Bottom, from 0.0 to 13.50 ft in this span Span #2 Reinforcing 4.48 at 3.0 in from Bottom, from 0.0 to 13.50 ft in this span span #3 Reinforcing 4.48 at 3.0 in from Bottom, from 0.0 to 13.50 ft in this span 4.48 at 3.0 in from Bottom, from 0.0 to 13.50 ft in this span 4.48 at 3.0 in from Bottom, from 0.0 to 13.50 ft in this span 4.48 at 3.0 in from Bottom, from 0.0 to 13.50 ft in this span 4.48 at 3.0 in from Bottom, from 0.0 to 13.50 ft in this span 4.48 at 3.0 in from Bottom, from 0.0 to 13.50 ft in this span 2.0 the point calculated and added to loads come and inspin acculated and added to loads D = 0.890, L = 0.320 Uniform Load on ALL spans : D = 0.890, L = 0.320 km Load for Span Number 2 Point Load : D = 4.60, L = 6.570 k @ 2.60 ft Load for Span Number 3

1	NIC NIC	1 1 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Project ID: Pratiat 2008 2018, 11:3006	witygrade beams (NEW) 10.17.12.10.Vert10.17.12 11. CG ENGINEER 11. CG ENGINEER	82085 >=36 0 <360 42331 >=18 999 >=18
Project ID:	ngineering/Gravity-grade beams (NEW) e 3-0017, Build: 10, 17, 12, 10, Merid: 17, 12, 1 1, Licensee - C.G. ENGINI ER/ING Design: OK	0.001 in Ratio = 82085 >=36 0.000 in Ratio = 82085 >=36 0.002 in Ratio = 42331 >=18 0.000 in Ratio = 999 >=18
	urallenginoerin 2.1983-2017/8 Licen	0.000 0.000 0.000
Project Tille: Engineer: Project Descor:	12015 Projecta15227.20 Rudoff Paciferee Coll Design, Sinchwillichgenering/Samén/grade homme (BEV) e ENERCALC, NC: 1983-2017, Bauf-10.77.24.0, Ver 10.17.24.1 Hitzanstee F.Co. ENGIVEE/AN	Maximum Deflection Max Comward Transient Deflection Max Upward Transient Deflection Max Upward Total Deflection Max Upward Total Deflection
	439	0.200 : 1 Typical Section -23.441 k-ft 117.418 k-ft 0.000 ft Span # 3
Title Block Line 1 You can change this area using the "Settings" manu item and them using the Printing & Title Block Line 6	Concrete Beam Lice#RW0000155	Maximum Bending Stress Ratio = Section used for this span Mu : Applied Mn * Phi : Allowable Location of maximum on span Span # where maximum occurs

Shear Stirrup Requirements Entire Beam Span Langth : Vu < PhV/02, Radd Vs = Not Reqd 56.3.1, use stirrups spaced at 0.000 in

3.122.0 ksi finantiti field time field fraction f			
s Flexure : 0.96 s Flexure : 0.756 = 29,000.0ks Size # = 29,000.0ks Size # = 2 Simur = 2 Simur = 2 Simur = 2 Simur = 2 span span span span span	IIIe Block Une 6 Concrete Beam Description : Grade Beam #8	3:2015 Projects/15227 20 Rudolf Re	addenoe Civil Designi, Structural Engineering Coraw/grade Jamae, 2 MAR 7011, 1 reau Barano, 1980, Barano, 1982, 2017, Bauk 10, 17, 22, 10, Vert 10, 17, 12, Licensee ; CG ENGIN Engineering Corawa (2017, 22, 10, Vert 10, 17, 12, 12, 12, 12, 12, 12, 12, 12, 12, 12
4.0 ksi ϕ Phi Values Flexure: 0.50 14.0 ksi Fy-Sitrups Shear: 0.750 15.10 ksi Fy-Sitrups = 0.850 5.112.0 ksi Fy-Sitrups = 29,000.0 ksi 5.112.0 ksi Fy-Sitrups = 29,000.0 ksi 5.112.0 ksi Firups = 29,000.0 ksi 5.110.0 ksi Sitrups = 29,000.0 ksi 5.110.0 ksi Firups = 2 2.100.0 ksi Firups = 2 2 2.111.0 ksi Firups = 2 2 2.111.0 ksi Firups = 2 2 2.111.0 ksi Firups = 2 2 2.111.1 ksi	CODE REFERENCES Calculations per ACI 318-14, IBC 2015, ASCE 7-10 Load Combination Set : ASCE 7-10 Marterial Properties		
Dt1.455),Lt4.013) Dt1.003.Lt01.160.560. T011 T22-Wx18-11 + S011 Span Dt1 in this span Dt1 in this span Dt1 in this span		Flexure : Shear : 29,000	•
6.0 in 16.0 in 18.0 in this span 0.4 in this span 0.4 in this span 0.4 in this span	× ************************************		BC: 1) L(1.2)
0 ft in this span 0 ft in this span 0 ft in this span 0 ft in this span	Cross Section & Reinforcing Details Rectanguar Section, Width = 22.0 in, Height = 18.0 in Sen #1 Reinforcing 4#5 at 3.0 in from Botton, from 0.0 to 8.330 ft in this sp		lin from Top, from 0.0 to 8.330 ft in this span
A tin this span A tin this span A fin this span	Span #2 Reinforcing 4-#6 at 3.0 in from Bottom, from 0.0 to 13.50 ft in this sp) in from Top, from 0.0 to 13.50 ft in this span
0 ft in this span 0 ft in this span	Reinforcing 5 at 3.0 in from Bottom, from 0.0 to 13.50 ft in this sp Reinforcing) in from Top, from 0.0 to 13.50 ft in this span
0 ft in this span	Span #5 Reinforcing) in from Top, from 0.0 to 13.50 ft in this span
weight calculated and added to loads if spans If spans $\mathbf{S}_{1} = 0.150$, $\mathbf{S} = 0.130$	Loads		ט וה ורמוד ו סף, ורמוד ט.ט נס ש.בסט וד וח נחוג span ads entered. Load Factors will be applied for calcula
	Beam self weight calculated and added to loads Loads on all spans D = 1.003, L = 0.160, S = 0.130		

		Project Descr:		
Tille Block Line 6 Concrete Bealm Lice #HXW05005155	400	Ridor S. Projects (1522/20 Rudol Residence Chill Design, Structurallergineering/Confriguedo Names (NEM) e ENERGALC, INC: 1982-0017, Balart 10 17, 10, 444-10 1772, 10, 444-10 1772, 10, 444-10 1772, 10, 444-10 1772, 10, 444-10 1772, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10	Pinal Cash Cash Cash Cash Cash Cash Cash Cash	2:1 2:1 RING
DESIGN SUMMARY Maximum Bending Stress Ratio = Section used for this span Mu - Phi : Allowable Location of maximum ocurs Span # Wriele maximum ocurs	0.240 : 1 Typical Section 28.175 k-ft 117.418 k-ft 4.625 ft Span#5	Maximum Deflection Max Downward Translent Deflection Max Upward Translent Deflection Max Downward Total Deflection Max Upward Total Deflection	0.001 in Ratio = 65903 >-36 0.001 in Ratio = 65903 >-36 0.008 in Ratio = 10213 >=18 -0.001 in Ratio = 53480 >=18	>= 36 >= 18 >= 18

Shear Stirrup Requirements Red9.5.1, use stimps spaced at 0.000 in Beween 0.01 to 22 4th, Var PMVCS, RedVs-s Not Red9.5.1, use stimps spaced at 7.000 in Beween 0.01 at 22 4th, PMVC2 </br>

Bakeen 22.5 to 31.07 th, Vu < PMVC2 </br>

Bakeen 31.28 to 31.28 th, PMVC2 </br>

Load for Span Number 3 Point Load : D = 1.455, L = 4.013 k @ 2.50 ft

Load for Span Number 1 Point Load : D = 3.20, L = 1.20 k 0 4.0 ft

Point Load : D = 1.445, L = 4.013 k @ 9.0 ft Load for Span Number 5 Point Load : D = 5.40, L = 1.20 k @ 4.50 ft

Project ID: Prevel 2 June 2016 1156444	ngineeringi/sawygrae peins (NEW) e 32017, Build: 10.17.12.10, Ver.10.17.12.1 LICE: DSGE X. CCE ENGINEERING		• •	11.50 ft	1.50 ft in this span 1.50 ft in this span 1.50 ft in this span 1.50 ft in this span 1.50 ft in this span s will be applied for calculations.
Frighest lite: Frighest lites Project Descr:	CUDIS Projectativ227.20 Nation Resource Company, Inc. 1983-2017 Band 50 717.20, Nation Revis O ENERCALC, INC. 1983-2017 Band 50 717.20, Nation Revis O Lifeensee ; CO ENGINEERIN		Aure: 0.90 hear: 0.750 0.850 0.850 29,000.0ksi 29,000.0ksi 2 2 2 000.0ksi 2 2 000.0ksi 2 2 000.0ksi 2 2	Dio (20) Dia 4). Lia 3)	4.#6 at 3.0 in from Top, from 0.0 to 11.50 ft in this span 4.#6 at 3.0 in from Top, from 0.0 to 11.50 ft in this span 4.#6 at 3.0 in from Top, from 0.0 to 11.50 ft in this span 4.#6 at 3.0 in from Top, from 0.0 to 11.50 ft in this span Service loads entered. Load Factors will be applied for calculations.
, and the second se		IBC 2015, ASCE 7-10 E 7-10	$\begin{array}{llllllllllllllllllllllllllllllllllll$	D(6.8) D(2.9)) L(9.026)	Cross Section & Reinforcing Details Rectangual section, Width = 220 in, Height = 18.0 in Spart # Reinforcing 4 #6 at 3.0 in from Bottom, from 0.0 to 11.50 ft in this span 4 #6 at 3.0 in from Bottom, from 0.0 to 11.50 ft in this span Spart #8 at 3.0 in from Bottom, from 0.0 to 11.50 ft in this span 4 #8 at 3.0 in from Bottom, from 0.0 to 11.50 ft in this span Spart #4 Reinforcing 1 #8 at 3.0 in from Bottom, from 0.0 to 11.50 ft in this span start #4 at 3.0 in from Bottom, from 0.0 to 11.50 ft in this span 4 #8 at 3.0 in from Bottom, from 0.0 to 11.50 ft in this span 1 #8 at 3.0 in from Bottom, from 0.0 to 11.50 ft in this span attrast self-weight calculated and added to loads and so at all spans D = 0.50
nue concentration of the state sta	Concrete Beam Ltc: # : KW2-05005155 Description : Grade Beam #9	CODE REFERENCES Calculations per ACI 318-14, IBC 2015, ASCE 7-10 Load Combination Set : ASCE 7-10 Material Promotios		22 ^{11,50} ft	Cross Section & Reinforcing Details Rectangular Section, Widh = 22.0 in, Height = 18.0 in Spar # Reinforcing 4 #56 at 3.0 in from Bottom, from 0.0 to 11.50 ft in 1 Spar #2 Reinforcing 4 #56 at 3.0 in from Bottom, from 0.0 to 11.50 ft in 1 Spar #4 Reinforcing 4 #56 at 3.0 in from Bottom, from 0.0 to 11.50 ft in 1 Applied Loads Beam self weight calculated and added to loads Loads on all spars D = 0.50 Uniform Load on ALL spans : D = 0.50 k/ft

c Project ID: Server 2016 mile 1 4644	3.0015 Projecta10227.28 Rudol Residence CMI Design, StructuralEngineering/GenkingGenkingGenking in 2.12.1 ExtERCALC, INC. 1983-2017, Balaki 19.17.2.10, Wet101.17.2.11, Licentose + CG ENGINEERING	aximum Deflection Deflection 0.004 in Ratio = 36861 >=36 Max Downward Transient Deflection 0.004 in Ratio = 56861 >=36 Max Downward Transient Deflection 0.001 in Ratio = 5580 >=18 Max Downward Total Deflection 0.011 in Ratio = 12800 >=18 Max Upward Total Deflection 0.000 in Ratio = 999 >=18	
Project Title: Engineer: Project Descr	12015 Projects 15227 20 Rudolf	0.298 :1 Maximum Deflection Deflection Max Downard Transfarmsent Deflection 35.044 Kf Max Downard Transfarmsent Deflection Max Downard Transfarmsent Deflection 117.418 Kf Max Downard Transfarmsent Deflection Max Downard Transfarmsent Deflection 0.000 ft Max Upward Transfarmsent Deflection Span # 3	Teqd 9.6.3.1, use stimups spaced at 0.000 in 1Ns = Mod 9.6.3.1, use stimups spaced at 7.000 NVs = Min 9.3.3, use stimups spaced at 7.000 NVs = Min 9.3.3, use stimups spaced at 7.000 Neop 9.6.3.1, use stimups spaced at 0.000 in Reop 9.6.3.1, use stimups spaced at 0.000 in
Title Block Line 1 You can change his area using the "Settings" menu item and then using the "Printing & True Block seteration.	uie doox uire o Lec.# # KW-2003155 Descrption : Grade Beam #9	DESTORY ON DUMARY T Maximum Bending Stress Ratio = Section used for this span and " Applied Mn " Phi, Allowable Location of maximum on span Span # where maximum occurs	Shear Stirrup Requirements Beween 000 br138; Uv < PhytoCs, Radyd 9- kki Redd 56.31. Las stirups spaced at 0.000 in Beween 1020 br1238; Uv < PhytoCs, Radyd 9- kki Redd 56.31. Las stirups spaced at 0.000 in Beween 1226 br238; Uv < PhytoCs, Reddvis Art Redd 95.31. Las attirups spaced at 7.000 in Beween 1230 br2318; Ruv < PhytoCs, Nuc < Phyto, Redd Vs = Min 96.33. Las stirups spaced at 7.000 in Beween 2324 br238 kt. Vu < PhytoCs, Nuc < Phyto, Redd Vs = Min 96.33. Las stirups spaced at 7.000 in Beween 2324 br388 kt. Vu < PhytoCs, Redd Vs = Not Redd 96.31. Las stirups spaced at 7.000 in

Point Load : D = 6.80, L = 2.90 k @ 0.0 ft Load for Span Number 3 Point Load : D = 8.40, L = 4.30 k @ 5.250 ft

Structural Step w=(10+40)pst + rels veight Assume 6 dab -> cu = 166 psf (LRFD) 14°0 1 $M = \omega l_{B}^{2} = (166)(14.0)^{2} = 42.8^{12}/F_{F}$ $V_{2} = \frac{\omega l_{2}}{2} = \frac{(166)(14)(1)}{2} = 1.16 \frac{m/s}{FT}$ $a = \frac{A_{5}5}{0.855} = 0.372(60)$ a = 0.855 = 0.85(3.0)(12) = 0.738 QMn = & As Sy (d- 1/2) = 0.9 (0.372) (60) (3- 0.73/2) × 12 1 = 52.7 "At (012) ØV = Ø2 √5 = bwel = 0.75 (2) V4000 12 ×3 = 3'.4 hins Ft Olz 6 slab w/ # 5 bors @ 10" o. c. Temp. Steel = A, × 0.0014 = 6×12×0.0018 = 0.13 ++ #4 bars 0 18° c.C. Date 3/16/17 Description Gravity - Concrete BY IDTR Date Checked NGINEERING Sheet No. Scale 250 4th Ave. South Job No. Suite 200 Rudolf Kes. Project Edmonds, WA 98020 15227.10 1-46 425.778.8500 www.cgengineering.com

Typical Interview Retaining will Controlling Lond Compo 11121 1.6 H + 1.0 E H pistance to top apple Note & Ouly @ locations where slab is not present to result diding 40 pet 9H (E) (4) Foraces @ Bolkow of und H Moment (Mn) Shew (Vn) 4 13¹²/57 0.72¹⁷/57 6 32.9¹⁷/57 1.17¹⁷/57 8 conc. wall \$\$ \$\$ \$\$ 15 c.c. $a = \frac{A_5 5 1}{0.25 5 b} = \frac{0.248(60)}{0.85 (4)(12)} = 0.365$ $\phi_{M_{q}} = A_{5}S_{7}(d-\frac{a_{2}}{2}) = c.7(c.242)(6c)(4-\frac{c.365}{2}) = 51.1$ (cm) QN = 2 VSc bol = 0.75(2) J4000 12×4 = 4.6" - (cm) Description Zataining Walls Date 2/22/18 BY DTR **B**,**G** Date Checked ENGINEERING Sheet No. Scale 250 4th Ave. South Suite 200 Job No. Project Rudat Rea Edmonds, WA 98020 1-47 15227.15 425.778.8500 www.cgengineering.com

Interior Retaining Wall (cont...) Forces @ Bottom at Grade Beaus Mn Vu H 5.5 24.6" At 0.98 (AT 7.5 51.4 "AT 1.47" (AT Design piles to resist these forces Space piles under 4 unther O 6-e a.C. Ma Vital = 5.88" M + tel = 12.3" Per Enerale -> [16\$ p.1e u] (6)#6 Vie Spuce piles under 6 wall O 4-00 c. Vtotil = 5.88" Mtotal = 17.3" Per Enercale > 16 p yle n/6)#6 Pite Capacity Per besteche 1.) passive resistance = 8.0"/ uile 2) Assume piles are tited ic below grude $16 \notin pile w/(6)\#6 = 5.0 \text{ (LEFP)}$ (no memory $O \exp = 7.15^{12/3} (ASP)$ 11 18 1 point lond located point of therety O goude, used for lateral analysis Date 2/28/18 Description Retaining Wells Βу PTZ. Date Checked ENGINEERING Sheet No. Scale 250 4th Ave. South Suite 200 Pudelf Job No. Project 205 Edmonds, WA 98020 1-48 425.778.8500 15227,15 www.cgengineering.com

Title Block Line 6			Project Descr:	PT0	Project IU: Preloct 1 MAR 2018, 1-42PM
Concrete Column Lic. # : KW2-05005155 Description : Pile Supporting 4: Retaining Wall	ataining Wall	File = R:00	5 Projectal 1527, 20 Rudoll Reside	File = R:0015 Projecta11227.20 Rutolf Residence Cui Dezigni, Senzamielanengoerany Arade De ENERCALC, INC 19202171, Bull 10, 11, 21, 00, 211, 211, 00, 211, 211,	unallengineeringisawivgade beam. 2017, Buid:10.17.12.10, Ver.10.17.12.1 Litensee ; CG ENGINEERING
uoue retenues Calculations per ACI 318-14, IBC 2015, CBC 2016, ASCE 7-10 Load Combinations Used : ASCE 7-10 General Information	3C 2015, CBC 2 CE 7-10	2016, ASCE 7-10			
fc : Concrete 28 day strength = E =	4.0 ksi 3,122.0 ksi		Overall Column Height End Fixity	= 10.0 ft Top Free, Bottom Fixed	
Density =	0.850 60.0 ksi		Brace condition for deflecti X-X (width) axis : Unbraced Length for	Brace condition for deflection (puckling) along columns X-X (width) axis : Unbraced Length for X-X Axis buckling = 10.0 ft, K = 0.80	80
g Limits = = = = = = = = = = = = = = = = = = =	29,000.0 ksi ASTM A615 Bars Used 0.50 % 8.0 %		Y-Y (depth) axis : Unbraced Length for	Y-Y (depth) axis : Unbraced Length for X-X Axis buckling = 10.0 ft, K = 0.80	80
Column Crose Section		(
	16.0in Diameter, Colun Edge Cover = 2.50in	16.0in Diameter, Column Edge to Rebar Edge Cover = 2.50in			
Column Reinforcing : 6.0 - #	6.0 - #6 bars			•	
			-	•	
Applied Loads			Entered loads are f	Entered loads are factored per load combinations specified by user.	specified by user.
Column self weight included : 2,094.40 lbs * Dead Load Factor BENDING: CLADS: Lat. Point Load at 5.6 ft creating Mx-x, E = 5,890 k Moment acting about X-X axis, E = 12.30 k-ft	94.40 lbs * Dead L∉ ng Mx-x, E = 5.880 E = 12.30 k-ft	oad Factor 0 k			
DESIGN SUMMARY					
Load Combination Location of max.above base		+1.20D+E 9.933 ft	Maximum SERVICE Load Reactions Top along Y-Y 0.0k E	I Reactions 0.0 k Bottom along Y-Y	
Maximum Stress Ratio Ratio = (Pu^2+Mu^2)^.5 / (PhiPn^2+PhiMn^2)^.5 Pn = 513 k = * Pn	1^2+PhiMn^2)^.5 0 * Pn =	0.945:1 2.444 k	Top along X-X		5.880
φ	ጥ * Mn-x = ዋ * Mn-y =	φ	Maximum SERVICE Load Deflections Along Y-Y 0.3635 in at for load combination F Only	oad Deflections 0.3635 in at 10.0ft above base titon E Onlv	Jase
Mu Angle = 0.0 deg Mu at Angle = 62.280 k-ft	pMn at Angle =	65.901 k-ft	Along X-X for load combination	0.0in at 0.0ft above base	Jase
Pr & Mn values located at Pu-Mu vector intersection with capacity curve Column Capacities Primax : Norminal Max. Compressive Axial Capacity 833.03 k Primax : Norminal Min. Tension Axial Capacity 531.06 k φ Pn, min : Usable Compressive Axial Capacity 531.06 k	vector intersection ive Axial Capacity ial Capacity e Axial Capacity al Capacity	with capacity curve 833.03 k 531.06 k k	General Section Informa p : % Reinforcing Reinforcing Area Concrete Area	$ \begin{array}{llllllllllllllllllllllllllllllllllll$	θ = 0.850
Governing Load Combination Results	Results				
Governing Factored Load Combination	Moment X-X Y-Y	Dist. from Axial Load base ft Pu of *Pn	8 x 8x*Mux 8	Bending Analysis k-ft Sy Sy≁Muy Alpha (deg) SMu	Utilization © Mn Ratio
		33 2.93	6	0.000	

Project Title: Bragineer: Broject Descr: Project Descr: Aniel 1. Not 2018, 1. 4294	Excerning Load Common Energy and Second File = R12015 Projectit 5227.20 Rodol Residence Cul Design StructuralEgipterinford/wydrate herms o Energy and the Supporting 4' Relaining Wall Description : Pile Supporting 4' Relaining Wall Governing Load Combination Results	Moment Dist.from Axial.Load Bending Analysis k-ft Utilization XX Y-Y base ft Pu σ^+ Pn 8.x 8.x 8.m 0.m Railo Actual 9.33 2.31 2.44 1000 65.28 0.945	9.93 1.88 531.06 9.93 1.88 2.44 1.000 -62.28 inations	Max. X-X Deflection Distance Max. Y-Y Deflection Distance 0.0000 in 0.000 it 0.000 it 0.0000 in 0.000 it 0.000 it 0.000 0.0000 in 0.000 it 0.254 in 10.000 it 0.0000 in 0.000 it 0.254 in 10.000 it 0.0000 in 0.000 it 0.000
Title Block Line 1 You can change this area using the "Settings" menu item and then using the "Printing & Trille Block" selection.		Governing Factored Load Combination +1.20D+E	+0.90D +0.90D+E Maximum Deflec	Load Combination D Only +D+0.70E +D-40.5250E +0.60D

A A A A Center al A A A A A A A A A A A A A A A A A A	File = R2015 Project File = R2015 Project File = R2015 File = R2015 Project File = R2015 Project File = R2015 Project File = R2015 Project File = R2015 Project Maxil File = G8.733 k.tl A = G0.0 k.tl A = G0.tl Cente for 833.0 3 k.tl Cente	Project Title: Engineer: Project Descr:	File = R:2015 Projects115227 20 Rudolf Residence Civil Design_SfurcturalEngineering/Gravity/grade beams e ENERCALC, INC, 1983-2017, Build 10,11112,10, Ver10,17121	Licensee : CG ENGINEERING		olumn Height	End Fixity Top Free, Bottom Fixed	ade condution of defrection (pudowing) arong continues X-X (width) axis :	Unbraced Length for X-X Axis buckling = 10.0 ft, K = 1.0 Y-Y (depth) axis :	Unbraced Length for X-X Axis buckling = 10.0 ft, K = 1.0		• •	- 	•	 Entered loads are factored per load combinations specified by user.		MaXIMUM SERVICE LOAD REACTIONS Top along Y-Y 0.0 k Bottom along Y-Y 0.0 k	Bottom along X-X		Maximum SERVICE Load Deflections Along Y-Y 0.4039 in at 10.0ft above base for load combination E Coliv	Along X.X. 0.0in at 0.0ft above base for load combination	$\begin{array}{llllllllllllllllllllllllllllllllllll$
	Block Line 1 end charge the "Printing 4 Block values" menu liem hen using the "Printing 4 Block relations" Elock relations Elock relations Elock relations Elock relations Elock relations Elock relations Elock relations Elock relations Elock relations end combination end combination concrete 28 day strength = 3, 120 kis end combination end combination end combination end combination end combination concrete 2000 kis with Rebar end combination concrete 2000 kis with Rebar end combination concrete 2000 kis end combination end combina	ጟ፼ጟ	File = R:\2015 Project		C 2016, ASCE 7-10				5	(lumn Edge to Rebar						ų	0.976:1	= 9.879 k	-69.430 k-ft 0.0 k-ft		

Project ID:	Printed 1 MAR 2018, 1:41PM	nce Civil Design_Structural/Engineering/Gravity/grade beams e ENERCALC, INC, 1983-2017, Build:10.17.12.10, Ver:10.17.12.1	Licensee : CG ENGINEERING	
Project Title: Engineer: Project Descr:		File = R:2015 Projects115227.20 Rudolf Residence Civil Design_StucturalEngineering/Gravitygrade beams e ENERCALC, INC, 1983-2017, Build:10.17.12.10, Ver:10.17.12.10, Ver:10.17.12.10,		
Tille Block Line 1 You can change this area using the "Seithngs" menu item and then using the "Printing & Tille Block" selection	Title Block Line 6	Concrete Column	Lic. # : KW-06005155	Description : Pile Supporting 6' Retaining Wall

			-	
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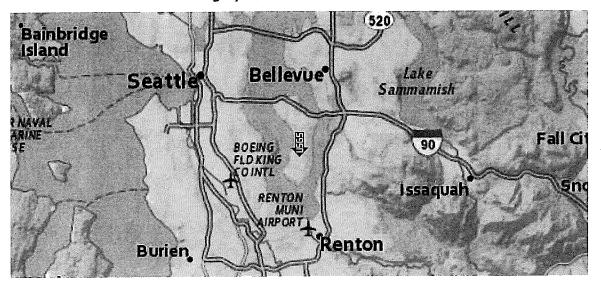
Load Combination	Moment	Dist. from	Axial Load	oad			Bene	ling Anal	Bending Analysis k-ft		90	Utilization
	Y-Y X-X	-		Pu	8 x 8	xuM.*;	8Y 8	y*Muy	&x &x*Mux &Y &y*Muy Alpha (deg)	8 Mu	o Mn	Ω.
+1.40D		9.93		31.06					0.000			0.032
+1.20D		9.93		31.06					0.000			0.027
+1.20D+E	Actual	9.93	14.51	13.56	1.000	-67.11			0.000	67.11	70.12	0.957
-0.90D		9.93		331.06					0.000			0.020
+0.90D+E	Actual	9.93		9.88	1.000	-67.11			0.000	67.11	68.73	0.976
Maximum Deflections for Load Combinations	pad Combination	S										
Load Combination	Max. X	Max. X-X Deflection	Distance		Ma	Max. Y-Y Deflection	action	Distance	Ince			
D Only	00000	00 ii	0.000	ŧ		0.000	.⊑	0.0	000 ft			
+D+0.70E	0.0000	ni 00	0.000	ŧ		0.283	.⊑	10.0	000 ft			
+D+0.5250E	0.00	00 in	0.000	ŧ		0.212	.⊑	10.0	000 ft			
+0.60D	00.00	00 in	0.000	ŧ		0.000	.⊑	0.0	0.000 ft			
+0.60D+0.70E	0.0000	00 in	00000	ŧ		0.283	.⊑	10.0	000 ft			
E Only	0.00	00 in	0000	ŧ		0.400	.⊑	6	9.933 ft			

USGS Design Maps Summary Report

User-Specified Input

2/3/2017

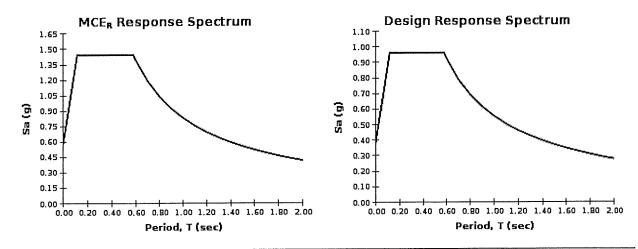
Report TitleRudolf Res.
Sat February 4, 2017 00:15:21 UTCBuilding Code Reference Document2012/2015 International Building Code
(which utilizes USGS hazard data available in 2008)Site Coordinates47.5561°N, 122.22481°WSite Soil ClassificationSite Class D – "Stiff Soil"Risk CategoryI/II/III



USGS-Provided Output

$s_s =$	1,442 g	S _{MS} =	1.442 g	S _{DS} =	0.961 g
S ₁ =	0.554 g	S _{M1} =	0.831 g	S _{D1} =	0.554 g

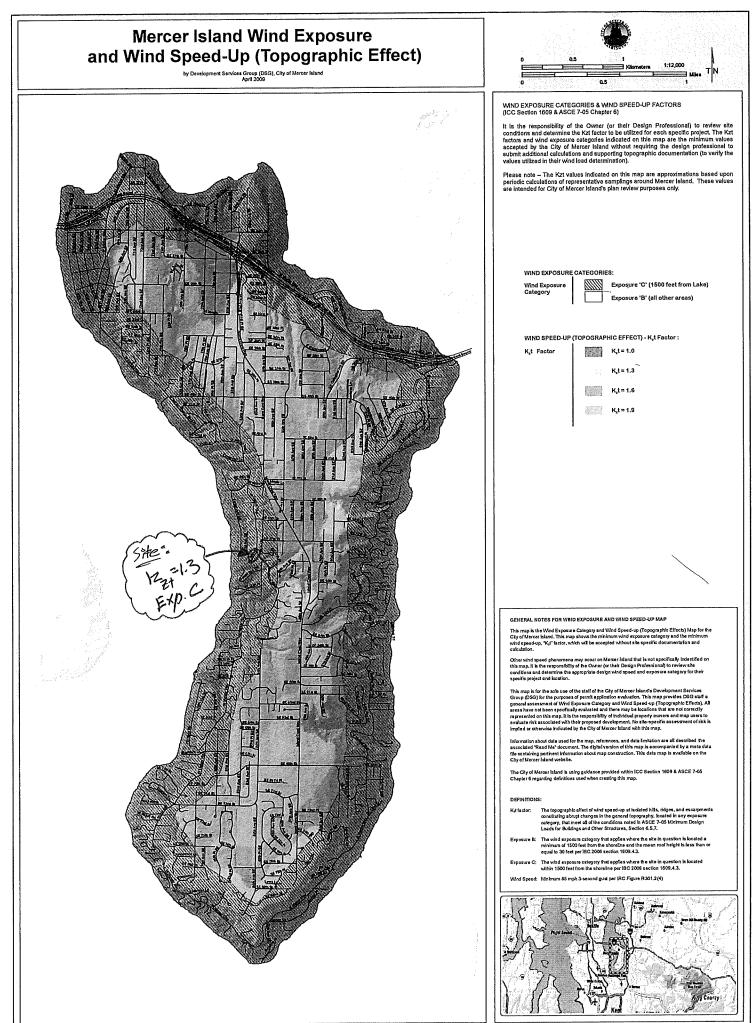
For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.



Although this information is a product of the U.S. Geological Survey, we provide no warranty, expressed or implied, as to the accuracy of the data contained therein. This tool is not a substitute for technical subject-matter knowledge.

2-1

1/1



<u>Seismic Design</u> Risk Category	Туре	11		2015 IBC Table 1604.5	ASCE 7-10 Table 1.5-1
Seismic Importance Factor	-	1.00	<i></i>	0	Table 1.5-2
Site Class	S.C.=	D	(Assumed)	Section 1613.3.2	Table 20.3-1
0.2s Spectral Response	S _S =	1.442		Figure 1613.3.1(1-6)	Figure 22-1
1.0s Spectral Response	-	0.554		Figure 1613.3.1(1-6)	Figure 22-2
	-		hazards.usgs	.gov/designmaps/us/ap	
Site Coefficient (short period)	F _a =	1		Table 1613.3.3(1)	Table 11.4-1
Site Coefficient (1.0 second)	F _v =	1.5		Table 1613.3.3(2)	Table 11.4-2
S _{MS} =F _a *S _s	S _{MS} =	1.442		Section 1613.3.3	Section 11.4.3
S _{M1} =F _v *S ₁	S _{M1} =	0.831		Section 1613.3.3	Section 11.4.3
S _{DS} =2/3*S _{MS}	S _{DS} =	0.961		Section 1613.3.4	Section 11.4.4
S _{D1} =2/3*S _{M1}	S _{D1} =	0.554		Section 1613.3.4	Section 11.4.4
Seismic Design Category	SDC=			Table 1613.3.3(1-2)	Section 11.6
Lateral Resisting System	Wood She				
Response Modification Coeff.		6.50			Table 12.2-1
System Overstrength Factor	Ω ₀ =				Table 12.2-1
Deflection Amplification Factor	C _d =	4.0			Table 12.2-1
Horizontal Irregularities		NA			Table 12.3-1
Vertical Irregularities		NA			Table 12.3-2
Analysis Procedure		ELF			Table 12.6-1
Equivalent Lateral Force Design					Section 12.8
Structure Type for Period	All Other S	Structural	Systems		Table 12.8-2
Building Period Coefficient	C _t =	0.02			Table 12.8-2
Building Period Coefficient	x=	0.75			Table 12.8-2
Building Height	h _n =	35			
Building Period, $T_a = C_t h_n^x$	T _a =	0.288			Section 12.8.2.1
$C_s = S_{DS} / (R/I_E)$	C _s =	0.148			Eqn. 12.8-2
$Max C_s = S_{D1} / (T^* R / I_E)$	Max C _s =				Eqn. 12.8-3
Min. C _s =0.044*S _{DS} *I _E	Min. C _s =				Eqn. 12.8-5
Min. Cs= 0.5 *S ₁ /(R/I _E), SDC E&F	Min. C _s =				Eqn. 12.8-6
Seismic Response Coeff., C _s	-	0.148	(LRFD)		Section 12.8.1.1

C G	Description	By DTR Checked	Date 3/9/2017 Date
ENGINEERING		Scale NTS	Sheet No.
250 4th Ave South Suite 200 Edmonds, WA 98020	Project Rudolf Res.	Job No. 15227.10	2-3

Seisinic I Orces	- Vertical	Distribut	ion						
Refer to ASCE 7-10	Section 12.8	.3		k =	1.0				
					. k	. k		0	
Diaphragm	DL	Area	W _{DL}	Story	w _i ₊ h _i ^k	w _x , h _x ^k	Shear	Sum	
Level	(psf)	(ft ²)	(kips)	Elev. (h)	(k-ft)	$\Sigma w_{i} \cdot h_{i}^{k}$	F _x	F _x	
Roof Framing	20	2752	55.0	32	1761	0.46	8.9	8.9	
3rd Framing	25	2950	73.8	20.75	1530	0.40	7.7	16.6	
2nd Framing	25	2225	55.6	10.16	565	0.15	2.9	19.5	
		Σ =	184.415	-	3857	1.00	19.5	-	
Base Shear (ULT)	27.3	kips							
Base Shear (ASD)		kips	* note that	all table forc	es are ASE)			
Seismic Forces	- Vertical	Distribut	ion Inclue	ling Rho					
Refer to ASCE 7-10	Section 12.3	.4.2							
Diaphragm	Rho	Shear	Sum						
Level		F _x	F _x						
Roof Framing	ρ 1.0	8.9	8.9						
	1.0	7.7	16.6						
3rd Framing	1.0	2.9	19.5						
2nd Framing		19.5	19.0						
	$\Sigma =$	19.5							
Diaphragm Ford	cos - Vorti	cal Distri	hution						
Diapinagin i orc									
	Section 12.1	011							
Potor to ASCE 7-10		0.1.1				<u> </u>			
Refer to ASCE 7-10									
		Σ \ν/.	 F.	Σ.Ε.	ΣΕΨ	E _{nv} (Min)	F _{av} (Max)	F	
Diaphragm	Wi	Σw _i	F _i	ΣF_i	$\Sigma F_{i} \cdot W_{px}$		F _{px} (Max)	P	
Diaphragm Level	w _i (kips)	(kips)	(kips)	(kips)	Σw _i	0.2S _{DS} Iw _{px}	0.4S _{DS} Iw _{px}	Govern	
Diaphragm Level Roof Framing	w _i (kips) 55.0	(kips) 55.0	(kips) 8.9	(kips) 8.9	Σw _i 8.9	0.2S _{DS} Iw _{px} 7.6	0.4S _{DS} Iw _{px} 15.1	Govern 8.9	
Diaphragm Level Roof Framing 3rd Framing	w _i (kips) 55.0 73.8	(kips) 55.0 128.8	(kips) 8.9 7.7	(kips) 8.9 16.6	Σw _i 8.9 9.5	0.2S _{DS} Iw _{px} 7.6 10.1	0.4S _{DS} Iw _{px} 15.1 20.3	Govern 8.9 10.1	
Diaphragm Level Roof Framing	w _i (kips) 55.0	(kips) 55.0	(kips) 8.9	(kips) 8.9	Σw _i 8.9	0.2S _{DS} Iw _{px} 7.6	0.4S _{DS} Iw _{px} 15.1	Govern 8.9	
Diaphragm Level Roof Framing 3rd Framing	w _i (kips) 55.0 73.8	(kips) 55.0 128.8	(kips) 8.9 7.7	(kips) 8.9 16.6	Σw _i 8.9 9.5	0.2S _{DS} Iw _{px} 7.6 10.1	0.4S _{DS} Iw _{px} 15.1 20.3	Govern 8.9 10.1	
Diaphragm Level Roof Framing 3rd Framing	w _i (kips) 55.0 73.8	(kips) 55.0 128.8	(kips) 8.9 7.7	(kips) 8.9 16.6	Σw _i 8.9 9.5	0.2S _{DS} Iw _{px} 7.6 10.1	0.4S _{DS} Iw _{px} 15.1 20.3	Govern 8.9 10.1	
Diaphragm Level Roof Framing 3rd Framing	w _i (kips) 55.0 73.8	(kips) 55.0 128.8	(kips) 8.9 7.7	(kips) 8.9 16.6	Σw _i 8.9 9.5	0.2S _{DS} Iw _{px} 7.6 10.1	0.4S _{DS} Iw _{px} 15.1 20.3	Govern 8.9 10.1	
Diaphragm Level Roof Framing 3rd Framing 2nd Framing	w _i (kips) 55.0 73.8	(kips) 55.0 128.8 184.4	(kips) 8.9 7.7 2.9	(kips) 8.9 16.6	Σ w _i 8.9 9.5 5.9	0.2S _{DS} Iw _{px} 7.6 10.1 7.6 By	0.4S _{DS} Iw _{px} 15.1 20.3	Govern 8.9 10.1 7.6	02/28
Diaphragm Level Roof Framing 3rd Framing 2nd Framing	w _i (kips) 55.0 73.8 55.6	(kips) 55.0 128.8 184.4	(kips) 8.9 7.7 2.9	(kips) 8.9 16.6 19.5	Σ w _i 8.9 9.5 5.9	0.2S _{DS} Iw _{px} 7.6 10.1 7.6 By Checked	0.4S _{DS} Iw _{px} 15.1 20.3 15.3	Govern 8.9 10.1 7.6 Date	02/28
Diaphragm Level Roof Framing 3rd Framing 2nd Framing	w _i (kips) 55.0 73.8 55.6	(kips) 55.0 128.8 184.4	(kips) 8.9 7.7 2.9	(kips) 8.9 16.6 19.5	Σ w _i 8.9 9.5 5.9	0.2S _{DS} Iw _{px} 7.6 10.1 7.6 By	0.4S _{DS} Iw _{px} 15.1 20.3 15.3	Govern 8.9 10.1 7.6	02/28

Wind Design (ASCE 28.5 Enclosed	Simple Diaphragm)	2015 IBC	ASCE 7-10
Building Exposure	Exp.= C	Section 1609.4	Section 26.7.3
Basic Wind Speed	V= 110		Per Jurisdiction
Risk Category	I _w = II		Table 1.5-1
Гор of Roof Height (feet)	h= 33.5		
Vean Roof Height (feet)	h _{mean} = 29.5		
Building Length (feet)	L= 78		
Building Width (feet)	W= 52		
End Zone Width, a (feet)	a≠ 5.2		Figure 28.6-1
Roof Angle	Angle= 36.5		
Design Wind Pressure, p _{s30A}	p _{s30A} = 21.6		Figure 28.6-1
Design Wind Pressure, p _{s30B}	p _{s30B} = 14.8		Figure 28.6-1
Design Wind Pressure, p _{s30C}	p _{s30C} = 17.2		Figure 28.6-1
Design Wind Pressure, p _{s30D}	p _{s30D} = 11.8		Figure 28.6-1
Design Wind Pressure, p _{s30E}	p _{s30E} = 1.7		Figure 28.6-1
Design Wind Pressure, p _{s30F}	p _{s30F} = -13.1		Figure 28.6-1
Design Wind Pressure, p₅30G	$p_{s30G} = 0.6$		Figure 28.6-1
Design Wind Pressure, p₅30H	р _{sзон} = -11.3		Figure 28.6-1
Design Wind Pressure, р _{sзоеон}	р _{sзоеон} = -7.6		Figure 28.6-1
Design Wind Pressure, p _{s30GOH}	р _{s30GOH} = -8.7		Figure 28.6-1
Height/Exposure Adjustment, λ	λ_{max} = 1.40		
Topo. Effect Coeff., K _{zt}	K _{zt} = 1.30		

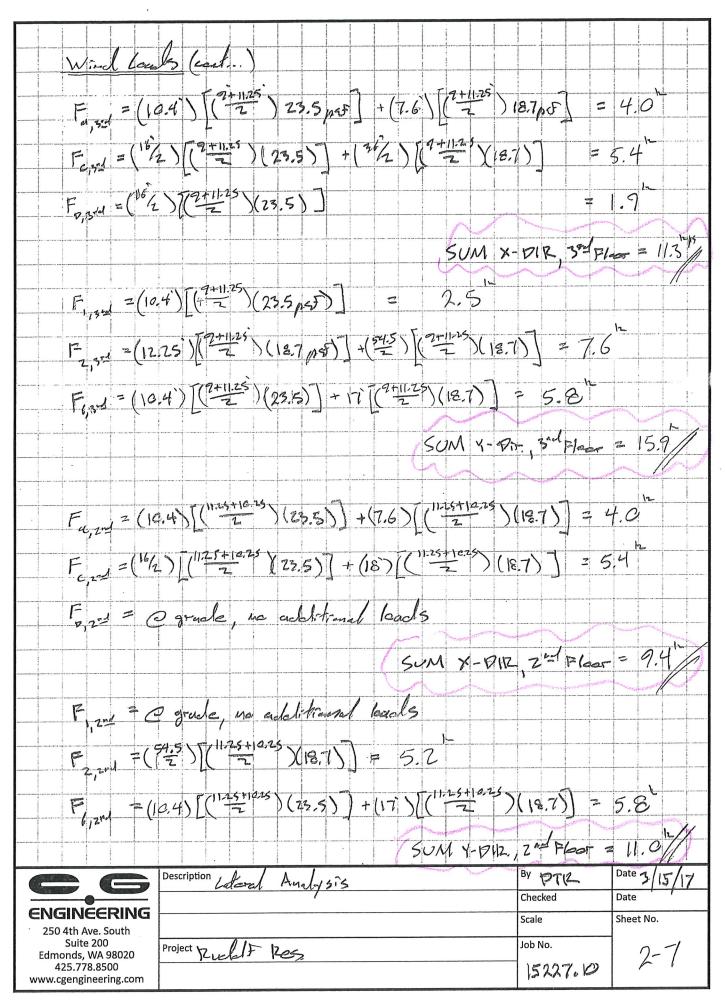
 $V_{asd} = V_{ult} * v0.6$

Section 1609.3.1

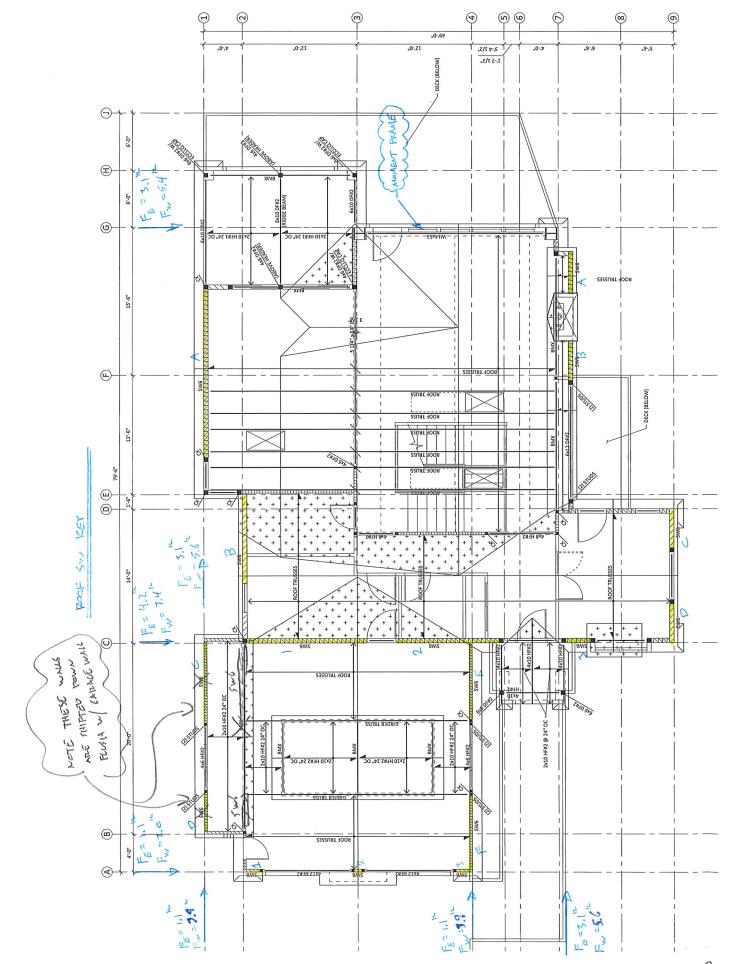
	ULT	ASD
	p _s =λ*Kzt*p _{s30}	p _s =λ*Kzt*ps30*0.6
p _{s30A} =	39.2	23.5
р _{\$30В} =	26.8	16.1
p _{s30C} =	31.2	18.7
p _{\$30D} =	21.4	12.8
p _{s30E} =	3.1	1.8
p _{s30F} =	-23.8	-14.3
p _{s30G} =	1.1	0.7
р _{sзон} =	-20.5	-12.3
р _{s30EOH} =	-13.8	-8.3
р _{s30GOH} =	-15.8	-9.5

CG	Description	By DTR Checked	Date 3/9/2017 Date
ENGINEERING	Wind Summary	Scale NTS	Sheet No.
250 4th Ave South Suite 200 Edmonds, WA 98020	Project Rudolf Res.	Job No. 15227.10	2-5

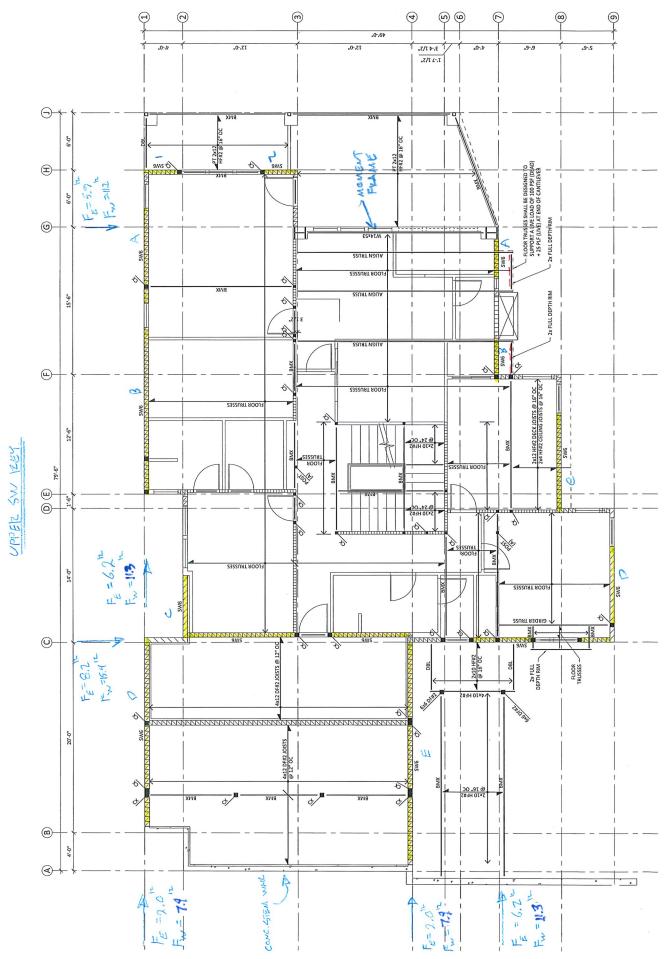
Wind (per ASCET-10 Chyster 28.5) Loads 201 = 10,4 A,p CP BV Rest a A,B 3501 znd AC C,P NOTE - SHEAR WALL HAVE BEEN ELEV. 6 6 PLAY REMSER AFTER THESE CAUS. HOW EVETZ, THE PINEWSDAS A = 23.5 pt B = 16.1 pt C = 18.7 pst P=12.8 pst OF THE HEUSE HA VE NOT CHANGED THOS WIND BASE SHEAKS ALLE STILL VALID -= (10.4) [8.25×16.1 p5+ = (9) × 235 pc5] + (7.6) 8.25×128p5+==(1)×18.7p5] F = 3.9 F = (=)(E. 25 × 16.1 + = () × 23.5] + (=) [8.25×12&+= () × 18.7 psf] = 5.4 =(16) B.25×16.1+(12)23.5 1.9 E lin 11.2 SUM X-Pir. Read = = (10.4) 4.25 × 16.1. + 1/2 × 23.5 + (2) 4.25 × 12.8 + 1/2×18.7 2.1 FL. F2, rant = (12.75) (4.25 × 12.8 + 1/2 × 18.7) + (4.25 × 12.8 + 1/2 × 18.7) 2 6.9 = (10.4) [E.25×16.1+= ×23.5] + 17 [E.25×12.8+ 2×18.7] FBII = 5.8 SUM 4- Pir Read = 14.8 Description Lateral Analysis BY PTTE Date 3/15/17 Date Checked ENGINEERING Sheet No. Scale 250 4th Ave. South Suite 200 Project Rudel 5 Res. Job No. 2-6 Edmonds, WA 98020 15227.10 425.778.8500 www.cgengineering.com



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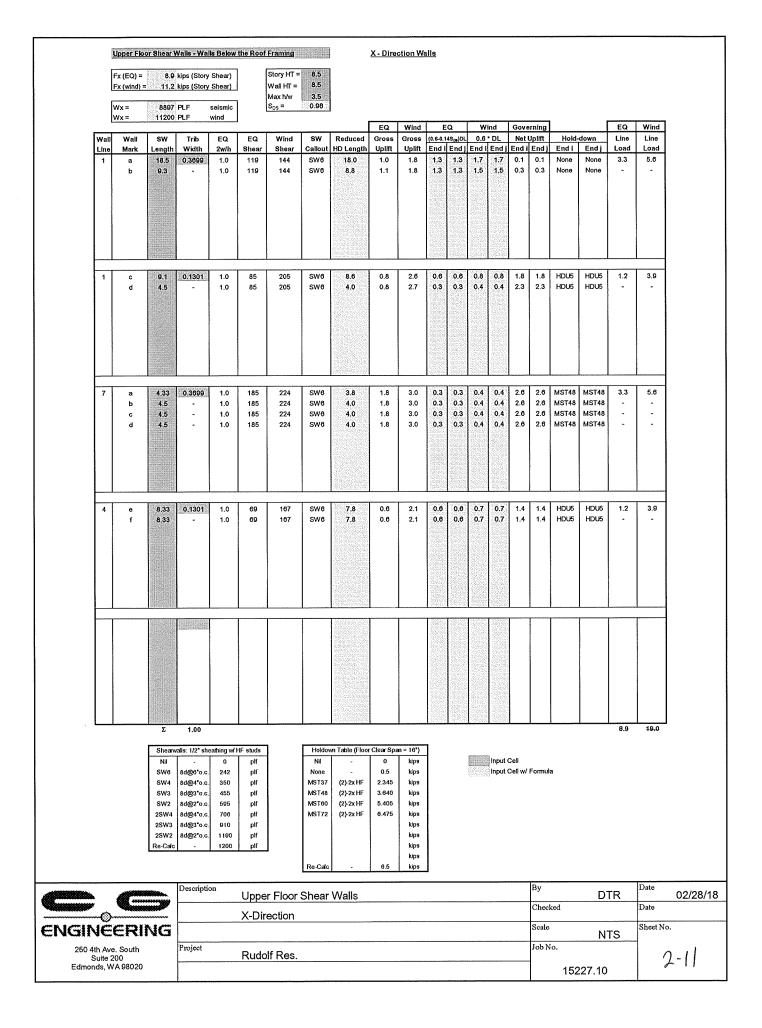
2-8



2-9



2-10



Wy = 8807 PLF seismic wind Mind So s O.0 Wy = 14800 PLF wind SW 0.0 Construction Construction EQ Wind Gross Gross Gross Governing Gross Net Upift Hold-down Line Line A a 2 0.13003 0.7 456 301 SW2 1.5 2 5.7 0.1 0.1 0.2 5.5 5.5 HOUe HOUB 1.2 2.0 Walls at garage have 6'-0'' height 1.0 180 214 SW0 12.5 1.8 2.7 0.9 0.9 1.2 1.5 1.5 MST37 MST37 4.4 7.4 0 1.0 180 214 SW0 12.5 1.8 2.7 0.9 0.9 1.2 1.5 1.5 MST37 MST37 4.4 7.4 0 11.07 - 1.0 180 214 SW0 11.2 1.8 2.7 0.8 0.8	Fyruma) = 1480 ispe (Story Shear) Wy = 8807 FLF seliamic Wy = 14800 PLF wind Wait SW Trib EQ Wind SW Reduced Gross Q.9 D.0 D.1 EQ Wind Load Loa		Upper Flo	or Shear \	Walls - Wal	lls Below	the Roo	f Framing]	<u>Y - Dire</u>	ction Wa	ills					/	~~ 12E)	LT	0 9 PC	127AL)
Wy = 14800 PLF wind EQ Wind SW Reduced Gross Gross 0.6-0L Net Uplit Hold-down Line Line Line Mind SW Reduced Gross Gross 0.6-0L Net Uplit Hold-down Line Line <thline< th=""> Line</thline<>	Ung Hold PL Wind Ung Wind		Fy (wind) :	: 14.8	kips (Story	Shear)		Wall HT = Max h/w	8.5 3.5							/	/	C	FILA	NE	CAL	ur J	
Line Mark Length Width 2w/h Shear Shear Callout HD Length Uplift End j	Number Variable State State Object State State Object State		Wy =	14800	PLF	wind]	•								<u> </u>				
b 2 0.7 456 381 SW2 1.5 2 5.7 0.1 0.1 0.2 0.2 5.5 HDUB HDUB - - Walls at garage have 6'-0" height 10 180 214 SW6 12.5 1.6 2.7 0.9 0.9 1.2 1.2 1.5 MST37 MST37 4.4 7.4 C a 13 0.5 1.0 180 214 SW6 12.5 1.6 2.7 0.9 0.9 1.2 1.5 1.5 MST37 MST37 - - B 11.07 - 1.0 180 214 SW6 11.2 1.8 2.7 0.8 0.8 1.1 1.1 1.6 MST37 MST37 -	b a o	Line	Mark	Length	Width	2w/h	Shear	Shear	Callout	HD Length	Uplift	Uplift	End i	Endj	Endj	Endj	End i	End j	End i	End j	Load	Load	
have 6'-0" height Image: second s	a 6 - 0' height 1 <			CONTRACTOR CONTRACTOR																		-	
b 11.07 - 1.0 180 214 SW8 11.2 1.8 2.7 0.8 0.8 1.1 1.1 1.6 1.6 MST37 MST37 - - G 1 3 0.36337 0.7 605 557 2SW4 2.5 4.8 8.0 0.2 0.2 0.3 0.3 7.7 7.7 0.0 0.0 1.4 2.3 G 1 3 0.36337 0.7 605 557 2SW4 2.5 4.8 8.0 0.2 0.2 0.3 0.3 7.7 7.7 0.0 0.0 1.4 2.3 G 1 3 0.36337 0.7 605 557 2SW4 2.5 4.8 8.0 0.2 0.3 0.3 7.7 7.7 0.0 0.0 1.4 2.3 G 1 3 3.0 3.0 3.0 7.7 7.7 0.0 0.0 1.4 2.3 G 1 3 3.0 3.0 3.0 7.7 7.7 <t< td=""><td>b. 11.67 - 1.0 180 214 SW0 11.2 1.0 2.7 0.8 0.8 1.1 1.1 1.8 1.8 MST37 - - - 0 1 3 0.08337 0.7 05 557 25W4 2.5 4.8 8.0 0.2 0.2 0.3 0.3 7.7 7.7 0.0 0.0 1.4 2.3 - <</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	b. 11.67 - 1.0 180 214 SW0 11.2 1.0 2.7 0.8 0.8 1.1 1.1 1.8 1.8 MST37 - - - 0 1 3 0.08337 0.7 05 557 25W4 2.5 4.8 8.0 0.2 0.2 0.3 0.3 7.7 7.7 0.0 0.0 1.4 2.3 - <																						
G 1 3 0.30337 0.7 665 557 25W4 2.5 4.8 8.0 0.2 0.2 0.3 0.3 7.7 7.7 0.0 0.0 1.4 2.3 3-Story Moment Frame, refer to additional calculations. Moment Frame supports full load from floor above in addition to tributary area on this floor. The remaining load is supported by (2) wall piers 0.3 0.3 7.7 7.7 0.0 0.0 1.4 2.3	a 1 3 0.38332 0.7 05 557 2544 2.5 4.8 8.0 0.2 0.2 0.3 7.7 7.7 0.0 0.0 1.4 2.3 3-Story Moment Frame, refer to additional calculations. Moment Frame, refer to additional calculations. Moment Frame, refer to additional calculations. Moment Frame, refer to addition to ritional calculations. Moment Frame, refer to additaddition to ritional calculations. Moment Fram	c				•		1	1	100000000000000000000000000000000000000			1000000		1 2000 (0000)	220202000						1 1	
3-Story Moment Frame, refer to additional calculations. Moment Frame supports full load from floor above in addition to tributary area on this floor. The remaining load is supported by (2) wall piers	3-Story Moment Frame, refer to additional calculations. Moment Frame supports full load from floor above in addition to tributary area on this floor. The remaining load is supported by (2) wall piers to north 1.8 3.0 Image: Image																						
Frame supports full load from floor above in addition to tributary area on this floor. The remaining load is supported by (2) wall piers	Story ment frame, refer to addition a claduators. The remaining load is supported by (2) well piers to not.	G	1	3	0.30337	0.7	665	557	2SW4	2.5	4.8	8.0	0.2	0.2	0.3	0.3	7.7	7.7	0.0	0.0	1.4	2.3	
	Input Cell				Frame area o	suppor n this fl	ts full	load from	i floor a	bove in a	dition	to tribu	tary	ι s							• 1.8	3.0	
	Input Cell																						
	Input Cell																						
	Input Cell																						
	Input Cell																						
	Input Cell																						
Σ 1.0 8.9 14.6				Σ	1.0															I	8.9	14.8	
		 *	ď		Descripti	on	Uppe	er Floor	Shear	Walls								By	ked	D	TR	Date Date	
Upper Floor Shear Walls DTR Checked Date	Upper Floor Shear Walls DTR	-©	ERI	NG			Y-Di	rection												N	TS		
Upper Floor Shear Walls DTR Y-Direction Checked Date	Upper Floor Shear Walls DTR Y-Direction Checked Date			~ ~ ~~	Project													Job N	lo.	11)
Upper Floor Shear Walls DTR Y-Direction Checked Date Scale NTS Sheet	Upper Floor Shear Walls DTR Y-Direction Checked Date IEERING Scale NTS Project Dudy (E.D.e.) Job No.						Rudo	oli Res.															•

Main Floor Shear Walls - Walls Below the Upper Floor Framing

 Fx (EQ) =
 7.7 kips (Story Shear)
 Story HT =
 10.33

 Fx (wind) =
 11.3 kips (Story Shear)
 Wall HT =
 9

 Wx =
 7730 PLF
 seismic
 Sos =
 0.96

 Wx =
 11300 PLF
 wind
 Sos =
 0.96

Visit West Visit State Card Scient Card Visit West Visit	w	/x =	11300	PLF	wind																				
image visition visition <t< td=""><td></td><td></td><td></td><td></td><td>- Service States of the service of t</td><td>Logia de traci, tales</td><td></td><td></td><td></td><td></td><td></td><td></td><td>1</td><td></td><td></td><td></td><td></td><td>ARGUMENT</td><td>1003333355</td><td></td><td></td><td>11-14</td><td></td><td>EQ</td><td>Wind Line</td></t<>					- Service States of the service of t	Logia de traci, tales							1					ARGUMENT	1003333355			11-14		EQ	Wind Line
b trap trap <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Line Load</td><td>Load</td></t<>												1												Line Load	Load
Image: Construct of the second state of the second stat		a b	10.0 _17.5		-	-	1.0	185	236	SW6	17.0	2.0	3.5	1.2	1.2	1.6	1.8	0.0	0.0	1.9	1.9	MST37	MST37	6.3 - -	
b 3 ar - - - 0.8 270 200 SW4 3.2 2.7 4.0 1.1 1.1 1.1 1.1 2.2 2.3 3.3 0.3 SMT72 MST72 MST72 6 10 - - - 1.0 227 200 SW4 9.5 2.5 4.4 0.7 0.7 0.0 0.0 0.5 5.5 MST64 MST72 MST72 MST64 4 a 23.33 0.11977 11.2 3.8 1.0 87 242 SW0 22.8 0.0 3.8 2.1 2.1 2.8 2.0 0.0 5.5 MST64 MST72 MST64 4 a 23.33 0.11977 11.2 3.8 1.0 87 242 SW0 22.8 0.0 3.8 2.1	1	e		0.11177		3.9	1.0	102	285	SW4	19.3	1.1	4.2	1.9	1,9	2.3	2.3		1.8	3.7	3.7	MST72	MST72	2.0	7.9
$ \begin{array}{ c c c c c } \hline \hline$	7	b c	3.67 10	-	-	-	0.8 1.0	279 227	290 290	SW4 SW4	3.2 9.5	2.7 2.5	4.9 4.4	1.1 0.7	1.1 0.7	1.1 0.9	1.1 0.9	2,6 0,0	2.6 0.0	6.3 3.5	6.3 3.5	MST72 MST48	MST72 MST48	6.3 - -	11.3
$\frac{1}{2} 10 6.9 19.0$ $\frac{1}{2} 10 6.9 10.0$ $\frac{1}{2} 10 10 10 10.0$ $\frac{1}{2} 10 10 10 10 10.0$ $\frac{1}{2} 10 10 10 10 10 10.0$ $\frac{1}{2} 10 10 10 10 10 10 10 1$	4	a	23.33		1.2	3.9	1.0	87	242	SW6	22.8	0.9	3.6	2.1	2.1	2.0	2.6		1.4	2.3	2.3	HDU5	HDU5	2.0	7.9
Sheawalls: 1/2' sheathing wf HF studs Nit 0 plf Nit 0 plf Nit 0 plf Sw3 8d@4'o.c. 350 plf Sw3 8d@4'o.c. 350 plf Sw3 8d@4'o.c. 350 plf Sw3 8d@2'o.c. 455 plf Sw3 8d@2'o.c. 700 plf Sw3 8d@2'o.c. 700 plf Sw3 8d@2'o.c. 700 plf Sw3 8d@2'o.c. 100 plf Sw3 8d@2'o.c. 100 plf Sw3 8d@2'o.c. 100 plf HDU14 6x0 DF#1 0.5 kips HDU14 6x0 DF#1 14.4 kips Re-Cato 0.5 kips Rein Floor Shear Walls DTR DTR																									
Main Floor Shear Walls DTR X-Direction Checked Date			Sheary Nil SW6 SW4 SW3 SW2 2SW4 2SW3 2SW2	valls: 1/2* sl 8d@6*0.4 8d@4*0.4 8d@2*0.4 8d@2*0.4 8d@2*0.4 8d@3*0.4 8d@3*0.4	heathing w/ 0 2. 242 c. 350 c. 465 c. 595 c. 708 c. 910 c. 1190	HF studs plf plf plf plf plf plf plf plf		Nil None MST37 MST48 MST72 HDU8 HDU11 HDU14	- (2)-2x HF (2)-2x HF (2)-2x HF (2)-2x HF 4x DF#2 6x6 DF#1 6x6 DF#1	0 0.5 2.345 3.640 6.5 7.0 9.5 1 14.4	kips kips kips kips kips kips kips kips						Formu	ıla						16.6	38.3
X-Direction Checked Date						Descrip	tion												By				Date		
X-Direction	C		in. Pr	C.				Main	Floor	Shear	Walls								Chee	ked	<u> </u>	DTR	Date	02	28/18
			@			ļ		X-Dir	ection																
NTS NTS	eN	IGII	NE	ERII	VG														Scale		1	NTS	Sheet N	0.	
250 4th Ave. South Suite 200 Edmonds, WA 98020 Project Rudolf Res. Job No. 15227.10			Suite 20	0		Project		Rudo	lf Res	•									Jop y		227.1	10		2-1	3

X - Direction Walls

	Main Floc	or Shear V	Valis - Wa	lis Below	the Uppe	r Floor Fra	ning				<u>Y - Dire</u>	ction Wa	alls											
	Fy (EQ) = Fy (wind) Wy =	= <u>15.9</u> 7730	kips (Stor kips (Stor PLF	y Shear) seismic	-	Story HT = Wall HT = Max h/w S _{DS} =	10.33 9 3.5 0.96																	
Wal Line A		SW Length	Trib	From EQ	Load Above Wind No S	EQ 2w/h hearwalls	EQ Shear , at gra	Wind Shear de	SW Callout	Reduced HD Length	EQ Gross Uplift	Wind Gross Uplift	(0.6-0.1	Q 4S _{ta})DL End J	Wi 0.6 ⁻ End i	DL	Net L From / End J	Above	Netl			down End j	EQ Line Load 2.3	Wind Line Load 4.2
C	a b c d	11.5 8.10 6.83 3.83				1.0 1.0 1.0 0.9	274 274 274 322	362 362 362 362	SW3 SW3 SW3 SW3	11.0 7.7 6.3 3.3	3.0 3.0 3.1 3.3	5.5 5.6 5.6 6.0	0.8 0.6 0.5 0.3	0.8 0.6 0.5 0.3	1.0 0.7 0.8 0.3	1.0 0.7 0.8 0.3	1.5 1.0 0.0	1.5 1.8 0.0	5.9 8.5 5.0 5.7	5.9 8.5 5.0 5.7	MST72 MST72 MST72 MST72	MST72 MST72 MST72 MST72	8.3 - -	15.4 - -
G		3.83 3.83	0.36337	1,4	2.3	0.9 0.9	188 188	235 235	SW6 SW6	3.3 3.3	1.9 1.9	3.9 3.9	0.3	0.3 0.3	0.3 0.3	0.3 0.3	7.7 0.0	7,7 0.0	11.2 3.6	11.2 3.6	HDU14 MST48	HDU14 MST48	1.2	2.5
						Fram	e suppo on this i	orts full	load fre	fer to addit om floor al paining load	bove in	additio	n to t	ributa	ary								3.0	5.6
																					0.8			
5																								
		Σ	1.0	7.1	11.8									Input (Cell Cell w/	Formu	la						14.8	27.7
)	¢		Descrip	otion				Walls								By Check	ked	C	TR	Date Date	02/	28/18
Ē) 4th Ave. Suite 20	South	١G	Project			ection										Scale Job N		N	ITS	Sheet N	 2-14	ł
	Edm	onds, WA	98020																152	27.1	0	′	~ 1	r

Lower Floor Shear Walls - Walls Below the Main Floor Framing

 Fx (EQ) =
 2.9 kips (Story Shear)
 Story HT =
 10.1

 Fx (wind) =
 9.4 kips (Story Shear)
 Wall HT =
 9

 Wx =
 2855 PL F
 seismic
 3.5

	wx= Wx=	2855 9400		wind		Ops -	00000000000	1																
r					Load						EQ	Wind		Q		ind		Jplift		rning		[EQ	Wind
Wali Line	Wall Mark	SW Length	Trib Width	From EQ	Above Wind	EQ 2w/h	EQ Shear	Wind Shear	SW Callout	Reduced HD Length	Gross Uplift	Gross Uplift		Endj		End j		End j	End i			Endj	Line Load	Line Load
1	a b c d	4.0 5.5 9.0	0,5	- - -	- - -	0.9 1.0 1.0 1.0	378 336 336 336 336	495 495 495 495	SW2 SW2 SW2 SW2	3.5 5.0 4.0 8.5	3.9 3.7 3.8 3.6	8.0 7.7 7.9 7.4	0.3 0.4 0.3 0.6	0.3 0.4 0.3 0.6	0.4 0.5 0.4 0.8	0.4 0.5 0.4 0.8	2.7 0.0 0.0	0.0	10.3 7.2 7.5 6.6	7.6 7.2 7.5 6.6	HDU14 HDU11 HDU11 HDU8	HDU11 HDU11 HDU11 HDU8	7.7	16.0 - - -
1																								
7	a b c d	5.5 3.67 10 14	0,5 - - -	6.3 - - -	-	1.0 0.8 1.0 1.0	233 285 233 233	343 343 343 343 343	SW4 SW4 SW4 SW4	5.0 3.2 9.5 13.5	2.6 2.7 2.5 2.4	5.3 5.6 5.1 5.0	0.4 0.3 0.7 1.0	0.4 0.3 0.7 1.0	0.5 0,3 0,9 1,3	0.5 0.3 0.9 1.3	8.3 8.3 3.5 8.1	6.3 6.3 3.5 3.5	11.1 11.6 7.7 9.9	11.1 11.8 7.7 7.3	HDU14 HDU11	HDU14	7.7	16.0
4																								
																							15.4	31.9
		Σ Nil SW6 SW4 SW3 SW2 2SW4 2SW3 2SW2 Re-Calc	1.0 alls: 1/2" sh ad@4"o.c ad@4"o.c ad@4"o.c ad@2"o.c ad@2"o.c ad@3"o.c ad@3"o.c	0 242 350 455 595 708 910	22.5 HF studs plf plf plf plf plf plf plf plf		NI None HDU2 HDU4 HDU5 HDU8 HDU11 HDU14 Re-Calc	- (2)-2x HF (2)-2x HF (2)-	3.3 4.1 7.0 1 9.5	kips kips kips kips kips kips kips kips				Input		Formul	la							
				880au	Descrip	tion	1	. Fl	- Ch	w \\/								Ву		 ר		Date	0.24	28/19
		<u>ب</u> ((Snea	r Walls								Checl	ked	L	TR	Date	02	28/18
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		Suite 200 Suite XA	0				Rudo	lf Res	•												0	2	2-15	>
																			152	27.1	U			

X - Direction Walls

	Lower Flo	or Shear	Walks - Wi	alls Below	the Mair	n Floor Fra	ming				<u>Y - Dire</u>	ction Wa	ills											
	Fy (EQ) = Fy (wind) :		kips (Stor kips (Stor			Story HT = Wall HT = Max h/w																		
	Wy= Wy=	2855 11000		seismic wind		S _{DS} =	0.96																	
Wali	Wall	sw	Trib		Load Above	EQ	EQ	Wind	sw	Reduced	EQ Gross	Wind Gross		4S _{D€})DL	0.6		From		Netl	rning Jplift		down	EQ Line	Wind Line
Line A	Mark	Length	Width	EQ	Wind	2w/h	Shear	Shear	Callout	HD Length	Uplift	Uplift	End i	End j	End i	End j	End i	<u>End j</u>	End i	End j	Endi	Endj	Load	Load
c			0,5	8.3	15.4																		9.7	20.9
			-			ull-Heigh		ete Base	ement															
G	1 2	3.83 3.83	0.5	1.2	2,5	0.9	283 283	458 458	SW2 SW2	3.3 3.3	2.8 2.8	7.4 7.4	0.3 0.3	0.3 0.3	0.3 0.3	0.3 0.3	11.2 3.6	11.2 3.8	18.3 10.7	18.3 10.7	0.0 HDU14	0.0 HDU14	1.8	4.9
	Z	3.83	-		-					, refer to a					\$235733 2384935		1	0.0	10.7	10.7	10014	1 DOI 4		
				3,0	5,8	a				d from flo remaining													3.8	8.7
																	ľ							
4																								
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		Σ	1.0	12.5	23.5									_									15.4	34.5
														Input Input	Cell Cell w/	Formu	la							
				886a.	Descrip	tion	Lowe	r Floor	Shea	r Walls								By		E	TR	Date	02	/28/18
								ection										Chec				Date		
€Ν		4th Ave.		4G	Project											~~~~		Scale Job N		Ν	ITS	Sheet N		,
		Suite 200 Suite XA	0				Rudo	lf Res	•											27.1	0		2-11	5

<u>ALLAGE PORTAL FIRAME</u> Design Louds Capacity Segmie =1.2th = 1.675th Word =2.0th = 2.345th

USE PORTAL PIZAME COBRACÉ

Table 1. Recommended Allowable Design Values for APA Portal Frame Used on a Rigid-Base

Minimum Width	Maximum Height	Allowable Design (ASD)	/alues per Frame Segment	
(in.)	(ft)	Shear ^(e,f) (lbf)	Deflection (in.)	Load Factor
	8	850	0.33	3.09
16	10	625	0.44	2.97
0.4	8	1,675	0.38	2.88
24	10	1,125	0.51	3.42

Foundation for Wind or Seismic Loading^(a,b,c,d)

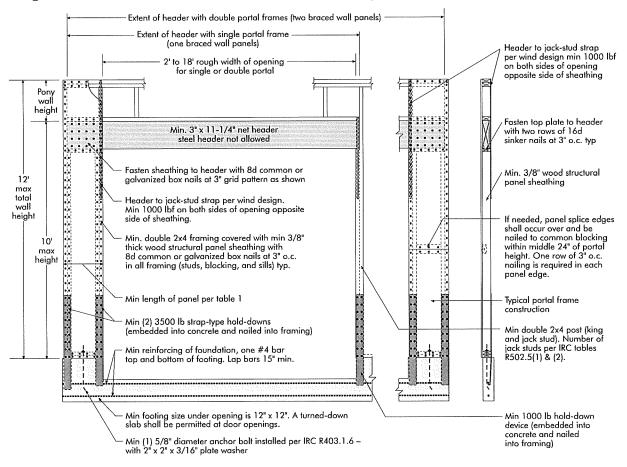
(a) Design values are based on the use of Douglas-fir or Southern pine framing. For other species of framing, multiply the above shear design value by the specific gravity adjustment factor = (1 – (0.5 – SG)), where SG = specific gravity of the actual framing. This adjustment shall not be greater than

(b) For construction as shown in Figure 1.

Values are for a single portal-frame segment (one vertical leg and a portion of the header). For multiple portal-frame segments, the allowable shear design values are permitted to be multiplied by the number of frame segments (e.g., two = 2x, three = 3x, etc.). (c)

- (d) Interpolation of design values for heights between 8 and 10 feet, and for portal widths between 16 and 24 inches, is permitted.
- (e) The allowable shear design value is permitted to be multiplied by a factor of 1.4 for wind design.
- If story drift is not a design consideration, the tabulated design shear values are permitted to be multiplied by a factor of 1.15. This factor is permitted (f) to be used cumulatively with the wind-design adjustment factor in Footnote (e) above.

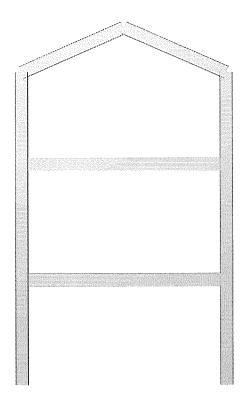
Figure 1. Construction Details for APA Portal-Frame Design with Hold Downs





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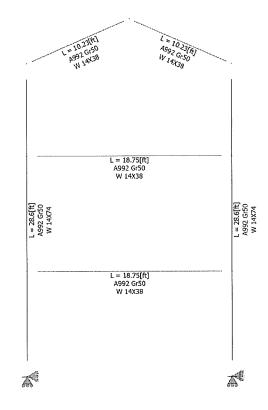
MOMENT FILAME DESIGN



Yanz X



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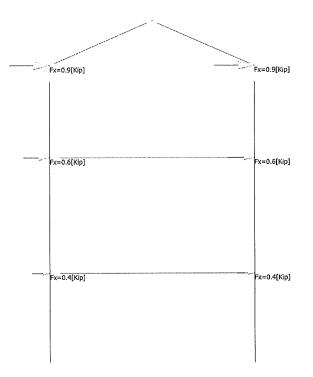


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Loads

Concentrated - Nodes

Seismiz Forces



Y A Z X

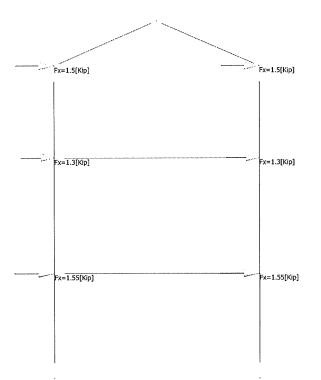


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Loads

Concentrated - Nodes

Wind Forces



X



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Seismic DelFadien (Straughlevel)

 $\Delta_2 = \frac{S_2 - S_1}{I_F} C_0 \leq \Delta_A$ $(\delta_2 - \delta_1)_{mat} = \frac{0.02(9 \times 12^2)}{5.5} = 0.372^2$ Tx=0.442955[in] A= 0.443-C.35 = 0.08 _010 $\left(S_{2}^{-}S_{1}\right)_{3=4} = \frac{0.02(10^{\circ} \times 12^{\circ})}{5.5} = 0.436^{\circ}$ Tx=0.36568[in] A = 0.366-0.213 = 0.153 _OT $Tx=0.213066[in] \left(S_2 - S_1\right)_{2=1} = \frac{0.02(10.2)(12.2)}{5.5} = 0.4445$ 5=0.218 (CR) Frame is adequate in dettection

Bentley HP Inc. Current Date: 2/28/2018 1:49 PM Units system: English File name: R:\2015 Projects\15227.20 Rudolf Residence Civil Design_Structural\Engineering\Lateral\New Lateral Analysis\Moment Frame\Moment Frame.etz\ Load condition: id7=DL+0.5LL+0.43WL Wind Delitections (per ASCE7-10 App. C) - Note optional check for servicebility - Bused on 72 mpt wind (10-year rescurance) (72 mph) (wind Pressure) = 0.43 - NSCE recommendes limit of 4600 28.6×12/ = 0.572 > 0.28 . Tx=0.27649[in] Tx=0.231481[in] France is adequite the Vel Hedim Tx=0.138606[in] <u>_X</u>



Current Date: 2/28/2018 1:50 PM Units system: English File name: R:\2015 Projects\15227.20 Rudolf Residence Civil Design_Structural\Engineering\Lateral\New Lateral Analysis\Moment Frame\Moment Frame.etz\

Steel Code Check

Report: Summary - Group by member

Load conditions to be included in design : id0=1.4DL id1=1.2DL+1.6LL+0.5SL id2=1.2DL+1.6LL+0.5WL id3=1.2DL+0.5LL+0.5SL+1.67WL Coverning lead Case id4=1.2DL+0.5LL+0.2SL+1.43EQ id5=0.9DL+1.67WL id6=0.6835DL+1.43EQ

Description	Section	Member	Ctrl Eq.	Ratio	Status	Reference
<u>Beam</u>	W 14X38	6 9 12 13	id3 at 100.00% id3 at 100.00% id5 at 0.00% id3 at 100.00%	0.35 0.21 0.09 0.13	ок ОК ОК ОК	Eq. H1-1b Eq. H1-1b Eq. H1-1b Eq. H1-1b
<u>Column</u>	W 14X74	1 2	 id5 at 33.33% id3 at 33.33%	0.15 0.17	ОК ОК	Eq. H1-1b Eq. H1-1b

All members are adequate in streigth

<u></u>			t Frames (Reduced			
	P		nic Design Manual 2	2012		1
Beam Proper	ties for W14x38	-	erties for W14x74			
L=	228.4 in	A _g =	21.8 in ²		L	
d=	14.1 in	d=	14.2 in	L'		
t _w =	0.31 <i>in</i>	t _w =	0.45 in		C	
b _f =	6.77 in	b _f =	10.1 in			
t _f =	0.515 in	t _f =	0.785 in			
Z _x =	61.5 in ³	k _{det} =	1.625 in		b	
R _y =	1.1 in 2	Z _x =	126 in ³	R	*\	
r _y =	1.55 in					
F _y =	50 <i>ksi</i>			S _h	a	
F _u =	65 <i>ksi</i>				a	
	ions (per AISC 538 5.3-1	.)		Ľ		
	Depth ≤ W36					\vee
	Weight ≤ 300 lbs/ft					
	r _f ≤ 1.75"					
	Clear Span-to-Depth Rat			a = .6*bf =	4.1 in (Eq. 5.8-1)	
N	Width-to Thickness Ratio	os per Seismic	Provisions	b = .75*d =	10.6 in (Eq. 5.8-2)	
	ateral Bracing per Seisn	nic Provisions		c = .2*bf =	1.4 in (Eq. 5.8-3)	
I	Protected Zone			(refer to RBS detail	sheets by CG Eng)	
Compute Pro	bable Maximum Mome					
ž	$Z_{RBS} = Z_x - 2ct_f(d-t_f) =$	42.6 <i>i</i>	n ³	(AIS	C 358 Eq. 5.8-4)	
($C_{pr} = (F_y + F_u)/2F_y \le 1.2 =$	1.15		(AISO	C 358 Eq. 2.4.3-2)	
1	$M_{pr} = C_{pr}R_{y}F_{y}Z_{RBS} =$	2692 <i> </i>	kip-in	(AIS	C 358 Eq. 5.8-5)	
Compute She	ar Force @ Center of RI	3S				
	S _h = a + b/2 =	9.3 <i>i</i>	in			
	V _{RBS} =	5.30 /	kips (factored shear d	due to gravity loads a	t S _h per RAM mode	el)
Compute Ma	ximum Moment @ Face	e of Column				
I	$M_f = M_{pr} + V_{RBS}S_h =$	2741.1 /	kip-in	(AIS	C 358 Eq. 5.8-6)	
Check Flexura	al Strength of the Beam	@ the Face of	the Column			
1	M _{pe} =R _y F _y Z _x =	3382.5	kip-in	(AIS	C 358 Eq. 5.8-7)	
	M _f ≤φ _d M _{pe}	ΟΚΑΥ		•	C 358 Eq. 5.8-8)	
	for $\phi_d = 1.0$					
	Description			Ву	Date	
; C	•			Check	ed Date	
-0- NEERING	Reduced B	eam Section .	Analysis		-	
				Scale	Shee	t No.
h Ave South	Project			Job No).	
uite 200	Rudolf Res					

	Per	AISC Seismic D	esign I	Manual 2	012	
Determine t	he Required Shear Strength	of the Beam				
	L _h =	195.5 in				
	V _{gravity} =	5.3 <i>kips</i>		(factored	shear at face of column per RAM r	
	$V_u = 2*M_{pr}/L_h + V_{gravity} =$	32.78 kips			(AISC 358 Eq. 5.8-9	
	φVn (web)=	195.0 kips		ΟΚΑΥ	(per AISC Section G	
	φVn (weld)=	195.0 kips		ΟΚΑΥ	(per AISC Section J)
Check Colun	nn-Beam Relationship Limit	ations				
	$M_{uv} = V_{RBS}^{*}(a+b/2+d_c/2) =$		87	kip-in		
	$\Sigma M_{pb}^* = \Sigma (M_{pr} + M_v)$			kip-in	(Seismic Provisions	s Eq. E3-3a
	P _{uc} =		18.27	kips	(factored axial demand per RAN	∕l output)
	$\Sigma M_{pc}^* = \Sigma Z_{xc} (F_{yc} - P_{uc} / A_g)$		6194	kip-in	(Seismic Provisions	s Eq. E3-2a
	$\Sigma M_{pc}^*/\Sigma M_{pb}^* \ge 1.0 =$		2.23	ΟΚΑΥ		
Check Colun	nn Panel Zone Shear Streng	th				
	$R_u = \Sigma M_f / (d - t_f) =$	201.8 kips				
	.75*F _y *A _g =	817.5 kips	>	USE J10-	-11	
	φRn =	231 kips		OKAY! D	OUBLER PLATE NOT REQ'D	
Check Conti	nuity Plate Requirements					
	$t_{cf} \ge .4 \sqrt{(1.8b_{bf}t_{bf}F_{yb}R_{yb}/(F_{yc}*$	(R _{yc})) =		REQUIRE		
	t _{cf} ≥b _{bf} /6 =			REQUIRE		
	lf	required, contin	nuity pla	ates shall	match thickness of beam flanges	
	Description				Ву	Date
			1		Checked	Date
NEERING	Reduced Bea	m Section Ana	lysis		Scale	Sheet No.
th Ave South Suite 200	Project				Job No.	