LAKE MEAD TITLE LOAN
615 LAKE MEAD PARKWAY
HENDERSON, NV. 840157

LRP PROJECT NO: 1150374

STRUCTURAL DESIGN CALCULATIONS

PREPARED FOR LAKE MEAD TITLE LOAN

BY

LRP

L.R. POPE ENGINEERING, INC.
1240 E 100 S #15B
ST. GEORGE, UTAH 84790
1-435-628-1676

STATE OF NEVADA
6008
LLOYD RIED
POPE
EXP: 12-31-19
CIVIL
PROFESSIONAL ENGINEER

11-20-19

Project Information

Project Number: 1150374
Project Name: Lake Mead Title Loan 615 Lake Mead Parkway
Project Location: Henderson, NV. 840157

Project Design Criteria per IBC 2018

Gravity Loads

Roof:			
	Live Load	20	psf
	Dead Load	15	psf
Floor:			
	Live Load	125	psf (Light Storage)
	Dead Load	15	psf

Lateral Loads:

Seismic:

Latitude: 37.05618° N Longitude: -113.547918° W
Seismic Design Category : C
Site Class: C
Occupancy Category: II
Importance Factor: 1.00
Seismic force resisting system: Light framed wall sheathed w/ wood structural panels and ordinary steel moment frames
Response Modification Factor: 6.5, 3.5
Overstrength Factor: 3.0, 3.0
Deflection Amplification factor: 4.0, 4.0
Design Base shear, V = CsW: 0.0812W
Analysis procedure: Equivalent lateral force procedure
S_{DS}: 0.528

Wind:

Design Wind Speed: 100 mph
Exposure: C
Occupancy category: II
Importance Factor: 1.00
Height and exposure coefficient: 1.21

Deflection criteria

	Live load	Total load
Roof members:	L/360	L/240
Floor members:	L/360	L/240
Walls:	L/240	

Project Specifications

Allowable soil bearing capacity = 2000 psf
Soils Report = DuPont Engineering, Inc. dated December 14, 2015.
Concrete f'c = 4,500 psi
Reinforcing steel: ASTM A615 Grade 60 steel
Solid sawn lumber = DF #2 (min)
Laminated veneer lumber = Fb = 2,600 psi (min), Fv = 285 psi (min)
Glulam lumber = 24F-V4 (min) and as noted on construction drawings
Structural steel = W sections – ASTM A992, Fy = 50 ksi
Angle Sections – ASTM A36, Fy = 36 ksi
Plates, bars, and other shapes – ASTM A36, Fy = 36 ksi
High strength bolts = ASTM A325
Anchor bolts and rods = ASTM F1554, GR. 36
Threaded rods = ASTM A36
Post installed anchor bolts = As specified on construction drawings
Shear stud connectors = ASTM A108
Cold formed steel studs ASTM A653/653 M galvanized

** Materials provided to construct this project shall conform to the specifications listed above. No material specifications are to be changed without the consent of the engineer of record. Some aspects of the structural design may require different material specifications than what is listed above. In that case, those requirements will be noted in the construction drawings.**

General Notes and Requirements

Install Simpson straps, tie downs, and other hardware and meet all nailing, reinforcement and other structural requirements as noted on the construction drawings and within the pages of this document. The structural calculations are based on the structural criteria listed above. If the conditions listed herein are not met or are different from what was assumed, it shall be brought to the attention of the engineer. Roof truss system is to be engineered by the supplier and reviewed and approved by the engineer of record. All structural engineering has been performed according to the project soils report provided to this firm. In the event that a project soils report is not provided to this firm or does not exist, this engineering assumes that the building site is dry and stable with no adverse conditions or soils such as: a high water table, expansive clays, plastic clays, collapsible soils, fills etc. that could cause future flooding, settlement, site instability, or other adverse conditions. Any site engineering including grading, drainage, and site retaining walls is the responsibility of others. These calculations and engineering are for the building structure only and do not provide any engineering analysis of or liability/warranty for the non-structural portions of the building, or the site itself. The purpose of these calculations and engineering is to help reduce structural damage and loss of life due to seismic activity and/or high wind conditions. The contractor shall verify all conditions, dimensions and structural details of the drawing. Multiple uses of structural design calculations are not permitted.

1. Contractor to verify all dimensions, spans, and conditions and notify engineer of any errors, omissions, or discrepancies prior to construction.
2. If discrepancies are found in the project specifications, the more stringent specification shall be followed.

3. Contractor shall assure that all materials are used per manufactures recommendations.
4. Site engineering and liability shall be provided by the owner/builder as required.
5. Contractor shall assure that soil footings bear on is properly drained and dry prior to pouring foundation. Footings shall bear on undisturbed native soil or soil approved by the project geotechnical engineer a minimum of 14 inches below finished grade. Foundation shall have a minimum horizontal clearance from ascending slopes shall be a minimum of 25 feet unless approved by the project geotechnical engineer.
6. The contractor shall conform to all building codes and practices as per the IBC 2012 edition and its referenced standards.
7. Builder shall follow all recommendations found in the project soils report and all referenced documents, letters, and addendums.
8. Contractor to verify all dimensions, spans, and conditions with architectural drawings. If any omissions, mistakes, or discrepancies exist within the construction drawings, the engineer shall be promptly notified so that he may have the opportunity to take whatever steps necessary to resolve them. Failure to promptly notify the engineer of such conditions shall absolve the engineer from any responsibility for the consequences of such a failure.
9. If discrepancies are found, the more stringent specification shall be followed. Contractor is responsible for adequate bracing of structural members, walls, and non-structural items during construction.
10. The engineer and his consultants do not warrant or guarantee the accuracy and completeness of the work herein beyond a reasonable diligence. If any omissions, mistakes, or discrepancies are found to exist within the work product, the engineer shall be promptly notified so that he may have the opportunity to take whatever steps necessary to resolve them. Failure to promptly notify the engineer of such conditions shall absolve the engineer from any responsibility for the consequences of such a failure.
11. Many portions of the construction documents, notes, and specifications are the result of demands by various approving agencies that must be performed as part of this work product. Any actions taken without the knowledge and consent of the engineer shall become the responsibility not of the engineer, but of the parties responsible for making the change and taking action to do so. Action taken without the knowledge and consent of the engineer or the contradiction of the engineer's work product, the intent, and/or recommendations, shall become the responsibility not of the engineer, but of the parties responsible for taking such action. The engineer should be contacted in matters of any and all changes to the drawings and specifications herein without exception.
12. Non structural framing requirements are not specified on the structural drawings. See architectural drawings for any additional framing required.
13. Contractor shall assure that all products and hardware are used and installed per manufacturer's recommendations and requirements.

****Refer to Sheet S0.10 of the construction documents for additional project specifications and requirements****

Required Project Special Inspections

Inspection of fabricators per IBC 1704.2.5

Inspection of steel construction per IBC 1705.2 & Table 1705.2.3

Concrete special Inspection per IBC 1705.3 & Table 1705.3
Soils inspections per IBC 1705.6 & Table 1705.6
Post installed anchor bolts per manufacturer and ICC report requirements

(2) 2X8 DF #2 Span Table

27-Jun-12

	Pitch 0.5:12		2:12		3:12		4:12		5:12		6:12	
Beam Clear Span	Trib. Width (ft)	Support Reaction (lbs)	Trib. Width (ft)	Support Reaction (lbs)	Trib. Width (ft)	Support Reaction (lbs)	Trib. Width (ft)	Support Reaction (lbs)	Trib. Width (ft)	Support Reaction (lbs)	Trib. Width (ft)	Support Reaction (lbs)
2.0	**70.83**	2796	**54.67**	2795	**54.17**	2795	**53.50**	2796	**52.67**	2795	**51.75**	2797
2.5	**57.92**	2795	**44.75**	2797	**44.33**	2797	**43.75**	2795	**43.08**	2796	**42.33**	2798
3.0	**49.00**	2796	**37.83**	2796	**37.50**	2797	**37.00**	2795	**36.42**	2795	**35.75**	2794
3.5	**42.42**	2794	**32.75**	2794	**32.42**	2792	**32.08**	2798	**31.58**	2798	**31.00**	2797
4.0	**32.67**	2585	**25.25**	2588	**25.00**	2586	**24.67**	2584	**24.33**	2589	**23.83**	2583
4.5	**26.42**	2325	**20.42**	2327	**20.25**	2330	**19.92**	2321	**19.67**	2328	**19.25**	2321
5.0	**21.75**	2108	**16.83**	2113	**16.67**	2112	**16.42**	2107	**16.17**	2107	**15.92**	2113
5.5	**18.25**	1932	**14.08**	1931	**13.92**	1926	**13.75**	1928	**13.58**	1934	**13.33**	1934
6.0	**15.50**	1781	**12.00**	1785	**11.83**	1777	**11.67**	1774	**11.50**	1777	**11.33**	1783
6.5	**13.33**	1652	**10.25**	1645	**10.17**	1647	**10.08**	1654	**9.92**	1652	**9.75**	1654
7.0	**11.58**	1540	**8.92**	1536	**8.83**	1535	**8.75**	1540	**8.58**	1535	**8.42**	1533
7.5	**10.17**	1445	**7.83**	1441	**7.75**	1440	**7.67**	1442	**7.50**	1433	**7.42**	1443
8.0	**8.92**	1349	**6.92**	1355	**6.83**	1351	**6.75**	1352	**6.67**	1356	**6.50**	1347
8.5	**7.92**	1271	**6.08**	1265	**6.08**	1276	**6.00**	1275	**5.92**	1277	**5.75**	1264
9.0	**7.08**	1203	**5.50**	1209	**5.42**	1202	**5.33**	1199	**5.25**	1199	**5.17**	1201
9.5	**6.42**	1149	**4.92**	1141	**4.83**	1132	**4.83**	1146	**4.75**	1144	**4.67**	1145
10.0	**5.75**	1084	**4.42**	1079	**4.42**	1088	**4.33**	1082	**4.25**	1078	**4.17**	1076

Continued

	7:12		8:12		9:12		10:12		11:12		12:12	
Beam Clear Span	Trib. Width (ft)	Support Reaction (lbs)	Trib. Width (ft)	Support Reaction (lbs)	Trib. Width (ft)	Support Reaction (lbs)	Trib. Width (ft)	Support Reaction (lbs)	Trib. Width (ft)	Support Reaction (lbs)	Trib. Width (ft)	Support Reaction (lbs)
2.0	**50.67**	2796	**49.58**	2797	**48.42**	2797	**47.17**	2794	**46.00**	2796	**44.83**	2798
2.5	**41.42**	2794	**40.50**	2794	**39.58**	2796	**38.58**	2795	**37.58**	2793	**36.67**	2798
3.0	**35.00**	2792	**34.25**	2794	**33.50**	2798	**32.67**	2798	**31.83**	2797	**31.00**	2797
3.5	**30.33**	2793	**29.67**	2794	**29.00**	2796	**28.25**	2793	**27.58**	2798	**26.83**	2795
4.0	**23.42**	2590	**22.83**	2583	**22.33**	2587	**21.75**	2583	**21.25**	2589	**20.67**	2586
4.5	**18.92**	2327	**18.50**	2328	**18.08**	2330	**17.58**	2323	**17.17**	2327	**16.67**	2319
5.0	**15.58**	2112	**15.25**	2113	**14.83**	2105	**14.50**	2109	**14.17**	2115	**13.75**	2107
5.5	**13.08**	1936	**12.75**	1930	**12.42**	1925	**12.17**	1933	**11.83**	1929	**11.50**	1925
6.0	**11.08**	1780	**10.83**	1779	**10.58**	1780	**10.33**	1781	**10.08**	1784	**9.83**	1786
6.5	**9.50**	1645	**9.33**	1653	**9.08**	1647	**8.83**	1643	**8.67**	1653	**8.42**	1649
7.0	**8.25**	1534	**8.08**	1536	**7.92**	1541	**7.67**	1530	**7.50**	1536	**7.33**	1542
7.5	**7.25**	1440	**7.08**	1439	**6.92**	1439	**6.75**	1439	**6.58**	1440	**6.42**	1441
8.0	**6.42**	1357	**6.25**	1351	**6.08**	1347	**5.92**	1343	**5.83**	1359	**5.67**	1355
8.5	**5.67**	1271	**5.58**	1281	**5.42**	1272	**5.25**	1265	**5.17**	1277	**5.00**	1269
9.0	**5.08**	1206	**4.92**	1193	**4.83**	1201	**4.75**	1210	**4.58**	1198	**4.50**	1208
9.5	**4.58**	1147	**4.42**	1131	**4.33**	1136	**4.25**	1142	**4.17**	1149	**4.00**	1133
10.0	**4.08**	1076	**4.00**	1078	**3.92**	1081	**3.83**	1085	**3.75**	1089	**3.67**	1093

(1) Trimmer provided for spans less than 4'. (2) Trimmers for spans equal to and greater than 4'.
Uniform Loading is as follows: Pitched Roof, DL 25 psf, LL 20 psf and Flat Roof, DL 15 psf, LL 20 psf.
Unbraced Length is equal to beam's clear span
Deflection Criteria is as follows, LL L/360, TL L/240
Created with LR Pope Engr. - ASD Wood Member Design v7.0.5 (10-20-11)

(2) 2X10 DF #2 Span Table

27-Jun-12

Beam Clear Span	Pitch 0.5:12		2:12		3:12		4:12		5:12		6:12	
	Trib. Width (ft)	Support Reaction (lbs)	Trib. Width (ft)	Support Reaction (lbs)	Trib. Width (ft)	Support Reaction (lbs)	Trib. Width (ft)	Support Reaction (lbs)	Trib. Width (ft)	Support Reaction (lbs)	Trib. Width (ft)	Support Reaction (lbs)
2.0	**70.83**	2798	**54.67**	2796	**54.17**	2796	**53.50**	2797	**52.67**	2797	**51.67**	2795
2.5	**57.92**	2797	**44.67**	2794	**44.25**	2794	**43.75**	2797	**43.08**	2798	**42.25**	2795
3.0	**48.92**	2794	**37.75**	2792	**37.42**	2794	**37.00**	2798	**36.42**	2797	**35.75**	2796
3.5	**42.42**	2797	**32.75**	2797	**32.42**	2794	**32.00**	2793	**31.50**	2793	**30.92**	2792
4.0	**48.75**	3855	**37.67**	3858	**37.33**	3859	**36.83**	3856	**36.25**	3855	**35.58**	3854
4.5	**39.42**	3467	**30.42**	3465	**30.17**	3468	**29.75**	3464	**29.25**	3459	**28.75**	3463
5.0	**32.42**	3139	**25.08**	3146	**24.83**	3144	**24.50**	3141	**24.17**	3147	**23.67**	3139
5.5	**27.17**	2873	**21.00**	2876	**20.75**	2869	**20.50**	2870	**20.25**	2880	**19.83**	2873
6.0	**23.08**	2648	**17.83**	2650	**17.67**	2649	**17.42**	2645	**17.17**	2648	**16.83**	2645
6.5	**19.83**	2454	**15.33**	2457	**15.17**	2453	**15.00**	2457	**14.75**	2454	**14.50**	2457
7.0	**17.25**	2290	**13.33**	2292	**13.17**	2285	**13.00**	2284	**12.83**	2291	**12.58**	2287
7.5	**15.08**	2139	**11.67**	2142	**11.50**	2132	**11.42**	2143	**11.25**	2145	**11.00**	2136
8.0	**13.33**	2012	**10.25**	2003	**10.17**	2006	**10.08**	2014	**9.92**	2012	**9.75**	2015
8.5	**11.83**	1894	**9.17**	1900	**9.08**	1900	**8.92**	1890	**8.75**	1884	**8.67**	1900
9.0	**10.58**	1791	**8.17**	1790	**8.08**	1789	**8.00**	1793	**7.83**	1783	**7.75**	1796
9.5	**9.50**	1696	**7.33**	1696	**7.25**	1692	**7.17**	1694	**7.08**	1700	**6.92**	1691
10.0	**8.58**	1612	**6.58**	1602	**6.58**	1617	**6.50**	1616	**6.33**	1600	**6.25**	1608

Continued

Beam Clear Span	7:12		8:12		9:12		10:12		11:12		12:12	
	Trib. Width (ft)	Support Reaction (lbs)	Trib. Width (ft)	Support Reaction (lbs)	Trib. Width (ft)	Support Reaction (lbs)	Trib. Width (ft)	Support Reaction (lbs)	Trib. Width (ft)	Support Reaction (lbs)	Trib. Width (ft)	Support Reaction (lbs)
2.0	**50.67**	2797	**49.50**	2794	**48.33**	2794	**47.17**	2795	**46.00**	2797	**44.75**	2794
2.5	**41.42**	2796	**40.50**	2796	**39.50**	2793	**38.58**	2797	**37.58**	2795	**36.58**	2794
3.0	**35.00**	2794	**34.25**	2796	**33.42**	2794	**32.58**	2793	**31.75**	2792	**30.92**	2792
3.5	**30.33**	2796	**29.67**	2796	**28.92**	2791	**28.25**	2795	**27.50**	2792	**26.83**	2797
4.0	**34.92**	3860	**34.08**	3853	**33.33**	3859	**32.50**	3857	**31.67**	3856	**30.83**	3855
4.5	**28.17**	3463	**27.58**	3468	**26.92**	3465	**26.25**	3465	**25.58**	3465	**24.92**	3465
5.0	**23.17**	3136	**22.67**	3138	**22.17**	3142	**21.58**	3137	**21.08**	3144	**20.50**	3139
5.5	**19.42**	2871	**19.00**	2872	**18.58**	2877	**18.08**	2870	**17.67**	2877	**17.17**	2871
6.0	**16.50**	2646	**16.17**	2651	**15.75**	2645	**15.42**	2654	**15.00**	2650	**14.58**	2645
6.5	**14.17**	2450	**13.92**	2461	**13.58**	2460	**13.25**	2460	**12.92**	2460	**12.50**	2445
7.0	**12.33**	2288	**12.08**	2292	**11.75**	2283	**11.50**	2291	**11.17**	2282	**10.92**	2291
7.5	**10.75**	2131	**10.58**	2145	**10.33**	2145	**10.08**	2146	**9.75**	2129	**9.50**	2130
8.0	**9.50**	2004	**9.33**	2013	**9.08**	2006	**8.83**	2001	**8.67**	2014	**8.42**	2008
8.5	**8.42**	1883	**8.25**	1888	**8.08**	1894	**7.83**	1882	**7.67**	1890	**7.50**	1898
9.0	**7.58**	1794	**7.42**	1794	**7.25**	1796	**7.00**	1778	**6.83**	1781	**6.67**	1784
9.5	**6.75**	1685	**6.67**	1701	**6.50**	1699	**6.33**	1697	**6.17**	1695	**6.00**	1694
10.0	**6.17**	1619	**6.00**	1611	**5.83**	1604	**5.67**	1598	**5.58**	1615	**5.42**	1609

(1) Trimmer provided for spans less than 4'. (2) Trimmers for spans equal to and greater than 4'.
Uniform Loading is as follows: Pitched Roof, DL 25 psf, LL 20 psf and Flat Roof, DL 15 psf, LL 20 psf.
Unbraced Length is equal to beam's clear span
Deflection Criteria is as follows, LL L/360, TL L240
Created with LR Pope Engr. - ASD Wood Member Design v7.0.5 (10-20-11)

(2) 9-1/2" LVL Span Table

27-Jun-12

	Pitch 0.5:12		2:12		3:12		4:12		5:12		6:12		7:12		8:12		9:12		10:12		11:12		12:12	
Beam Clear Span	Trib. Width (ft)	Support Reaction (lbs)	Trib. Width (ft)	Sprt. Rea. (Lbs)	Trib. Width (ft)	Sprt. Rea. (Lbs)	Trib. Width (ft)	Sprt. Rea. (Lbs)	Trib. Width (ft)	Sprt. Rea. (Lbs)	Trib. Width (ft)	Sprt. Rea. (Lbs)	Trib. Width (ft)	Sprt. Rea. (Lbs)	Trib. Width (ft)	Sprt. Rea. (Lbs)	Trib. Width (ft)	Sprt. Rea. (Lbs)	Trib. Width (ft)	Sprt. Rea. (Lbs)	Trib. Width (ft)	Sprt. Rea. (Lbs)	Trib. Width (ft)	Sprt. Rea. (Lbs)
2.0	82.58	3264	63.75	3263	63.17	3263	62.33	3261	61.42	3264	60.25	3261	59.08	3264	57.75	3262	56.42	3264	55.00	3262	53.58	3261	52.25	3265
2.5	67.50	3263	52.08	3261	51.58	3260	51.00	3264	50.17	3261	49.25	3261	48.25	3260	47.25	3265	46.08	3261	45.00	3264	43.83	3263	42.67	3261
3.0	57.08	3264	44.08	3264	43.67	3263	43.08	3261	42.42	3261	41.67	3262	40.83	3263	39.92	3262	39.00	3264	38.00	3260	37.08	3265	36.08	3262
3.5	52.50	3465	38.17	3263	37.75	3258	37.33	3263	36.75	3263	36.08	3262	35.33	3261	34.58	3263	33.75	3261	32.92	3261	32.08	3261	31.25	3262
4.0	82.58	6528	63.75	6526	63.17	6527	62.33	6523	61.42	6528	60.25	6522	59.08	6528	57.75	6525	56.42	6527	55.00	6524	53.58	6522	52.25	6530
4.5	74.25	6524	57.33	6524	56.83	6527	56.08	6523	55.25	6528	54.25	6528	53.17	6530	51.92	6520	50.75	6527	49.50	6526	48.25	6528	47.00	6528
5.0	67.50	6526	52.08	6521	51.58	6519	51.00	6528	50.17	6522	49.25	6521	48.25	6521	47.25	6530	46.08	6522	45.00	6529	43.83	6526	42.67	6522
5.5	61.83	6524	47.75	6525	47.33	6528	46.67	6518	46.00	6527	45.17	6526	44.25	6526	43.25	6523	42.25	6525	41.17	6518	40.17	6526	39.08	6520
6.0	57.08	6527	44.08	6528	43.67	6527	43.08	6522	42.42	6522	41.67	6525	40.83	6527	39.92	6524	39.00	6527	38.00	6521	37.08	6529	36.08	6523
6.5	53.00	6529	40.92	6528	40.50	6522	40.00	6523	39.42	6529	38.67	6523	37.92	6529	37.08	6530	36.17	6521	35.25	6516	34.42	6528	33.50	6524
7.0	49.42	6525	38.17	6526	37.75	6516	37.33	6526	36.75	6525	36.08	6525	35.33	6521	34.58	6527	33.75	6523	32.92	6522	32.08	6523	31.25	6523
7.5	46.33	6528	35.75	6523	35.42	6523	35.00	6528	34.42	6521	33.83	6528	33.08	6516	32.42	6528	31.58	6513	30.83	6519	30.08	6526	29.25	6515
8.0	43.58	6527	33.67	6529	33.33	6525	32.92	6526	32.42	6528	31.83	6529	31.17	6524	30.50	6528	29.75	6521	29.00	6517	28.25	6514	27.50	6511
8.5	39.58	6280	30.58	6284	30.25	6274	29.92	6284	29.42	6276	28.92	6283	28.33	6284	27.67	6274	27.08	6290	26.42	6290	25.67	6271	25.00	6271
9.0	34.67	5812	26.75	5808	26.50	5807	26.17	5807	25.75	5805	25.33	5816	24.83	5819	24.25	5811	23.67	5807	23.08	5807	22.50	5808	21.92	5809
9.5	29.67	5242	22.92	5244	22.67	5236	22.42	5244	22.08	5247	21.67	5243	21.25	5249	20.75	5241	20.25	5238	19.75	5237	19.25	5238	18.75	5238
10.0	25.58	4754	19.75	4753	19.58	4757	19.33	4756	19.00	4747	18.67	4750	18.33	4762	17.92	4758	17.50	4760	17.08	4763	16.58	4745	16.17	4749
10.5	22.25	4338	17.17	4335	17.00	4333	16.75	4324	16.50	4326	16.25	4339	15.92	4338	15.50	4320	15.17	4328	14.83	4340	14.42	4328	14.08	4341
11.0	19.42	3965	15.00	3967	14.83	3960	14.67	3965	14.42	3959	14.17	3962	13.83	3949	13.58	3965	13.25	3960	12.92	3958	12.58	3957	12.25	3955
11.5	17.08	3647	13.17	3640	13.00	3628	12.83	3627	12.67	3637	12.42	3631	12.17	3631	11.92	3636	11.67	3646	11.33	3631	11.08	3643	10.75	3629
12.0	15.08	3361	11.58	3343	11.50	3350	11.33	3344	11.17	3347	11.00	3357	10.75	3349	10.50	3345	10.25	3344	10.00	3345	9.75	3346	9.50	3347
12.5	13.33	3097	10.25	3084	10.17	3088	10.08	3101	9.92	3098	9.75	3102	9.50	3085	9.33	3099	9.08	3089	8.83	3080	8.67	3100	8.42	3091
13.0	11.92	2882	9.17	2871	9.08	2872	9.00	2881	8.83	2873	8.67	2871	8.50	2874	8.33	2881	8.08	2862	7.92	2873	7.67	2856	7.50	2868
13.5	10.58	2662	8.17	2660	8.08	2658	8.00	2664	7.92	2677	7.75	2669	7.58	2666	7.42	2666	7.25	2669	7.08	2673	6.92	2678	6.67	2651
14.0	9.50	2482	7.33	2481	7.25	2476	7.17	2479	7.08	2488	6.92	2475	6.83	2495	6.67	2489	6.50	2485	6.33	2483	6.17	2481	6.00	2478
14.5	8.58	2327	6.58	2312	6.58	2333	6.50	2332	6.33	2309	6.25	2320	6.08	2306	6.00	2325	5.83	2315	5.67	2306	5.58	2330	5.42	2322
15.0	7.75	2178	6.00	2184	5.92	2174	5.83	2171	5.75	2173	5.67	2181	5.50	2161	5.42	2176	5.25	2160	5.17	2179	5.00	2164	4.92	2184
15.5	7.00	2038	5.42	2043	5.33	2030	5.25	2024	5.17	2024	5.08	2028	5.00	2035	4.92	2046	4.75	2025	4.67	2039	4.50	2018	4.42	2033
16.0	6.33	1909	4.92	1919	4.83	1905	4.83	1928	4.75	1925	4.67	1926	4.50	1897	4.42	1904	4.33	1912	4.25	1922	4.08	1896	4.00	1907
16.5	5.75	1794	4.50	1817	4.42	1801	4.33	1790	4.33	1817	4.25	1815	4.17	1816	4.00	1784	3.92	1789	3.83	1794	3.75	1801	3.67	1808
17.0	5.25	1693	4.08	1705	4.00	1687	4.00	1707	3.92	1698	3.83	1693	3.75	1691	3.67	1691	3.58	1692	3.50	1694	3.42	1697	3.33	1699
17.5	4.83	1610	3.75	1618	3.67	1598	3.67	1617	3.58	1606	3.50	1598	3.42	1592	3.33	1589	3.25	1586	3.17	1585	3.08	1583	3.00	1582
18.0	4.42	1520	3.42	1523	3.33	1501	3.33	1519	3.25	1505	3.25	1531	3.17	1523	3.08	1517	3.00	1512	2.92	1507	2.83	1503	2.75	1498

(1) Trimmer provided for spans less than 4'. (2) Trimmers for spans equal to and greater than 4'.

Uniform Loading is as follows: Pitched Roof, DL 25 psf, LL 20 psf and Flat Roof, DL 15 psf, LL 20 psf.

Unbraced Length is equal to beam's clear span

Deflection Criteria is as follows, LL L/360, TL L240

Created with LR Pope Engr. - ASD Wood Member Design v7.0.5 (10-20-11)

Floor Span Table

27-Jun-12

	(2) 2X10DF#2		(2) 9-1/2"LVL		(2) 11-78" LVL	
Beam Clear Span	Trib. Width (ft)	Support Reaction (lbs)	Trib. Width (ft)	Support Reaction (lbs)	Trib. Width (ft)	Support Reaction (lbs)
2.0	**45.08**	2797	**52.58**	3265	**52.50**	3262
2.5	**36.83**	2795	**42.92**	3259	**42.92**	3262
3.0	**31.17**	2796	**36.33**	3263	**36.25**	3259
3.5	**27.00**	2797	**31.42**	3258	**31.42**	3263
4.0	**24.83**	3088	**50.58**	6282	**52.50**	6524
4.5	**20.08**	2778	**45.50**	6280	**47.25**	6527
5.0	**16.50**	2514	**41.33**	6278	**42.92**	6524
5.5	**13.83**	2302	**37.92**	6285	**39.33**	6526
6.0	**11.75**	2122	**34.92**	6273	**36.25**	6519
6.5	**10.08**	1964	**32.42**	6274	**33.67**	6523
7.0	**8.75**	1829	**29.50**	6121	**31.42**	6525
7.5	**7.67**	1713	**25.83**	5722	**29.42**	6520
8.0	**6.75**	1606	**22.83**	5379	**27.67**	6519
8.5	**6.00**	1515	**20.33**	5076	**26.08**	6510
9.0	**5.42**	1446	**18.17**	4792	**24.75**	6524
9.5	**4.83**	1362	**16.33**	4540	**23.50**	6523
10.0	**4.33**	1286	**14.75**	4310	**22.17**	6464
10.5	x	x	**13.08**	4011	**20.08**	6142
11.0	x	x	**11.50**	3693	**18.25**	5841
11.5	x	x	**10.08**	3386	**16.67**	5573
12.0	x	x	**8.92**	3126	**15.33**	5347
12.5	x	x	**7.92**	2893	**14.08**	5114
13.0	x	x	**7.08**	2695	**13.00**	4908
13.5	x	x	**6.33**	2506	**12.00**	4705
14.0	x	x	**5.67**	2330	**11.08**	4507
14.5	x	x	**5.17**	2204	**10.08**	4250
15.0	x	x	**4.67**	2064	**9.17**	4001
15.5	x	x	**4.25**	1948	**8.33**	3764
16.0	x	x	**3.83**	1819	**7.58**	3541
16.5	x	x	**3.50**	1719	**6.92**	3337
17.0	x	x	**3.25**	1649	**6.33**	3154
17.5	x	x	**3.00**	1572	**5.83**	2997
18.0	x	x	**2.75**	1489	**5.33**	2825

(1) Trimmer provided for spans less than 4', (2) Trimmers all else.
Uniform Loading is as follows: DL 15 psf, LL 40 psf.
Unbraced Length is equal to beam's clear span
Deflection Criteria is as follows, LL L/360, TL L240
Created with LR Pope Engr. - ASD Wood Member Design v7.0.5 (10-20-11)

Wood Framed Shear Wall Schedule

SW-1 7/16" APA rated sheathing, exp. 1 with 8d common nails at 6" o.c. along panel edges and 12" o.c. at intermediate supports. Bolt 2x sill plate to foundation with 1/2" dia. x 10" anchor bolts & 0.229" x 3" x 3" steel plate washers at 48" o.c. Nail 2x sill plate to wood floor with 16d common nails at 12" o.c. Allowable shear = 140 plf.

SW-2 7/16" APA rated sheathing, exp. 1 with 8d common nails at 6" o.c. along panel edges and 12" o.c. at intermediate supports. Bolt 2x sill plate to foundation with 1/2" dia. x 10" anchor bolts & 0.229" x 3" x 3" steel plate washers at 32" o.c. Nail 2x sill plate to wood floor with 16d common nails at 6" o.c. Allowable shear = 260 plf.

SW-3 7/16" APA rated sheathing, exp. 1 with 8d common nails at 4" o.c. along panel edges and 12" o.c. at intermediate supports. Bolt 2x sill plate to foundation with 1/2" dia. x 10" anchor bolts & 0.229" x 3" x 3" steel plate washers at 23" o.c. Nail 2x sill plate to wood floor with 16d common nails at 4-3/4" o.c. Allowable shear = 350 plf.

SW-4 7/16" APA rated sheathing, exp. 1 with 8d common nails at 3" o.c. along panel edges and 12" o.c. at intermediate supports. Framing at adjoining panel edges shall be 3x or double 2x. Nails shall be staggered at adjoining panel edges. Bolt 2x sill plate to foundation w/ 1/2" dia. x 10" anchor bolts & 0.229" x 3" x 3" steel plate washers at 17" o.c. Nail 2x sill plate to wood floor with 16d common nails at 3-1/2" o.c. Allowable shear = 490 plf.

SW-5 7/16" APA rated sheathing, exp. 1 with 10d common nails at 2" o.c. along panel edges and 12" o.c. at intermediate supports. Framing at adjoining panel edges shall be 3x or double 2x. Nails shall be staggered at all panel edges. Bolt 2x sill plate to foundation w/ 5/8" dia. x 10" anchor bolts & 0.229" x 3" x 3" steel plate washers at 24" o.c. Nail 2x sill plate to wood floor with (2) 16d common nails at 5" o.c. Allowable shear = 640 plf

SW-6 15/32" APA rated sheathing, exp. 1 with 10d common nails at 2" o.c. along panel edges and 12" o.c. at intermediate supports. Framing at adjoining panel edges shall be 3x or double 2x. Nails shall be staggered at all panel edges. Bolt 2x sill plate to foundation w/ 5/8" dia. x 10" anchor bolts & 0.229" x 3" x 3" steel plate washers at 18" o.c. Nail 2x sill plate to wood floor with (2) 16d common nails at 4" o.c. Allowable shear = 770 plf

SW-7 19/32" APA rated sheathing, exp. 1 with 10d common nails at 2" o.c. along panel edges and 12" o.c. at intermediate supports. Framing at adjoining panel edges shall be 3x or double 2x. Nails shall be staggered at all panel edges. Bolt 2x sill plate to foundation w/ 5/8" dia. x 10" anchor bolts & 0.229" x 3" x 3" steel plate washers at 14" o.c. Nail 2x sill plate to wood floor with (2) 16d common nails at 3" o.c. Allowable shear = 870 plf

Cast in anchor bolts for interior shear walls may be replaced with Simpson Strong bolts, Titen HD, or Hilti Kwik Bolt TZ anchors of the same diameter and 4-1/2" minimum embedment. Interior shear wall anchor bolts may also be epoxied into concrete with Hilti HIT-RE 500-SD epoxy and a minimum 4-1/2" embedment. Interior shear walls shall extend to bottom of floor sheathing or roof sheathing. 0.229"x3"x3" steel plate washers shall extend to within 1/2" from edge of sill plate on the sheathed side of the wall

Wood Framed Roof Diaphragm Schedule

RD-1 7/16" APA rated sheathing, exp. 1, unblocked with 8d common nails at 6" o.c. along diaphragm perimeter, shear wall lines, and supported panel edges and 8d common nails at 12" o.c. in the field.
Allowable Shear = 230 plf (Minimum required roof diaphragm nailing)

RD-2 19/32" APA rated sheathing, exp. 1, blocked with 10d common nails at 6" o.c. along diaphragm perimeter and shear wall lines. 8d common nails at 6" o.c. at all other supported panel edges and 10d common nails at 12" o.c. in the field.
Allowable Shear = 285 plf

RD-3 7/16" APA rated sheathing, exp. 1, blocked with 8d common nails at 4" o.c. along diaphragm perimeter and shear wall lines. 8d common nails at 6" o.c. at all other supported panel edges and 8d common nails at 12" o.c. in the field.
Allowable Shear = 340 plf

RD-4 19/32" APA rated sheathing, exp. 1, blocked with 10d common nails at 2 1/2" o.c. along diaphragm perimeter and shear wall lines. 10d common nails at 4" o.c. at all other supported panel edges and 10d common nails at 12" o.c. in the field. Panel edges to be supported/blocked with 3" nominal framing or wider.
Allowable Shear = 640 plf

Wood Framed Floor Diaphragm Schedule

FD-1 3/4" tongue and groove APA rated sheathing exp. 1, Case 1, unblocked with 10d common nails at 6" o.c. along diaphragm perimeter, shear wall lines, and supported panel edges and 10d common nails at 12" o.c. in the field. Floor sheathing shall be glued to all supports in addition to required diaphragm nailing.
Allowable Shear = 285 plf (Minimum required floor diaphragm nailing)

FD-2 3/4" tongue and groove APA rated sheathing, exp. 1, Case 1, blocked with 10d common nails at 4" o.c. along diaphragm perimeter and shear wall lines. 10d common nails at 12" o.c. at all other supported panel edges and 10d common nails at 12" o.c. in the field. Floor sheathing shall be glued to all supports in addition to required diaphragm nailing.
Allowable Shear = 425 plf

Top Plate Splice Schedule

Bearing, shear and exterior wall studs shall be capped with double top plates installed to provide overlapping at corners and at intersections with other partitions. Double top plates shall be nailed with 16d nails at 16" o.c. end joints in double top plates shall be offset at least 48" unless noted otherwise 8-16d nails shall be placed each side of top chord splice.

TC-1 8-16d nails = 8 x 93 x 1.6 = 1,190 lbs (Minimum)
TC-2 10-16d nails = 1,480 lbs
TC-3 15-16d nails = 2,230 lbs
TC-4 20-16d nails = 2,970 lbs
TC-5 24-16d nails = 3,570 lbs
TC-6 Simpson MST48 strap = 4,840 lbs
TC-7 Simpson MST60 strap = 6,420 lbs

LATERAL LOAD ANALYSIS FOR 1150374 LAKE MEAD TITLE LOAN

BY L.R. POPE ENGINEERING, INC.

Version 9.3.2 (9/14/15)

CONSTRUCTION TYPE = COMMERCIAL

WIND LOADS

SIMPLIFIED WIND LOAD METHOD (ASCE 7-10 28.6.3)

Wind loads multiplied by 0.6 in accordance with IBC 2018 EQN 16-15

Risk Category = II

BASIC WIND SPEED = 100 MPH

EXPOSURE = C

	Main	Alternate	
Parapet Height (r) =	6.00		ft
Wall Height 2nd Level (hs) =	8.00		ft
Width of Floor (f) =	2.00		ft
Wall Height First Level (hf) =	12.00		ft
ROOF PITCH =	0.5		:12
ROOF TYPE =	PARAPET		
Topographical factor, K_{zt} =	1.00		

Htotal = hs+f+hf = 28

mean roof ht, h = 28

Building ht & exposure, λ = 1.38 ASCE 7-10 Figure 28.6-1

Wind pressure zone A, p_{s30} =	21.00	psf
Wind pressure zone B, p_{s30} =	-10.90	psf
Wind pressure zone C, p_{s30} =	13.90	psf
Wind pressure zone D, p_{s30} =	-6.50	psf
Wind pressure zone E_{OH}, p_{s30} =	-35.30	psf
Wind pressure zone G_{OH}, p_{s30} =	-27.60	psf

ASCE 7-10 Figure 28.6-1

EDGE STRIPS (a)		END ZONES 2(a)	
LONG. (a) =	3.00	2(a)=	6.00
TRANS. (a) =	6.05	2(a)=	12.10

Formula

WIND LOAD, $p_s = \lambda K_{zt} I p_{S30}$

	Results TRANS	LONG	
WALL END ZONE A, $\lambda K_{zt} I_W p_{S30}$ =	29.0	29.0	psf
ROOF END ZONE B, $\lambda K_{zt} I_W p_{S30}$ =	31.6	31.6	psf
WALL INTERIOR ZONE C, $\lambda K_{zt} I_W p_{S30}$ =	19.2	19.2	psf
ROOF INTERIOR ZONE D, $\lambda K_{zt} I_W p_{S30}$ =	31.6	31.6	psf
OVERHANG INTERIOR ZONE E_{OH}, $\lambda K_{zt} I_W p_{S30}$ =	N/A	N/A	psf
OVERHANG INTERIOR ZONE G_{OH}, $\lambda K_{zt} I_W p_{S30}$ =	N/A	N/A	psf

****Min allowable pressure = ±16 psf (Zones A & C) and ±8 psf (Zones B & D) per ASCE 7-10 28.6.4****

Total Wind Load at Roof

w=0.6*WL*(r+hs/2)

		Main	Alternate	
TRANSVERSE	**END ZONE w=**	179	0	plf
	INTERIOR w=	137	0	plf
LONGITUDINAL	**END ZONE w=**	179	0	plf
	INTERIOR w=	137	0	plf

Total Wind Load at Floor

w=WL*(r+hs+hf/2)

		Main	Alternate	
TRANSVERSE	**END ZONE w=**	209	0	plf
	INTERIOR w=	138	0	plf
LONGITUDINAL	**END ZONE w=**	209	0	plf
	INTERIOR w=	138	0	plf

SEISMIC FORCES

EQUIVALENT LATERAL FORCE PROCEDURE (ASCE 7-10 12.8)

Seismic loads multiplied by 0.7 in accordance with IBC 2018 EQN 16-16

ZIP CODE =

Central lat. = 36.03454° Central long. = -115.00198°

Risk Category =	II		
Seismic Design Category =	C		IBC Tables 1613.3.5(1),1613.3.5(2)
Site Class =	C		
Seismic Importance Factor, I_e=	1.00		
S_S=	0.487		
S_1=	0.161		
Response modification coefficient, R =	6.5		ASCE 7-10 TABLE 12.2-1
Upper roof area (Ar_2) =	1452	ft^2	
Lower roof area (Ar_1) =		ft^2	
Floor area (Af) =	1452	ft^2	
2nd story or roof length (Lr) =	60.50	ft	
2nd story or roof width (Wr) =	24.00	ft	
1st story or floor length (Lf) =	60.50	ft	
1st story or floor width (Wf) =	24.00	ft	
Height of 2nd Story Wall (hs) =	8	ft	
Height of First Story Wall (hf) =	12	ft	
Weight of Exterior Walls (Ww) =	15	psf	
Roof Dead Load (Rdl) =	15	psf	
Floor Dead Load + parition (Fdl) =	46.25	psf	

Trib. wt @ roof, w_2 =Ar*Rdl+hs*Ww*(Lr+Wr) =

w_2 = 34824 **lbs**

Trib. wt @ floor, w_1 = Fdl*Af+Ar_1*Rdl+Ww*(Lf+Wf)*(hs/2+hf/2) =

w_1 = 95409 **lbs**

T_L =	8.00	sec
Fv=	1.64	IBC 2012 Table 1613.3.3(1)
Fa=	1.20	IBC 2012 Table 1613.3.3(2)
S_{MS} = Fa*S_S =	0.584	IBC 2012 EQN 16-37
S_{M1} = Fv*S_1 =	0.264	IBC 2012 EQN 16-38
S_{DS} = 2/3*S_{MS} =	0.390	IBC 2012 EQN 16-39
S_{D1} = 2/3*S_{M1} =	0.176	IBC 2012 EQN 16-40
Cs = S_{DS}/(R/Ie) =	0.0599	ASCE 7-10 EQN 12.8-2
Csmax = SD1/(T*(R/Ie)) =	0.111	ASCE 7-10 EQNS 12.8-3 & 12.8-4
Cs_{min} =	0.017	ASCE 7-10 EQNS 12.8-5 & 12.8-6
T_s = S_{D1}/S_{DS} =	0.452	sec
x =	0.75	
C_t =	0.020	
Period, T = $C_t h_n^x$ =	0.243	sec
Frequency = 1/T =	4.108	Hz

For Seismic Design Category C

Redundancy factor, ρ = 1.0

1

LOADS AND EQUATIONS

Total wt, $W = w_1+w_2$ = 130233 lbs
$V = C_sW$ = 7806 lbs
k = 1.000
$w_2h_2^k$ = 766128
$w_1h_1^k$ = 1335726
$C_{v2} = w_2h_2^k/(w_1h_1^k+w_2h_2k)$ = 0.36 ASCE 7-10 EQN 12.8-12
$C_{v1} = w_1h_1^k/(w_1h_1^k+w_2h_2^k)$ = 0.64 ASCE 7-10 EQN 12.8-12

Redundancy factor calculation $1.00 < \rho_x < 1.30$

Long roof % = 1.000 ρ_x = 1.000
Long floor % = 1.000 ρ_x = 1.000
Trans roof % = 1.000 ρ_x = 1.000
Trans floor % = 1.000 ρ_x = 1.000
Maximum Roof story ρ_x = 1.000
Maximum Floor ρ_x = 1.000

Story forces (ASCE 7-10 EQN 12.8-11)

Story force @ roof, $F_2 = C_{V2}*V$ = 2845 lbs
Story force @ floor, $F_2 = C_{V1}*V$ = 4961 lbs
Story shear @ roof, V_2 = 2845 lbs
Story shear @ floor, V_1 = 4961 lbs

Total story shear forces

Long. Diaphragm load @ roof, F_2/W_r = 119 plf
Long. Diaphragm load @ floor, $(F_1+F_2)/W_f$ = 207 plf
Trans. Diaphragm load @ roof, F_2/L_r = 47 plf
Trans. Diaphragm load @ floor, $(F_1+F_2)/L_f$ = 82 plf

Longitudinal Seismic Loads

Seismic load @ roof, $0.7*E = 0.7*\rho Q_E$ = 83 plf
Seismic load @ floor, $0.7*E = 0.7*\rho Q_E$ = 145 plf

Transverse Seismic Loads

Seismic load @ roof, $0.7*E = 0.7*\rho Q_E$ = 33 plf
Seismic load @ floor, $0.7*E = 0.7*\rho Q_E$ = 57 plf

ROOF LEVEL LONGITUDINAL END ZONES GOVERNED BY WIND LOADS (179 plf)
ROOF LEVEL INTERIOR ZONES GOVERNED BY WIND LOADS (137 plf)
ROOF LEVEL TRANSVERSE END ZONES GOVERNED BY WIND LOADS (179 plf)
ROOF LEVEL TRANSVERSE INTERIOR ZONES GOVERNED BY WIND LOADS (137 plf)
FLOOR LEVEL LONGITUDINAL END ZONES GOVERNED BY WIND LOADS (209 plf)
FLOOR LEVEL LONGITUDINAL INTERIOR ZONES GOVERNED BY SEISMIC LOADS (145 plf)
FLOOR LEVEL TRANSVERSE END ZONES GOVERNED BY WIND LOADS (209 plf)
FLOOR LEVEL TRANSVERSE INTERIOR ZONES GOVERNED BY WIND LOADS (138 plf)

LATERAL LOAD ANALYSIS FOR 1150374 LAKE MEAD TITLE LOAN

Grid Line P1

MAIN OR ALT. PARAPET?	MAIN
LONGITUDINAL OR TRANSVERSE?	L
END ZONE OR INTERIOR?	E

At Roof **Wind governs shear wall design**

End Zone Wind Load (WL/Vs)=	179	plf
Interior Zone Wind Load (WL/Vs)=	137	plf
Seismic Load ,(WL/Vs) =	83	plf
Shear Load Span (sls)=	24.00	ft
Roof Dead Load (Rdl)=	15	psf
Wall Weight (wwt)=	15	psf
Length of Shear Wall (Sw)=	21.75	ft

Formula		**Results**	**Units**
P=WL/Vs*sls/2	**Wind Shear Load (P)=**	**1896**	**lbs**
Us=P/Sw	**Unit Shear (Us)=**	**87**	**plf**
P=WL/Vs*sls/2	**Seismic Shear Load (P)=**	**996**	**lbs**
Us=P/Sw	**Unit Shear (Us)=**	**46**	**plf**
	Wind end zone width =	**6.00**	**ft**
	Wind interior zone width =	**6.00**	**ft**

EXTERIOR SHEAR WALLS: SW-1

Wall Overturning

w1 **Wind controls overturning, 0.6D+0.6W**

Short wall segment (sws)=	12.00	ft
2nd Story Wall height (h)=	8.00	ft
Roof Load Width (rlw)=	12.00	ft
Dead load Reduct (swred)=	0.60	
Allowable story drift = .02*h =	1.92	

h/w ratio OK for wind forces

Below = **Wood framing**

Formula		**Wind**		**Seismic**	
Mot=Us*sws*h	**Mot=**	**8369**	**ft-lbs**	**4395**	**ft-lbs**
Hdl=wwt*h+Rdl*rlw	**Hdl=**	**300**	**plf**	**284**	**plf**
Mres=(swred *Hdl*sws^2)/2	**Mres=**	**12960**	**ft-lbs**	**12253**	**ft-lbs**
Hd-uplift=(Mot-Mres)/sws	**Hd-uplift=**	**-383**	**lbs**	**-655**	**lbs**

$\Delta_s = 8vh^3/(EAb) + vh/(Gt) + 0.75*h*e_n + h/b*d_a =$ **0.40** **OK**

h/w ratio OK for seismic forces

NO HOLDOWNS REQUIRED

w2 **Wind controls overturning, 0.6D+0.6W**

Short wall segment (sws)=	9.75	ft
2nd Story Wall height (h)=	8.00	ft
Roof Load Width (rlw)=	12.00	ft
Dead load Reduct (swred)=	0.60	
Allowable story drift = .02*h =	1.92	

h/w ratio OK for wind forces

Below = **Wood framing**

		Wind		**Seismic**	
Mot=Us*sws*h	**Mot=**	**6800**	**ft-lbs**	**3571**	**ft-lbs**
Hdl=wwt*h+Rdl*rlw	**Hdl=**	**300**	**plf**	**284**	**plf**
Mres=(swred *Hdl*sws^2)/2	**Mres=**	**8556**	**ft-lbs**	**8089**	**ft-lbs**
Hd-uplift=(Mot-Mres)/sws	**Hd-uplift=**	**-180**	**lbs**	**-463**	**lbs**

$\Delta_s = 8vh^3/(EAb) + vh/(Gt) + 0.75*h*e_n + h/b*d_a =$ **0.48** **OK**

h/w ratio OK for seismic forces

NO HOLDOWNS REQUIRED

LATERAL LOAD ANALYSIS FOR 1150374 LAKE MEAD TITLE LOAN

Grid Line P1

MAIN OR ALT. ROOF?	MAIN
LONGITUDINAL OR TRANSVERSE?	L
END ZONE OR INTERIOR?	E

Formula		Results	Units
P=WL/Vs*sls/2	Wind Shear Load (P)=	3977	lbs
Us=P/Sw	Unit Shear (Us)=	183	plf
P=WL/Vs*sls/2	Seismic Shear Load (P)=	2732	lbs
Us=P/Sw	Unit Shear (Us)=	126	plf
	Wind end zone width =	6.00	ft
	Wind interior zone width =	6.00	ft

At Floor **Wind governs shear wall design**

End Zone Wind Load (WL/Vs)=	209	plf
Interior Zone Wind Load (WL/Vs)=	138	plf
Seismic Load ,(WL/Vs) =	145	plf
Shear Load Span (sls)=	24.00	ft
Roof Dead Load (Rdl)=	15	psf
Floor Dead Load (Fdl)=	46	psf
Wall Weight (wwt)=	15	psf
Length of Shear Wall (Sw)=	21.75	ft

EXTERIOR SHEAR WALLS: SW-2

Wall Overturning

w1 **Wind controls overturning, 0.6D+0.6W**

Short wall segment (sws)=	12.00	ft
2nd Story Wall height (h)=	8.00	ft
1st Story Wall height (h)=	12.00	ft
Roof Load Width (rlw)=	12.00	ft
Floor Load Width (flw)=	12.00	ft
Dead load Reduct (swred)=	0.60	
Allowable story drift = .02*h =	2.88	

h/w ratio OK for wind forces

Below = **Concrete**

Formula		Wind		Seismic	
Mot=Us*sws*h	Mot=	26329	ft-lbs	18088	ft-lbs
DL=(wwt*(hf+hs))+(rlw*Rdl)+(flw*Fdl)	DL=	1035	plf	979	plf
Mres=(swred *DL*sws^2)/2	Mres=	44712	ft-lbs	42273	ft-lbs
Hd-uplift=(Mot-Mres)/sws	Hd-uplift=	-1532	lbs	-2015	lbs
	Uplift from wall above =		lbs		lbs
	Total HD Uplift =	-1532	lbs	-2015	lbs

$\Delta_s = 8vh^3/(EAb) + vh/(Gt) + 0.75*h*e_n + h/b*d_a =$ 1.05 OK

h/w ratio OK for seismic forces

NO HOLDOWNS REQUIRED

w2 **Wind controls overturning, 0.6D+0.6W**

Short wall segment (sws)=	9.75	ft
2nd Story Wall height (h)=	8.00	ft
1st Story Wall height (h)=	12.00	ft
Roof Load Width (rlw)=	12.00	ft
Floor Load Width (flw)=	12.00	ft
Dead load Reduct (swred)=	0.60	
Allowable story drift = .02*h =	2.88	

h/w ratio OK for wind forces

Below = **Concrete**

		Wind		Seismic	
Mot=Us*sws*h	Mot=	21392	ft-lbs	14697	ft-lbs
DL=(wwt*(hf+hs))+(rlw*Rdl)+(flw*Fdl)	DL=	1035	plf	979	plf
Mres=(swred *DL*sws^2)/2	Mres=	29517	ft-lbs	27907	ft-lbs
Hd-uplift=(Mot-Mres)/sws	Hd-uplift=	-833	lbs	-1355	lbs
	Uplift from wall above =		lbs		lbs
	Total HD Uplift =	-833	lbs	-1355	lbs

$\Delta_s = 8vh^3/(EAb) + vh/(Gt) + 0.75*h*e_n + h/b*d_a =$ 1.17 OK

h/w ratio OK for seismic forces

NO HOLDOWNS REQUIRED

P1

LATERAL LOAD ANALYSIS FOR 1150374 LAKE MEAD TITLE LOAN

Roof length, L_R = $\boxed{60.50}$ Ω = **1.0** ASCE 7-10 Table 12.2-1

v_{RW} = W/L_R = **31.34** **(Wind)**

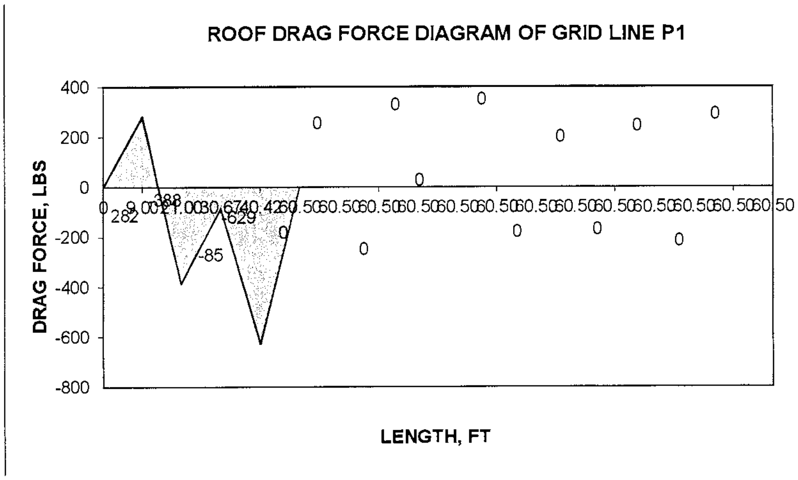
v_W = P/Sw - v_R = **-55.84** **(Wind)**

v_{RE} = E/L_R = **16.46** **(Seismic)**

v_W = P/Sw - v_R = **-29.33** **(Seismic)**

DRAG FORCE CALCULATIONS

WALL/OPENING	LENGTH	Σ LENGTH	Wind DRAG, LBS	Seismic DRAG, LBS	E_m LEVEL
	0	0	0	0	0
OPENING	9.00	9.00	282	148	148
W1	12.00	21.00	-388	-204	-204
OPENING	9.67	30.67	-85	-45	-45
W2	9.75	40.42	-629	-331	-331
OPENING	20.08	60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0



ROOF DRAG FORCE DIAGRAM OF GRID LINE P1

LATERAL LOAD ANALYSIS FOR 1150374 LAKE MEAD TITLE LOAN

Floor length, L_F = 60.50 Ω = 1.0 ASCE 7-10 Table 12.2-1

$v_{RW} = W/L_F =$ 34.39 **(Wind)**

$v_W = P/Sw - v_R =$ -61.27 **(Wind)**

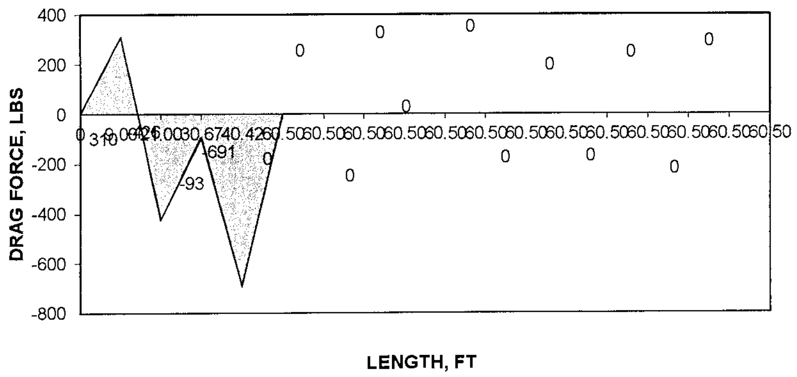
$v_{RE} = E/L_F =$ 28.70 **(Seismic)**

$v_W = P/Sw - v_R =$ -51.13 **(Seismic)**

DRAG FORCE CALCULATIONS

			Wind	Seismic	
WALL/OPENING	LENGTH	Σ LENGTH	DRAG, LBS	DRAG, LBS	E_m LEVEL
	0	0	0	0	0
OPENING	9.00	9.00	310	258	258
W1	12.00	21.00	-426	-355	-355
OPENING	9.67	30.67	-93	-78	-78
W2	9.75	40.42	-691	-576	-576
OPENING	20.08	60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0

2ND FLOOR DRAG FORCE DIAGRAM OF GRID LINE P1



P2

LATERAL LOAD ANALYSIS FOR 1150374 LAKE MEAD TITLE LOAN

Grid Line P2

MAIN OR ALT. PARAPET?	MAIN
LONGITUDINAL OR TRANSVERSE?	L
END ZONE OR INTERIOR?	E

Formula		Results	Units
P=WL/Vs*sls/2	**Wind Shear Load (P)=**	**1896**	**lbs**
Us=P/Sw	**Unit Shear (Us)=**	**103**	**plf**
P=WL/Vs*sls/2	**Seismic Shear Load (P)=**	**996**	**lbs**
Us=P/Sw	**Unit Shear (Us)=**	**54**	**plf**

At Roof **Wind governs shear wall design**

End Zone Wind Load (WL/Vs)=	179	plf
Interior Zone Wind Load (WL/Vs)=	137	plf
Seismic Load ,(WL/Vs) =	83	plf
Shear Load Span (sls)=	24.00	ft
Roof Dead Load (Rdl)=	15	psf
Wall Weight (wwt)=	15	psf
Length of Shear Wall (Sw)=	18.33	ft

Wind end zone width = 6.00 ft

Wind interior zone width = 6.00 ft

EXTERIOR SHEAR WALLS: SW-1

Wall Overturning

w1 **Wind controls overturning, 0.6D+0.6W**

Short wall segment (sws)=	6.00	ft
2nd Story Wall height (h)=	8.00	ft
Roof Load Width (rlw)=	12.00	ft
Dead load Reduct (swred)=	0.60	
Allowable story drift = .02*h =	1.92	

h/w ratio OK for wind forces

Below = Wood framing

Formula		Wind		Seismic	
Mot=Us*sws*h	**Mot=**	**4966**	**ft-lbs**	**2608**	**ft-lbs**
Hdl=wwt*h+Rdl*rlw	**Hdl=**	**300**	**plf**	**284**	**plf**
Mres=(swred *Hdl*sws^2)/2	**Mres=**	**3240**	**ft-lbs**	**3063**	**ft-lbs**
Hd-uplift=(Mot-Mres)/sws	**Hd-uplift=**	**288**	**lbs**	**-76**	**lbs**
$\Delta_s = 8vh^3/(EAb) + vh/(Gt) + 0.75*h*e_n + h/b*d_a =$		**0.75**	**OK**		

h/w ratio OK for seismic forces

USE SIMPSON HOLDOWN: CS16

w2 **Wind controls overturning, 0.6D+0.6W**

Short wall segment (sws)=	12.33	ft
2nd Story Wall height (h)=	8.00	ft
Roof Load Width (rlw)=	12.00	ft
Dead load Reduct (swred)=	0.60	
Allowable story drift = .02*h =	1.92	

h/w ratio OK for wind forces

Below = Wood framing

		Wind		Seismic	
Mot=Us*sws*h	**Mot=**	**10204**	**ft-lbs**	**5359**	**ft-lbs**
Hdl=wwt*h+Rdl*rlw	**Hdl=**	**300**	**plf**	**284**	**plf**
Mres=(swred *Hdl*sws^2)/2	**Mres=**	**13683**	**ft-lbs**	**12936**	**ft-lbs**
Hd-uplift=(Mot-Mres)/sws	**Hd-uplift=**	**-282**	**lbs**	**-615**	**lbs**
$\Delta_s = 8vh^3/(EAb) + vh/(Gt) + 0.75*h*e_n + h/b*d_a =$		**0.40**	**OK**		

h/w ratio OK for seismic forces

NO HOLDOWNS REQUIRED

LATERAL LOAD ANALYSIS FOR 1150374 LAKE MEAD TITLE LOAN

Grid Line P2

MAIN OR ALT. ROOF?	MAIN
LONGITUDINAL OR TRANSVERSE?	L
END ZONE OR INTERIOR?	E

Formula		Results	Units
P=WL/Vs*sls/2	**Wind Shear Load (P)=**	**3977**	**lbs**
Us=P/Sw	**Unit Shear (Us)=**	**217**	**plf**
P=WL/Vs*sls/2	**Seismic Shear Load (P)=**	**2732**	**lbs**
Us=P/Sw	**Unit Shear (Us)=**	**149**	**plf**

At Floor Wind governs shear wall design

End Zone Wind Load (WL/Vs)=	209	plf
Interior Zone Wind Load (WL/Vs)=	138	plf
Seismic Load ,(WL/Vs) =	145	plf
Shear Load Span (sls)=	24.00	ft
Roof Dead Load (Rdl)=	15	psf
Floor Dead Load (Fdl)=	46	psf
Wall Weight (wwt)=	15	psf
Length of Shear Wall (Sw)=	18.33	ft

Wind end zone width = 6.00 ft

Wind interior zone width = 6.00 ft

EXTERIOR SHEAR WALLS: SW-2

Wall Overturning

w1 **Wind controls overturning, 0.6D+0.6W**

Short wall segment (sws)=	6.00	ft
2nd Story Wall height (h)=	8.00	ft
1st Story Wall height (h)=	12.00	ft
Roof Load Width (rlw)=	12.00	ft
Floor Load Width (flw)=	12.00	ft
Dead load Reduct (swred)=	0.60	
Allowable story drift = .02*h =	2.88	

Formula		Wind		Seismic	
Mot=Us*sws*h	**Mot=**	**15621**	**ft-lbs**	**10732**	**ft-lbs**
DL=(wwt*(hf+hs))+(rlw*Rdl)+(flw*Fdl)	**DL=**	**1035**	**plf**	**979**	**plf**
Mres=(swred *DL*sws^2)/2	**Mres=**	**11178**	**ft-lbs**	**10568**	**ft-lbs**
Hd-uplift=(Mot-Mres)/sws	**Hd-uplift=**	**740**	**lbs**	**27**	**lbs**
	Uplift from wall above =	**288**	**lbs**		**lbs**
	Total HD Uplift =	**1028**	**lbs**	**27**	**lbs**

$\Delta_s = 8vh^3/(EAb) + vh/(Gt) + 0.75*h*e_n + h/b*d_a =$ **1.63** **OK**

h/w ratio OK for wind forces

h/w ratio OK for seismic forces

Below = **Concrete** **Hold down location =** **Corner** **USE SIMPSON HOLDOWN: LSTHD8 OR HTT4**

w2 **Wind controls overturning, 0.6D+0.6W**

Short wall segment (sws)=	12.33	ft
2nd Story Wall height (h)=	8.00	ft
1st Story Wall height (h)=	12.00	ft
Roof Load Width (rlw)=	12.00	ft
Floor Load Width (flw)=	12.00	ft
Dead load Reduct (swred)=	0.60	
Allowable story drift = .02*h =	2.88	

		Wind		Seismic	
Mot=Us*sws*h	**Mot=**	**32101**	**ft-lbs**	**22053**	**ft-lbs**
DL=(wwt*(hf+hs))+(rlw*Rdl)+(flw*Fdl)	**DL=**	**1035**	**plf**	**979**	**plf**
Mres=(swred *DL*sws^2)/2	**Mres=**	**47205**	**ft-lbs**	**44630**	**ft-lbs**
Hd-uplift=(Mot-Mres)/sws	**Hd-uplift=**	**-1225**	**lbs**	**-1831**	**lbs**
	Uplift from wall above =		**lbs**		**lbs**
	Total HD Uplift =	**-1225**	**lbs**	**-1831**	**lbs**

$\Delta_s = 8vh^3/(EAb) + vh/(Gt) + 0.75*h*e_n + h/b*d_a =$ **1.06** **OK**

h/w ratio OK for wind forces

h/w ratio OK for seismic forces

Below = **Concrete**

NO HOLDOWNS REQUIRED

LATERAL LOAD ANALYSIS FOR 1150374 LAKE MEAD TITLE LOAN

Roof length, L_R = **60.50** Ω = **1.0** ASCE 7-10 Table 12.2-1

$\upsilon_{RW} = W/L_R =$ **31.34** **(Wind)**

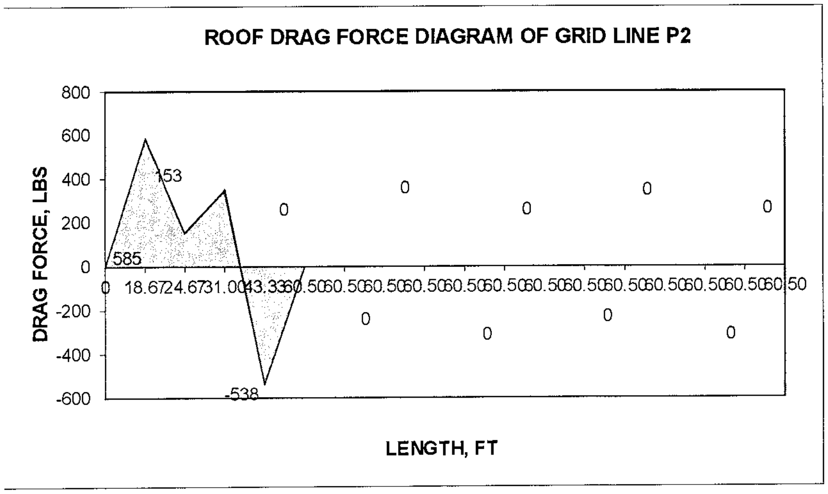
$\upsilon_W = P/Sw - \upsilon_R =$ **-72.11** **(Wind)**

$\upsilon_{RE} = E/L_R =$ **16.46** **(Seismic)**

$\upsilon_W = P/Sw - \upsilon_R =$ **-37.87** **(Seismic)**

DRAG FORCE CALCULATIONS

WALL/OPENING	LENGTH	Σ LENGTH	Wind DRAG, LBS	Seismic DRAG, LBS	E_m LEVEL
	0	0	0	0	0
OPENING	18.67	18.67	585	307	307
W1	6.00	24.67	153	80	80
OPENING	6.33	31.00	351	184	184
W2	12.33	43.33	-538	-283	-283
OPENING	17.17	60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0



LATERAL LOAD ANALYSIS FOR 1150374 LAKE MEAD TITLE LOAN

Floor length, $L_F =$ **60.50** $\Omega =$ 1.0 ASCE 7-10 Table 12.2-1

$\upsilon_{RW} = W/L_F =$ 34.39 **(Wind)**

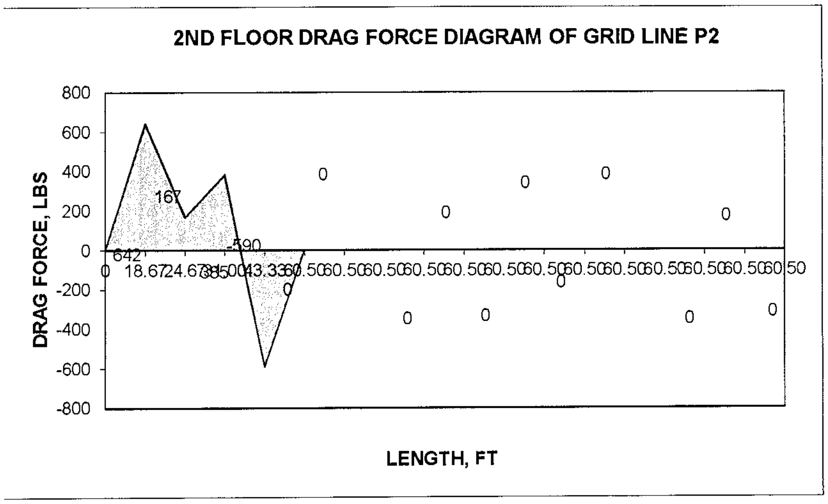
$\upsilon_W = P/Sw - \upsilon_R =$ -79.12 **(Wind)**

$\upsilon_{RE} = E/L_F =$ 28.70 **(Seismic)**

$\upsilon_W = P/Sw - \upsilon_R =$ -66.02 **(Seismic)**

DRAG FORCE CALCULATIONS

			Wind	Seismic	
WALL/OPENING	**LENGTH**	**Σ LENGTH**	**DRAG, LBS**	**DRAG, LBS**	**E_m LEVEL**
	0	0	0	0	0
OPENING	18.67	18.67	642	536	536
W1	6.00	24.67	167	140	140
OPENING	6.33	31.00	385	321	321
W2	12.33	43.33	-590	-493	-493
OPENING	17.17	60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0
		60.50	0	0	0



LATERAL LOAD ANALYSIS FOR 1150374 LAKE MEAD TITLE LOAN

Grid Line P3

MAIN OR ALT. PARAPET?	MAIN	
LONGITUDINAL OR TRANSVERSE?	T	
END ZONE OR INTERIOR?	E	

At Roof **Wind governs shear wall design**

End Zone Wind Load (WL/Vs)=	179	plf
Interior Zone Wind Load (WL/Vs)=	137	plf
Seismic Load ,(WL/Vs) =	33	plf
Shear Load Span (sls)=	33.83	ft
Roof Dead Load (Rdl)=	15	psf
Wall Weight (wwt)=	15	psf
Length of Shear Wall (Sw)=	24.00	ft

Wall Overturning

w1 **Wind controls overturning, 0.6D+0.6W**

Short wall segment (sws)=	24.00	ft
2nd Story Wall height (h)=	8.00	ft
Roof Load Width (rlw)=	2.00	ft
Dead load Reduct (swred)=	0.60	
Allowable story drift = .02*h =	1.92	

h/w ratio OK for wind forces

Below = Wood framing

Formula		Results	Units
P=WL/Vs*sls/2	**Wind Shear Load (P)=**	**2823**	**lbs**
Us=P/Sw	**Unit Shear (Us)=**	**118**	**plf**
P=WL/Vs*sls/2	**Seismic Shear Load (P)=**	**557**	**lbs**
Us=P/Sw	**Unit Shear (Us)=**	**23**	**plf**

Wind end zone width = 12.10 ft

Wind interior zone width = 4.82 ft

EXTERIOR SHEAR WALLS: SW-1

Formula		Wind		Seismic	
Mot=Us*sws*h	**Mot=**	**22582**	**ft-lbs**	**4455**	**ft-lbs**
Hdl=wwt*h+Rdl*rlw	**Hdl=**	**150**	**plf**	**142**	**plf**
Mres=(swred *Hdl*sws^2)/2	**Mres=**	**25920**	**ft-lbs**	**24506**	**ft-lbs**
Hd-uplift=(Mot-Mres)/sws	**Hd-uplift=**	**-139**	**lbs**	**-835**	**lbs**

$\Delta_s = 8vh^3/(EAb) + vh/(Gt) + 0.75*h*e_n + h/b*d_a =$ **0.22** **OK**

h/w ratio OK for seismic forces

NO HOLDOWNS REQUIRED

LATERAL LOAD ANALYSIS FOR 1150374 LAKE MEAD TITLE LOAN

Grid Line P3

MAIN OR ALT. ROOF?	MAIN
LONGITUDINAL OR TRANSVERSE?	T
END ZONE OR INTERIOR?	E

Formula		Results	Units
P=WL/Vs*sls/2	**Wind Shear Load (P)=**	**6012**	**lbs**
Us=P/Sw	**Unit Shear (Us)=**	**859**	**plf**
P=WL/Vs*sls/2	**Seismic Shear Load (P)=**	**1528**	**lbs**
Us=P/Sw	**Unit Shear (Us)=**	**218**	**plf**

At Floor Wind governs shear wall design

End Zone Wind Load (WL/Vs)=	209	plf
Interior Zone Wind Load (WL/Vs)=	138	plf
Seismic Load ,(WL/Vs) =	57	plf
Shear Load Span (sls)=	33.83	ft
Roof Dead Load (Rdl)=	15	psf
Floor Dead Load (Fdl)=	46	psf
Wall Weight (wwt)=	15	psf
Length of Shear Wall (Sw)=	7.00	ft

Wind end zone width = 12.10 ft

Wind interior zone width = 4.82 ft

EXTERIOR SHEAR WALLS: SW-7

Wall Overturning

w1 **Wind controls overturning, 0.6D+0.6W**

Short wall segment (sws)=	3.50	ft
2nd Story Wall height (h)=	8.00	ft
1st Story Wall height (h)=	12.00	ft
Roof Load Width (rlw)=	2.00	ft
Floor Load Width (flw)=	1.00	ft
Dead load Reduct (swred)=	0.60	
Allowable story drift = .02*h =	2.88	

Formula		Wind		Seismic	
Mot=Us*sws*h	**Mot=**	**36075**	**ft-lbs**	**9166**	**ft-lbs**
DL=(wwt*(hf+hs))+(rlw*Rdl)+(flw*Fdl)	**DL=**	**376**	**plf**	**356**	**plf**
Mres=(swred *DL*sws^2)/2	**Mres=**	**1383**	**ft-lbs**	**1307**	**ft-lbs**
Hd-uplift=(Mot-Mres)/sws	**Hd-uplift=**	**9912**	**lbs**	**2245**	**lbs**
	Uplift from wall above =	**0**	**lbs**	**0**	**lbs**
	Total HD Uplift =	**9912**	**lbs**	**2245**	**lbs**

$\Delta_s = 8vh^3/(EAb) + vh/(Gt) + 0.75*h*e_n + h/b*d_a =$ **2.37** **OK**

h/w ratio OK for wind forces

2:1 < h/w ratio < 3.5:1, tabulated shear value mulliplied by 2w/h, use SW-4

Below = Concrete **Hold down location = Corner** **USE SIMPSON HOLDOWN: OR HHDQ11-SDS2.5 W/ 6X6**

w2 **Wind controls overturning, 0.6D+0.6W**

Short wall segment (sws)=	3.50	ft
2nd Story Wall height (h)=	8.00	ft
1st Story Wall height (h)=	12.00	ft
Roof Load Width (rlw)=	2.00	ft
Floor Load Width (flw)=	1.00	ft
Dead load Reduct (swred)=	0.60	
Allowable story drift = .02*h =	2.88	

		Wind		Seismic	
Mot=Us*sws*h	**Mot=**	**36075**	**ft-lbs**	**9166**	**ft-lbs**
DL=(wwt*(hf+hs))+(rlw*Rdl)+(flw*Fdl)	**DL=**	**376**	**plf**	**356**	**plf**
Mres=(swred *DL*sws^2)/2	**Mres=**	**1383**	**ft-lbs**	**1307**	**ft-lbs**
Hd-uplift=(Mot-Mres)/sws	**Hd-uplift=**	**9912**	**lbs**	**2245**	**lbs**
	Uplift from wall above =		**lbs**		**lbs**
33.83	**Total HD Uplift =**	**9912**	**lbs**	**2245**	**lbs**

$\Delta_s = 8vh^3/(EAb) + vh/(Gt) + 0.75*h*e_n + h/b*d_a =$ **2.37** **OK**

h/w ratio OK for wind forces

2:1 < h/w ratio < 3.5:1, tabulated shear value mulliplied by 2w/h, use SW-4

Below = Concrete **Hold down location = Corner** **USE SIMPSON HOLDOWN: OR HHDQ11-SDS2.5 W/ 6X6**

P3

LATERAL LOAD ANALYSIS FOR 1150374 LAKE MEAD TITLE LOAN

Floor length, L_F = **24.00** Ω = **1.0** ASCE 7-10 Table 12.2-1

$\upsilon_{RW} = W/L_F =$ **132.91** **(Wind)**

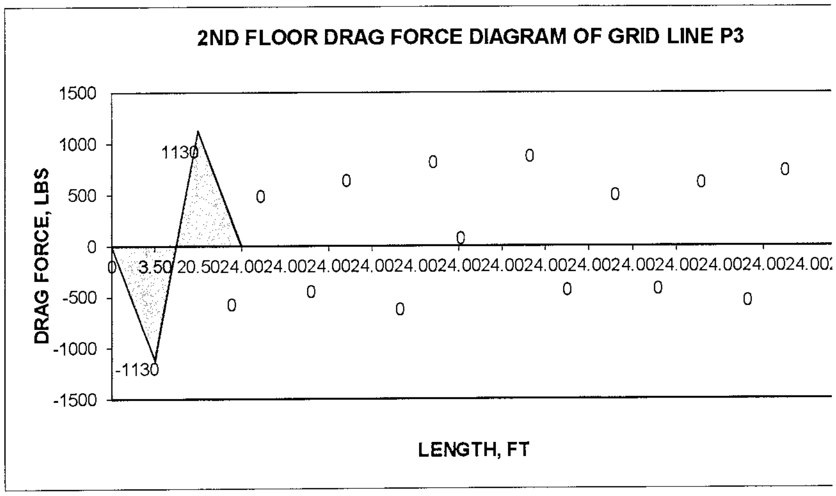
$\upsilon_W = P/Sw - \upsilon_R =$ **-322.77** **(Wind)**

$\upsilon_{RE} = E/L_F =$ **40.45** **(Seismic)**

$\upsilon_W = P/Sw - \upsilon_R =$ **-98.24** **(Seismic)**

DRAG FORCE CALCULATIONS

			Wind	Seismic	
WALL/OPENING	**LENGTH**	**Σ LENGTH**	**DRAG, LBS**	**DRAG, LBS**	**E_m LEVEL**
	0	0	**0**	**0**	**0**
W1	**3.50**	3.50	**-1130**	**-344**	**-344**
OPENING	**17.00**	20.50	**1130**	**344**	**344**
W2	**3.50**	24.00	**0**	**0**	**0**
		24.00	**0**	**0**	**0**
		24.00	**0**	**0**	**0**
		24.00	**0**	**0**	**0**
		24.00	**0**	**0**	**0**
		24.00	**0**	**0**	**0**
		24.00	**0**	**0**	**0**
		24.00	**0**	**0**	**0**
		24.00	**0**	**0**	**0**
		24.00	**0**	**0**	**0**
		24.00	**0**	**0**	**0**
		24.00	**0**	**0**	**0**
		24.00	**0**	**0**	**0**
		24.00	**0**	**0**	**0**
		24.00	**0**	**0**	**0**



2ND FLOOR DRAG FORCE DIAGRAM OF GRID LINE P3

LATERAL LOAD ANALYSIS FOR 1150374 LAKE MEAD TITLE LOAN

Grid Line P4

MAIN OR ALT. PARAPET?	MAIN
LONGITUDINAL OR TRANSVERSE?	T
END ZONE OR INTERIOR?	I

At Roof **Wind governs shear wall design**

End Zone Wind Load (WL/Vs)=	179	plf
Interior Zone Wind Load (WL/Vs)=	137	plf
Seismic Load ,(WL/Vs) =	33	plf
Shear Load Span (sls)=	60.50	ft
Roof Dead Load (Rdl)=	15	psf
Wall Weight (wwt)=	15	psf
Length of Shear Wall (Sw)=	16.67	ft

Formula		Results	Units
P=WL/Vs*sls/2	**Wind Shear Load (P)=**	**4158**	**lbs**
Us=P/Sw	**Unit Shear (Us)=**	**249**	**plf**
P=WL/Vs*sls/2	**Seismic Shear Load (P)=**	**996**	**lbs**
Us=P/Sw	**Unit Shear (Us)=**	**60**	**plf**

Wind end zone width = **0.00** **ft**

Wind interior zone width = **30.25** **ft**

EXTERIOR SHEAR WALLS: SW-2

Wall Overturning

w1 **Wind controls overturning, 0.6D+0.6W**

Short wall segment (sws)=	16.67	ft
2nd Story Wall height (h)=	8.00	ft
Roof Load Width (rlw)=	2.00	ft
Dead load Reduct (swred)=	0.60	
Allowable story drift = .02*h =	1.92	

h/w ratio OK for wind forces

Below = **Wood framing**

Formula		Wind		Seismic	
Mot=Us*sws*h	**Mot=**	**33261**	**ft-lbs**	**7967**	**ft-lbs**
Hdl=wwt*h+Rdl*rlw	**Hdl=**	**150**	**plf**	**142**	**plf**
Mres=(swred *Hdl*sws^2)/2	**Mres=**	**12505**	**ft-lbs**	**11823**	**ft-lbs**
Hd-uplift=(Mot-Mres)/sws	**Hd-uplift=**	**1245**	**lbs**	**-231**	**lbs**

$\Delta_s = 8vh^3/(EAb) + vh/(Gt) + 0.75*h*e_n + h/b*d_a =$ **0.54** **OK**

h/w ratio OK for seismic forces

USE SIMPSON HOLDOWN: CS16

LATERAL LOAD ANALYSIS FOR 1150374 LAKE MEAD TITLE LOAN

Grid Line P4

MAIN OR ALT. ROOF?	MAIN
LONGITUDINAL OR TRANSVERSE?	T
END ZONE OR INTERIOR?	I

Formula		Results	Units
P=WL/Vs*sls/2	**Wind Shear Load (P)=**	8335	lbs
Us=P/Sw	**Unit Shear (Us)=**	366	plf
P=WL/Vs*sls/2	**Seismic Shear Load (P)=**	2732	lbs
Us=P/Sw	**Unit Shear (Us)=**	120	plf
	Wind end zone width =	0.00	ft
	Wind interior zone width =	30.25	ft

At Floor Wind governs shear wall design

End Zone Wind Load (WL/Vs)=	209	plf
Interior Zone Wind Load (WL/Vs)=	138	plf
Seismic Load ,(WL/Vs) =	57	plf
Shear Load Span (sls)=	60.50	ft
Roof Dead Load (Rdl)=	15	psf
Floor Dead Load (Fdl)=	46	psf
Wall Weight (wwt)=	15	psf
Length of Shear Wall (Sw)=	22.75	ft

EXTERIOR SHEAR WALLS: SW-4

Wall Overturning

Perforated Wall (SDPWS 2008 Table 4.3.3.5)

C_o = 0.870

SW-4

Sill plate uplift anchorage: *SW-6*

Perforated wall Length (sws)=			22.75	ft	
Full ht segment lengths =			9.67	9.67	
% Full Height sheathing =			85%		
Max Opening Ht =			8.00	ft	
2nd Story Wall height (h)=			8.00	ft	
1st Story Wall height (h)=			12.00	ft	
Roof Load Width (rlw)=			2.00	ft	
Floor Load Width (flw)=			2.00	ft	
Dead load Reduct (swred)=			0.60		
Allowable story drift = .02*h =			2.88		

		Wind		Seismic	
Mot=Us*sws*h	Mot=	100025	ft-lbs	32785	ft-lbs
DL=(wwt*(hf+hs))+(rlw*Rdl)+(flw*Fdl)	**DL=**	423	plf	399	plf
Mres=(swred *DL*sws^2)/2	**Mres=**	65601	ft-lbs	62023	ft-lbs
T/C =V*h/(Co*ΣL)	**T/C =**	5947	lbs	1949	lbs
Hd-uplift=(Mot-Mres)/sws	**Hd-uplift=**	3064	lbs	-777	lbs
	Uplift from wall above =	1245	lbs		lbs
	Total HD Uplift =	4309	lbs	-777	lbs

$\Delta_s = 8vh^3/(EAb) + vh/(Gt) + 0.75*h*e_n + h/b*d_a =$ **0.65 OK**

h/w ratio OK for wind forces

h/w ratio OK for seismic forces

Below = Concrete Hold down location = Corner

USE SIMPSON HOLDOWN: STHD14 OR HTT5

LATERAL LOAD ANALYSIS FOR 1150374 LAKE MEAD TITLE LOAN

Grid Line P5

MAIN OR ALT. PARAPET?	MAIN
LONGITUDINAL OR TRANSVERSE?	T
END ZONE OR INTERIOR?	E

Formula		Results	Units
P=WL/Vs*sls/2	**Wind Shear Load (P)=**	**2331**	**lbs**
Us=P/Sw	**Unit Shear (Us)=**	**291**	**plf**
P=WL/Vs*sls/2	**Seismic Shear Load (P)=**	**439**	**lbs**
Us=P/Sw	**Unit Shear (Us)=**	**55**	**plf**
	Wind end zone width =	**12.10**	**ft**
	Wind interior zone width =	**1.24**	**ft**

At Roof Wind governs shear wall design

End Zone Wind Load (WL/Vs)=	179	plf
Interior Zone Wind Load (WL/Vs)=	137	plf
Seismic Load ,(WL/Vs) =	33	plf
Shear Load Span (sls)=	26.67	ft
Roof Dead Load (Rdl)=	15	psf
Wall Weight (wwt)=	15	psf
Length of Shear Wall (Sw)=	8.00	ft

EXTERIOR SHEAR WALLS: SW-3

Wall Overturning

w1 Wind controls overturning, 0.6D+0.6W

Short wall segment (sws)=	4.00	ft
2nd Story Wall height (h)=	8.00	ft
Roof Load Width (rlw)=	2.00	ft
Dead load Reduct (swred)=	0.60	
Allowable story drift = .02*h =	1.92	

Formula		Wind		Seismic	
Mot=Us*sws*h	**Mot=**	**9323**	**ft-lbs**	**1756**	**ft-lbs**
Hdl=wwt*h+Rdl*rlw	**Hdl=**	**150**	**plf**	**142**	**plf**
Mres=(swred *Hdl*sws^2)/2	**Mres=**	**720**	**ft-lbs**	**681**	**ft-lbs**
Hd-uplift=(Mot-Mres)/sws	**Hd-uplift=**	**2151**	**lbs**	**269**	**lbs**

$\Delta_s = 8vh^3/(EAb) + vh/(Gt) + 0.75*h*e_n + h/b*d_a =$ **1.24 OK**

h/w ratio OK for wind forces

h/w ratio OK for seismic forces

Below = Wood framing

USE SIMPSON HOLDOWN: CS14

w2 Wind controls overturning, 0.6D+0.6W

Short wall segment (sws)=	4.00	ft
2nd Story Wall height (h)=	8.00	ft
Roof Load Width (rlw)=	2.00	ft
Dead load Reduct (swred)=	0.60	
Allowable story drift = .02*h =	1.92	

		Wind		Seismic	
Mot=Us*sws*h	**Mot=**	**9323**	**ft-lbs**	**1756**	**ft-lbs**
Hdl=wwt*h+Rdl*rlw	**Hdl=**	**150**	**plf**	**142**	**plf**
Mres=(swred *Hdl*sws^2)/2	**Mres=**	**720**	**ft-lbs**	**681**	**ft-lbs**
Hd-uplift=(Mot-Mres)/sws	**Hd-uplift=**	**2151**	**lbs**	**269**	**lbs**

$\Delta_s = 8vh^3/(EAb) + vh/(Gt) + 0.75*h*e_n + h/b*d_a =$ **1.24 OK**

h/w ratio OK for wind forces

h/w ratio OK for seismic forces

Below = Wood framing

USE SIMPSON HOLDOWN: CS14

LATERAL LOAD ANALYSIS FOR 1150374 LAKE MEAD TITLE LOAN

Grid Line P5

MAIN OR ALT. ROOF?	MAIN
LONGITUDINAL OR TRANSVERSE?	T
END ZONE OR INTERIOR?	E

Formula		Results	Units
P=WL/Vs*sls/2	**Wind Shear Load (P)=**	**5026**	**lbs**
Us=P/Sw	**Unit Shear (Us)=**	**628**	**plf**
P=WL/Vs*sls/2	**Seismic Shear Load (P)=**	**1204**	**lbs**
Us=P/Sw	**Unit Shear (Us)=**	**151**	**plf**
	Wind end zone width =	**12.10**	**ft**
	Wind interior zone width =	**1.24**	**ft**

At Floor Wind governs shear wall design

End Zone Wind Load (WL/Vs)=	209	plf
Interior Zone Wind Load (WL/Vs)=	138	plf
Seismic Load ,(WL/Vs) =	57	plf
Shear Load Span (sls)=	26.67	ft
Roof Dead Load (Rdl)=	15	psf
Floor Dead Load (Fdl)=	46	psf
Wall Weight (wwt)=	15	psf
Length of Shear Wall (Sw)=	8.00	ft

EXTERIOR SHEAR WALLS: SW-5

Wall Overturning

w1 Wind controls overturning, 0.6D+0.6W

			Formula		Wind		Seismic	
Short wall segment (sws)=	4.00	ft	Mot=Us*sws*h	**Mot=**	**30156**	**ft-lbs**	**7226**	**ft-lbs**
2nd Story Wall height (h)=	8.00	ft	DL=(wwt*(hf+hs))+(rlw*Rdl)+(flw*Fdl)	**DL=**	**376**	**plf**	**356**	**plf**
1st Story Wall height (h)=	12.00	ft	Mres=(swred *DL*sws^2)/2	**Mres=**	**1806**	**ft-lbs**	**1707**	**ft-lbs**
Roof Load Width (rlw)=	2.00	ft	Hd-uplift=(Mot-Mres)/sws	**Hd-uplift=**	**7088**	**lbs**	**1380**	**lbs**
Floor Load Width (flw)=	1.00	ft		**Uplift from wall above =**	**2187**	**lbs**	**303**	**lbs**
Dead load Reduct (swred)=	0.60			**Total HD Uplift =**	**9275**	**lbs**	**1683**	**lbs**
Allowable story drift = .02*h =	2.88		$\Delta_s = 8vh^3/(EAb) + vh/(Gt) + 0.75*h*e_n + h/b*d_a =$		**2.02**	**OK**		

h/w ratio OK for wind forces

2:1 < h/w ratio < 3.5:1, tabulated shear value muliplied by 2w/h, use SW-2

Below = Concrete Hold down location = Corner **USE SIMPSON HOLDOWN: OR HHDQ11-SDS2.5 W/ 6X6**

w2 Wind controls overturning, 0.6D+0.6W

					Wind		Seismic	
Short wall segment (sws)=	4.00	ft	Mot=Us*sws*h	**Mot=**	**30156**	**ft-lbs**	**7226**	**ft-lbs**
2nd Story Wall height (h)=	8.00	ft	DL=(wwt*(hf+hs))+(rlw*Rdl)+(flw*Fdl)	**DL=**	**376**	**plf**	**356**	**plf**
1st Story Wall height (h)=	12.00	ft	Mres=(swred *DL*sws^2)/2	**Mres=**	**1806**	**ft-lbs**	**1707**	**ft-lbs**
Roof Load Width (rlw)=	2.00	ft	Hd-uplift=(Mot-Mres)/sws	**Hd-uplift=**	**7088**	**lbs**	**1380**	**lbs**
Floor Load Width (flw)=	1.00	ft		**Uplift from wall above =**	**2187**	**lbs**	**303**	**lbs**
Dead load Reduct (swred)=	0.60			**Total HD Uplift =**	**9275**	**lbs**	**1683**	**lbs**
Allowable story drift = .02*h =	2.88		$\Delta_s = 8vh^3/(EAb) + vh/(Gt) + 0.75*h*e_n + h/b*d_a =$		**2.02**	**OK**		

h/w ratio OK for wind forces

2:1 < h/w ratio < 3.5:1, tabulated shear value muliplied by 2w/h, use SW-2

Below = Concrete Hold down location = Corner **USE SIMPSON HOLDOWN: OR HHDQ11-SDS2.5 W/ 6X6**

P5

LATERAL LOAD ANALYSIS FOR 1150374 LAKE MEAD TITLE LOAN

Roof length, $L_R =$ 24.00 $\Omega =$ 1.0 ASCE 7-10 Table 12.2-1

$\upsilon_{RW} = W/L_R =$ 97.11 **(Wind)**

$\upsilon_W = P/Sw - \upsilon_R =$ -194.23 **(Wind)**

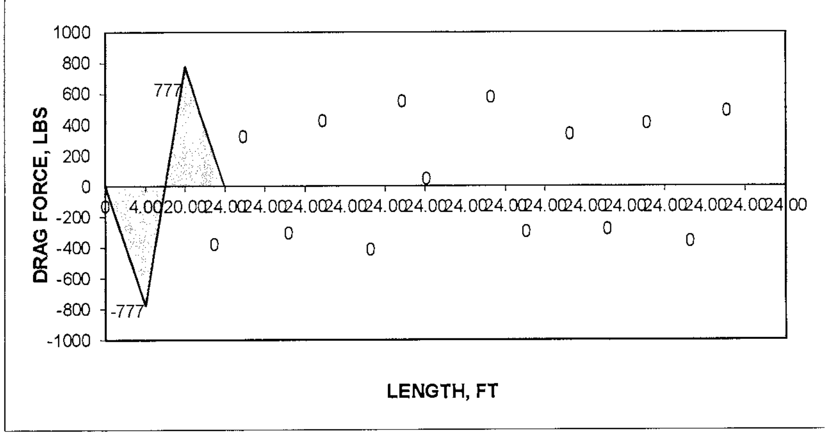
$\upsilon_{RE} = E/L_R =$ 18.29 **(Seismic)**

$\upsilon_W = P/Sw - \upsilon_R =$ -36.58 **(Seismic)**

DRAG FORCE CALCULATIONS

			Wind	Seismic	
WALL/OPENING	LENGTH	Σ LENGTH	DRAG, LBS	DRAG, LBS	E_m LEVEL
	0	0	0	0	0
W1	4.00	4.00	-777	-146	-146
OPENING	16.00	20.00	777	146	146
W2	4.00	24.00	0	0	0
		24.00	0	0	0
		24.00	0	0	0
		24.00	0	0	0
		24.00	0	0	0
		24.00	0	0	0
		24.00	0	0	0
		24.00	0	0	0
		24.00	0	0	0
		24.00	0	0	0
		24.00	0	0	0
		24.00	0	0	0
		24.00	0	0	0
		24.00	0	0	0
		24.00	0	0	0

ROOF DRAG FORCE DIAGRAM OF GRID LINE P5



LATERAL LOAD ANALYSIS FOR 1150374 LAKE MEAD TITLE LOAN

Floor length, $L_F =$ 24.00 $\Omega =$ 1.0 ASCE 7-10 Table 12.2-1

$v_{RW} = W/L_F =$ 112.30 **(Wind)**

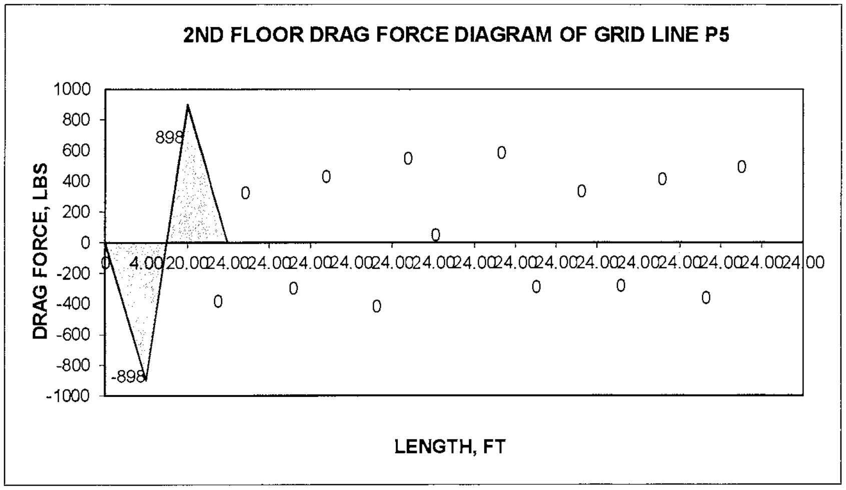
$v_W = P/Sw - v_R =$ -224.61 **(Wind)**

$v_{RE} = E/L_F =$ 31.89 **(Seismic)**

$v_W = P/Sw - v_R =$ -63.78 **(Seismic)**

DRAG FORCE CALCULATIONS

			Wind	Seismic	
WALL/OPENING	LENGTH	Σ LENGTH	DRAG, LBS	DRAG, LBS	E_m LEVEL
	0	0	0	0	0
W1	4.00	4.00	-898	-255	-255
OPENING	16.00	20.00	898	255	255
W2	4.00	24.00	0	0	0
		24.00	0	0	0
		24.00	0	0	0
		24.00	0	0	0
		24.00	0	0	0
		24.00	0	0	0
		24.00	0	0	0
		24.00	0	0	0
		24.00	0	0	0
		24.00	0	0	0
		24.00	0	0	0
		24.00	0	0	0
		24.00	0	0	0
		24.00	0	0	0
		24.00	0	0	0



LATERAL LOAD ANALYSIS FOR 1150374 LAKE MEAD TITLE LOAN
ROOF DIAPHRAGM AND TOP CHORD FORCES PER ASCE 7-10 12.10

WORST CASE TRANSVERSE

Diaphragm type = Supported
Case = Case 1
Depth of diaphragm (b) = 24.00 ft
Length of diaphragm (L) = 33.83 ft
Ratio = 1.4:1
OK
Transverse Wind Lateral Load @ roof = 137 plf
Transverse Wind Lateral Load @ floor = 138 plf
Transverse Seismic Lateral Load @ roof = 33 plf
Transverse Seismic Lateral Load @ floor = 57 plf
Max Seismic diaphragm load, $F_p = 0.4I_E S_{DS} w_{px}$ = 63 plf (ASCE 7-10 12.10-3)
Min Seismic diaphragm load, $F_p = 0.2I_E S_{DS} w_{px}$ = 31 plf (ASCE 7-10 12.10-2)
w_2 = tributary wt to roof = 34824 lbs
w_1 = tributary wt to floor = 95409 lbs

			Results	
Formula		**Wind**	**Seismic**	
ASCE 7-10 12.10-1	$F_{px} = \Sigma F_{it}/\Sigma w_i * w_{px}$ =	137	33	plf
Msls=WL/Vs*L/2	**Max Shear (Msls)**	***97***	**23**	**plf**
Mols=Msls*L^2/8	Moment (Mols)	19662	4710	ft-lbs
Tcl=Mols/W	**Top Chord Force (Tcl)**	***819***	**196**	**lbs**
	Required Diaphragm =	**RD-1**	**RD-1**	
IBC 2012 EQN 23-1	Δ = 5vl^3/(8Eab) + vL/(4Gt) + 0.188*L*en + Σ(ΔcX)/2b =	**0.20070464**	**0.159**	**in**
		L/2022	**L/2545**	

RD-1
Use 7/16" APA rated sheathing, exp. 1 unblocked with 8d common nails at 6" o.c. along panel edges, shear walls and perimeter with intermediate nails at 12" o.c. in the field.
Allowable Shear = 323 plf (W), 230 plf (E)

TC-1
Splice double top plate w/ 8-16d nails each side in 4'-0"splice
Allowable tension = 1190 lbs

WORST CASE LONGITUDINAL

Diaphragm type = Supported
Case = Case 3
Depth of diaphragm (b) = 33.83 ft
Length of diaphragm (L) = 24.00 ft
Ratio = 0.7:1
OK
Longitudinal Wind Lateral Load @ roof = 137 plf
Longitudinal Wind Lateral Load @ floor = 138 plf
Longitudinal Seismic Lateral Load @ roof = 83 plf
Longitudinal Seismic Lateral Load @ floor = 145 plf
Max Seismic diaphragm load, $F_p = 0.4I_E S_{DS} w_{px}$ = 158 plf (ASCE 7-10 12.10-3)
Min Seismic diaphragm load, $F_p = 0.2I_E S_{DS} w_{px}$ = 79 plf (ASCE 7-10 12.10-2)
w_2 = tributary wt to roof = 34824 lbs
w_1 = tributary wt to floor = 95409 lbs

			Results	
Formula		**Wind**	**Seismic**	
ASCE 7-10 12.10-1	$F_{px} = \Sigma F_{it}/\Sigma w_i * w_{px}$ =	137	83	plf
Msls=WL/Vs*L/2	**Max Shear (Msls)**	***49***	**29**	**plf**
Mols=Msls*L^2/8	Moment (Mols)	9896	5975	ft-lbs
Tcl=Mols/W	**Top Chord Force (Tcl)**	***293***	**177**	**lbs**
	Required Diaphragm =	**RD-1**	**RD-1**	
IBC 2012 EQN 23-1	Δ = 5vl^3/(8Eab) + vL/(4Gt) + 0.188*L*en + Σ(ΔcX)/2b =	**0.089966**	**0.078**	**in**
		L/3201	**L/3681**	

RD-1
Use 7/16" APA rated sheathing, exp. 1 unblocked with 8d common nails at 6" o.c. along panel edges, shear walls and perimeter with intermediate nails at 12" o.c. in the field.
Allowable Shear = 238 plf (W), 170 plf (E)

TC-1

Splice double top plate w/ 8-16d nails each side in 4'-0"splice
Allowable tension = 1190 lbs

LATERAL LOAD ANALYSIS FOR 1150374 LAKE MEAD TITLE LOAN
2ND FLOOR DIAPHRAGM AND TOP CHORD FORCES PER ASCE 7-10 12.10

WORST CASE TRANSVERSE

Diaphragm type = Supported
Case = Case 1
Depth of diaphragm (b) = 24.00 ft — Ratio = 1.4:1
Length of diaphragm (L) = 33.83 ft — *OK*
Transverse Wind Lateral Load @ roof = 137 plf
Transverse Wind Lateral Load @ floor = 138 plf
Transverse Seismic Lateral Load @ roof = 33 plf
Transverse Seismic Lateral Load @ floor = 57 plf
Max Seismic diaphragm load, $F_p = 0.4 I_E S_{DS} w_{px}$ = 172 plf (ASCE 7-10 12.10-3)
Min Seismic diaphragm load, $F_p = 0.2 I_E S_{DS} w_{px}$ = 86 plf (ASCE 7-10 12.10-2)
w_2 = tributary wt to roof = 34824 lbs
w_1 = tributary wt to floor = 95409 lbs

		Results		
Formula		**Wind**	**Seismic**	
ASCE 7-10 12.10-1	$F_{px} = \Sigma F_{it} / \Sigma w_i * w_{px}$ =	138	86	plf
Msls=WL/Vs*L/2	**Max Shear (Msls)**	***97***	**61**	**plf**
Mols=Msls*L^2/8	Moment (Mols)	19758	12305	ft-lbs
Tcl=Mols/W	**Top Chord Force (Tcl)**	***823***	**513**	**lbs**
	Required Diaphragm =	**FD-1**	**FD-1**	
IBC 2012 EQN 23-1	Δ = 5vl^3/(8Eab) + vL/(4Gt) + 0.188*L*en + Σ(ΔcX)/2b =	**0.15675703**	**0.136**	**in**
		L/2589	**L/2980**	

FD-1

Use 3/4" APA rated sheathing, exp. 1 unblocked with 10d common nails at 6" o.c. along panel edges, shear walls and perimeter with intermediate nails at 12" o.c. in the field.
Allowable Shear = 400 plf (W), 285 plf (E)

TC-1

Splice double top plate w/ 8-16d nails each side in 4'-0"splice
Allowable tension = 1190 lbs

WORST CASE LONGITUDINAL

Diaphragm type = Supported
Case = Case 3
Depth of diaphragm (b) = 33.83 ft — Ratio = 0.7:1
Length of diaphragm (L) = 24.00 ft — *OK*
Longitudinal Wind Lateral Load @ roof = 137 plf
Longitudinal Wind Lateral Load @ floor = 138 plf
Longitudinal Seismic Lateral Load @ roof = 83 plf
Longitudinal Seismic Lateral Load @ floor = 145 plf
Max Seismic diaphragm load, $F_p = 0.4 I_E S_{DS} w_{px}$ = 434 plf (ASCE 7-10 12.10-3)
Min Seismic diaphragm load, $F_p = 0.2 I_E S_{DS} w_{px}$ = 217 plf (ASCE 7-10 12.10-2)
w_2 = tributary wt to roof = 34824 lbs
w_1 = tributary wt to floor = 95409 lbs

		Results		
Formula		**Wind**	**Seismic**	
ASCE 7-10 12.10-1	$F_{px} = \Sigma F_{it} / \Sigma w_i * w_{px}$ =	138	217	plf
Msls=WL/Vs*L/2	**Max Shear (Msls)**	**49**	***77***	**plf**
Mols=Msls*L^2/8	Moment (Mols)	9944	15612	ft-lbs
Tcl=Mols/W	**Top Chord Force (Tcl)**	**294**	***461***	**lbs**
	Required Diaphragm =	**FD-1**	**FD-1**	
IBC 2012 EQN 23-1	Δ = 5vl^3/(8Eab) + vL/(4Gt) + 0.188*L*en + Σ(ΔcX)/2b =	**0.07727481**	**0.094**	**in**
		L/3726	**L/3056**	

FD-1

Use 3/4" APA rated sheathing, exp. 1 unblocked with 10d common nails at 6" o.c. along panel edges, shear walls and perimeter with intermediate nails at 12" o.c. in the field.
Allowable Shear = 300 plf (W), 215 plf (E)

TC-1

Splice double top plate w/ 8-16d nails each side in 4'-0"splice
Allowable tension = 1190 lbs

PROJECT 1150374 LAKE MEAD TITLE LOAN EXTERIOR, BOTTOM STORY
Design calculations for 2X6 12 foot tall DF #2 wood stud wall

Gravity loads (Compression only) D+L
Compression allowable stress calculations

Stud grade = DF #2
Fc = 1350 psi NDS 2012 Table 4A
E = 1600000 psi NDS 2012 Table 4A
Actual stud width = 1.50 in
Actual stud depth = 5.50 in
Fc' = Fc*$(C_DC_MC_tC_FC_iC_P)$
C_D = 1.00 For floor live load
C_M = 1.00 For MC < 19%
C_t = 1.00 Insulated against 100+ F
C_F = 1.10 Size increase
C_i = 1.00 No incising
C_T = 1.00

Fc* = Fc*$(C_DC_MC_tC_FC_i)$ = 1485 psi
Emin = 580000 psi
E' = E*$(C_MC_tC_iC_T)$ = 580000 psi
k = 1.0
L = 12.00 ft
le = kL = 12.00 ft
le/d = 26.18 ≤ *50, OK*
F_{cE} = 0.822*E'min/$(le/d)^2$ = 696 psi
c = 0.8 For solid sawn lumber
C_P = 0.411
Fc' = Fc*$(C_DC_MC_tC_FC_iC_P)$ = 610 psi

Lateral Loads (Bending only) 0.6D+0.6W
Bending allowable stress calculations

Fb = 900 psi NDS 2012 Table 4A
E = 1600000 psi NDS 2012 Table 4A
Actual stud width = 1.5 in
Actual stud depth = 5.5 in

Fb' = Fb*$(C_DC_MC_tC_LC_FC_{fu}C_iC_rC_t)$
C_D = 1.60 For wind or seismic loads
C_M = 1.00 For MC < 19%
C_t = 1.00 Insulated against 100+ F
C_F = 1.30 Size increase
C_{fu} = 1.00 No flat side
C_i = 1.00 No incising
C_r = 1.15 Repetitive member
C_t = 1.00 Rectangular shaped
C_T = 1.00

Fb* = Fb*$(C_DC_MC_tC_FC_{fu}C_iC_rC_t)$ = 2153 psi
Emin = 580000 psi
E' = E*$(C_MC_tC_iC_T)$ = 580000 psi
unbraced length, lu = 1.00 ft
lu/d = 2.18
le = 24.72 in
$R_B = (le*d/b^2)^{1/2}$ = 7.77 ≤ *50, OK*
F_{bE} = 1.20*E'min/$(R_B)^2$ = 11518 psi
C_L = 0.989
Fb' = Fb*$(C_DC_MC_tC_LC_FC_{fu}C_iC_rC_t)$ = 2129 psi

Bending + Compression D+0.75*(0.6W)+0.75*L+0.75*(Lr or S or R)

fc = P/A = 318 psi
F'_c = 647 psi
F_{cE} = 696 psi *> fc, OK*
fb = 547 psi
F'_b = 2129 psi

$(f_c/F'_c)^2+f_b/(F_b'*[1-f_c/F_{cE}])$ = 0.714 *OK*

Compression actual stress calculations

Gravity unit loads
Roof DL = 15 psf
Lr = 20 psf
S = 15 psf
R = 5 psf
Floor DL = 15 psf
LL = 125 psf
Wall weight = 15 psf

Roof slope = 1 :12
Roof Tributary width = 12.00 ft
Floor Tributary width = 12.00 ft
Wall height on top of wall = 8.00 ft
Stud spacing = 16 in o.c.
Roof Tributary Area = 16.00 ft^2
Floor Tributary Area = 16.00 ft^2
width, b = 1.50
depth, d = 5.50
P = 2881 lbs
A = b*d = 8.25 in^2
fc = P/A = 349 *psi OK*

Bending actual stress calculations

Stud height = 12.0 ft
Stud spacing = 16 in o.c.
P_{net30} = 23.14 psf
λ = 1.38
Wind load, W = 42.58 plf

I_E = 1.00
S_{DS} = 0.542
W_W = 15 psf
Stud spacing = 16 in o.c.
Seismic load, E = 9.52 plf
Design Load 0.6W = 25.55 plf
Design Moment = $wl^2/8$ = 460 ft-lb
S = $bd^2/6$ = $b*d^2/6$ = 7.56 in^3
fb = M/S = 730 *psi OK*

Deflection

Allowable deflection, L/360 0.40 in
Actual deflection = $5wL^4/384EI$ = 0.25 *in OK*
L/575

Shear

Fv = 180 psi NDS 2012 Table
Fv' = Fv*$(C_DC_MC_tC_i)$ = 288 psi
Max V = W*L/2 = 153 psi
A = b*d = 8.25 in^2
fv = 1.5*V/A = 28 *psi OK*

Plate Bearing D+L
Perpendicular to grain (DF #2 top and bottom plates)

$Fc_\perp' = Fc_\perp*(C_MC_tC_iC_b)$
Top and bottom plate grade = DF #2
C_M = 1.00 for MC < 19%
C_t = 1.00 Insulated against 100+
C_i = 1.00 No incising
C_b = 1.00 No increase for bearin
$Fc_\perp$ = 625 psi
$Fc_\perp' = Fc_\perp*(C_MC_tC_iC_b)$ = 625 psi
$fc_\perp$ = 349 lbs

Calculation summary

Load combination	Allowable and actual stresses							
	C_D	fc	Fc'	fc/Fc'	fb	Fb'	fb/Fb'	fb+fc
D	0.90	107	598	0.178	0	1204	0.000	0.03
D+L	1.00	349	610	0.572	0	1337	0.000	0.33
D+(Lr or S or R)	1.25	146	631	0.231	0	1668	0.000	0.05
D+0.75*LL+0.75*(Lr or S or R)	1.25	318	631	0.504	0	1668	0.000	0.25
D+(0.6W or 0.7E)	1.60	107	647	0.165	730	2129	0.343	0.43
D+0.75*(0.6W)+0.75*L+0.75*(Lr or S or R)	1.60	318	647	0.491	547	2129	0.257	0.71
D+0.75*(0.7E)+0.75*L+0.75*S	1.60	310	647	0.480	143	2129	0.067	0.35
0.6D+0.6W	1.60	64	647	0.099	1216	2129	0.571	0.64
0.6D+0.7E	1.60	64	647	0.099	190	2129	0.089	0.11

6/11/2019 14:27

ASD Wood Member Design v7.4.0 (7-3-18)

PROJECT 1150374 LAKE MEAD TITLE LOAN (FB-1)

Member Dimensions

Beam ● Joist ○

	Cantilever	Span	Cantilever	Total Length
Span =		16.50		16.50
Unbraced length =		16.00	ft	
Number of plys =		1		
Member width, b =		5.5	in	☐ Custom width
Member depth, d =		21	in	☐ Custom depth
Orientation =		Strong		

Member Material Properties

Lumber type = Glulam
Stress Class = 24F-V4 DF
Grade = 1.8E
Member unit weight = 36 pcf
Bearing length @ support A = 6.00 in ≥ 4.66 in
Bearing length @ support B = 6.00 in ≥ 4.66 in

Pos. Bending stress controls member design (88%)

Loads

	Loads	
Roof DL =	15	psf
Roof Lr =	20	psf
Snow, S =	15	psf
Rain, R =	5	psf
Floor DL =	15	psf
Floor LL =	125	psf

Unfactored Load Reactions

Load type	R_A	R_B	
D =	3643	3643	*lbs*
L =	12375	12375	*lbs*
Lr =	1980	1980	*lbs*
S =	0	0	*lbs*
R =	0	0	*lbs*
W =	0	0	*lbs*
E =	0	0	*lbs*

Point Loads

	P_L	P_D	P_T	a	LL Type	Load Description
P_1 =			0			
P_2 =			0			
P_3 =			0			
P_4 =			0			
P_5 =			0			
P_6 =			0			

Uniform Loads

Roof slope = 0.50 :12 Member slope = :12

Live, psf	Dead, psf	Trib. Width		W_L	W_D	W_T	Start @	End @	LL Type	Load Description
20	15	12.00	W_1 =	240	180	420	0.00	16.50	Roof	
0	15	3.50	W_2 =	0	53	53	0.00	16.50	Floor	PARAPET
125	15	12.00	W_3 =	1500	180	1680	0.00	16.50	Floor	
			W_4 =			0				
			W_5 =			0				
			W_6 =			0				

Triangular Loads (Starting or ending load must be 0)

	Start W_L	Start W_D	End W_L	End W_D	Start W_T	End W_T	Start @	End @	LL Type	Load Description
T_1 =					0	0				
T_2 =					0	0				
T_3 =					0	0				
T_4 =					0	0				

Member Shear Design — *Member design controlled by D+L*

Fv =	265	psi
$Fv' = Fv^*(C_D C_M C_t C_i)$ =	265	psi
Max V =	16018	lbs
Design V =	12135	lbs
A = b*d =	115.50	in^2
fv = 1.5*V/A =	208	psi
	OK	

Adjustment Factors

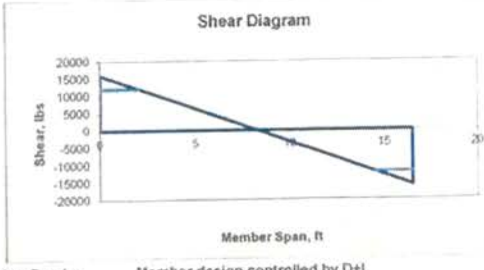
C_D =	1.00	For floor live load
C_M =	1.00	For MC < 19%
C_t =	1.00	Insulated against 100+ F
C_F =		No size increase
C_V =	0.96	Volume Factor
C_{fu} =	1.00	Narrow face loaded
C_i =		No incising
C_r =	1.00	Not a repetitive member
C_f =		Rectangular shaped
C_T =		Buckling stiffness factor
C_b =	1.00	Bearing area factor

Member Bending Design — *Member design controlled by D+L*

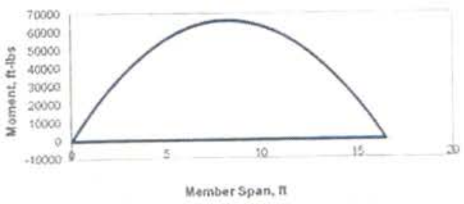
	Fb^+	Fb^-	
Fb =	2400	1850	psi
$Fb^* = Fb^*(C_D C_M C_t C_F C_i C_r C_f)$ =	2400	1850	psi
Emin =	830000	830000	psi
Emin' = Emin*(CMCtCiCT) =	830000	830000	psi
unbraced length, lu =	16.00	16.00	ft
lu/d =	9.14	9.14	
le =	376	376	in
$R_B = (le^*d/b^2)^{1/2}$ =	16.16	16.16	≤ 50. OK
$F_{bE} = 1.20^*E'min/(R_B)^2$ =	3816	3816	psi
C_L =	0.934	0.958	
$Fb' = Fb^*(C_D C_M C_t C_L C_F C_V C_{fu} C_i C_r C_f)$ =	2241	1773	psi

	+ Moment	- Moment	
Max moment, M =	66073		lb-ft
$S = bd^2/6$ =	404.25	404.25	in^3
fb = M/S =	1961	0	psi
	OK	OK	

Shear Diagram



Moment diagram



Member Bearing — Member design controlled by D+L

$Fc_\perp$ = 625 psi
$F'c_\perp = Fc_\perp^*(C_M C_t C_b)$ = 625 psi

	C_b	P, lbs	A, in^2	$fc_\perp$ = P/A		
Support @ A =	1.00	16018	33.00	485	psi	OK
Support @ B =	1.00	16018	33.00	485	psi	OK

Member Deflection

Moment of Inertia, $I = bd^3/12$ = 4244.625 in^4
E = 1800000 psi
$E' = E^*(C_M C_t)$ = 1800000 psi

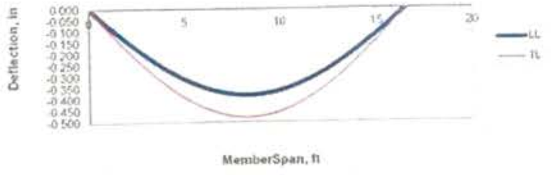
Mid Span Deflection

Loading	$Ratio_{allow}$	$\Delta_{allowed}$	Δ_{actual}	$Ratio_{actual}$	Check
Δ_{LL}	360	0.550	0.380	L/521	OK
Δ_{TL}	240	0.825	0.476	L/415	OK

Cantilever Deflection

Loading	$Ratio_{allow}$	$\Delta_{allowed}$	Δ_{actual}	$Ratio_{actual}$	Check
Δ_{LL}	180	0.000	0.000	N/A	OK
Δ_{TL}	120	0.000	0.000	N/A	OK

Deflection



(1) 5.5" x 21" 24F-V4 DF 1.8E

Date: 6/11/19 2:33 PM

ASD Wood Member Design v7.4.0 (7-3-18)

PROJECT 1150374 LAKE MEAD TITLE LOAN (FB-2)

Member Dimensions

Beam ● Joist ○

	Cantilever	Span	Cantilever	Total Length	
Span =		7.00		7.00	
Unbraced length =		6.50	ft		
Number of plys =		2			
Member width, b =		1.75	in	☐ Custom width	
Member depth, d =		11.875	in	☐ Custom depth	
Orientation =		Strong			

Member Material Properties

Lumber type = Engineered
Type = LVL
Grade = 1.9E
Member unit weight = 42 pcf
Bearing length @ support A = 4.50 in ≥ 3.08 in
Bearing length @ support B = 4.50 in ≥ 3.08 in

	Loads	
Roof DL =	15	psf
Roof Lr =	20	psf
Snow, S =	15	psf
Rain, R =	5	psf
Floor DL =	15	psf
Floor LL =	125	psf

"Shear stress controls member design (85%)"

Unfactored Load Reactions

Load type	R_A	R_B	
D =	1487	1487	*lbs*
L =	5250	5250	*lbs*
Lr =	840	840	*lbs*
S =	0	0	*lbs*
R =	0	0	*lbs*
W =	0	0	*lbs*
E =	0	0	*lbs*

Point Loads

	P_L	P_D	P_T	a	LL Type	Load Description
P_1 =			0			
P_2 =			0			
P_3 =			0			
P_4 =			0			
P_5 =			0			
P_6 =			0			

Uniform Loads

Roof slope = 0.50 :12 Member slope = :12

Live, psf	Dead, psf	Trib. Width		W_L	W_D	W_T	Start @	End @	LL Type	Load Description
20	15	12.00	W_1 =	240	180	420	0.00	7.00	Roof	
0	15	3.50	W_2 =	0	53	53	0.00	7.00	Floor	PARAPET
125	15	12.00	W_3 =	1500	180	1680	0.00	7.00	Floor	
			W_4 =			0				
			W_5 =			0				
			W_6 =			0				

Triangular Loads (Starting or ending load must be 0)

	Start W_L	Start W_D	End W_L	End W_D	Start W_T	End W_T	Start @	End @	LL Type	Load Description
T_1 =					0	0				
T_2 =					0	0				
T_3 =					0	0				
T_4 =					0	0				

Member Shear Design ***Member design controlled by D+L***

Fv =	285	psi
$Fv' = Fv^*(C_DC_MC_tC_i)$ =	285	psi
Max V =	6737	lbs
Design V =	4471	lbs
A = b*d =	41.56	in^2
fv = 1.5*V/A =	243	psi
	OK	

Adjustment Factors

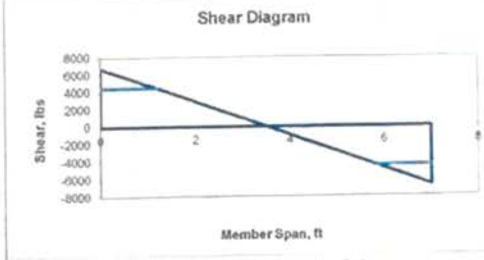
C_D =	1.00	For floor live load
C_M =	1.00	For MC < 19%
C_t =	1.00	Insulated against 100+ F
C_F =	▨	No size increase
C_V =	1.00	Volume Factor
C_{fu} =	▨	Narrow face loaded
C_i =	▨	No incising
C_r =	1.00	Not a repetitive member
C_f =	▨	Rectangular shaped
C_T =	▨	Buckling stiffness factor
C_b =	1.00	Bearing area factor

Member Bending Design ***Member design controlled by D+L***

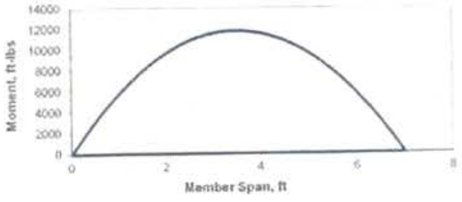
	Fb^+	Fb^-	
Fb =	2600	2600	psi
$Fb^* = Fb^*(C_DC_MC_tC_FC_iC_rC_f)$ =	2600	2600	psi
Emin =	965710	965710	psi
Emin' = Emin*(CMCtCiCT) =	965710	965710	psi
unbraced length, lu =	6.50	6.50	ft
lu/d =	6.57	6.57	
le =	161	161	in
$R_B = (le^*d/b^2)^{1/2}$ =	12.48	12.48	≤ 50, OK
$F_{bE} = 1.20^*E'min/(R_B)^2$ =	7440	7440	psi
C_L =	0.975	0.975	
$Fb' = Fb^*(C_DC_MC_tC_LC_FC_VC_{fu}C_iC_rC_f)$ =	2538	2538	psi

	+ Moment	- Moment	
Max moment, M =	11789		lb-ft
$S = bd^2/6$ =	82.26	82.26	in^3
fb = M/S =	1720	0	psi
	OK	OK	

Shear Diagram



Moment diagram



Member Bearing Member design controlled by D+L

$Fc_\perp$ = 625 psi
$F'c_\perp = Fc_\perp^*(C_MC_tC_iC_b)$ = 625 psi

	C_b	P, lbs	A, in^2	$fc_\perp = P/A$		
Support @ A =	1.00	6737	15.75	428	psi	OK
Support @ B =	1.00	6737	15.75	428	psi	OK

Member Deflection

Moment of Inertia, $I = bd^3/12$ = 488.413 in^4
E = 1900000 psi
$E' = E^*(C_MC_tC_i)$ = 1900000 psi

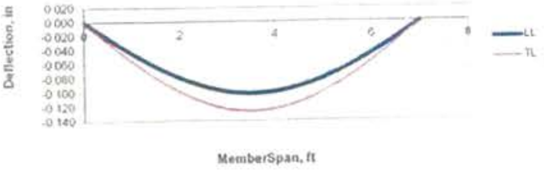
Mid Span Deflection

Loading	$Ratio_{allow}$	$\Delta_{allowed}$	Δ_{actual}	$Ratio_{actual}$	Check
Δ_{LL}	360	0.233	0.101	L/829	OK
Δ_{TL}	240	0.350	0.126	L/666	OK

Cantilever Deflection

Loading	$Ratio_{allow}$	$\Delta_{allowed}$	Δ_{actual}	$Ratio_{actual}$	Check
Δ_{LL}	180	0.000	0.000	N/A	OK
Δ_{TL}	120	0.000	0.000	N/A	OK

Deflection



(2) 1.75" x 11.875" LVL 1.9E

Date: 6/11/19 2:34 PM

ASD Wood Member Design v7.4.0 (7-3-18)

PROJECT 1150374 LAKE MEAD TITLE LOAN (FB-3)

Member Dimensions Beam ● Joist ○

	Cantilever	Span	Cantilever	Total Length
Span =		10.17		10.17

Unbraced length = 9.67 ft
Number of plys = 2
Member width, b = 1.75 in ☐ Custom width
Member depth, d = 16 in ☐ Custom depth
Orientation = Strong

Member Material Properties

Lumber type = Engineered
Type = LVL
Grade = 1.9E
Member unit weight = 42 pcf
Bearing length @ support A = 4.50 in ≥ 4.49 in
Bearing length @ support B = 4.50 in ≥ 4.49 in

Loads

Roof DL = 15 psf
Roof Lr = 20 psf
Snow, S = 15 psf
Rain, R = 5 psf
Floor DL = 15 psf
Floor LL = 125 psf

Bearing stress controls member design (100%)

Unfactored Load Reactions

Load type	R_A	R_B	
D =	2181	2181	lbs
L =	7628	7628	lbs
Lr =	1220	1220	lbs
S =	0	0	lbs
R =	0	0	lbs
W =	0	0	lbs
E =	0	0	lbs

Point Loads

	P_L	P_D	P_T	a	LL Type	Load Description
P_1 =			0			
P_2 =			0			
P_3 =			0			
P_4 =			0			
P_5 =			0			
P_6 =			0			

Uniform Loads Roof slope = 0.50 :12 Member slope = :12

Live, psf	Dead, psf	Trib. Width		W_L	W_D	W_T	Start @	End @	LL Type	Load Description
20	15	12.00	W_1 =	240	180	420	0.00	10.17	Roof	
0	15	3.50	W_2 =	0	53	53	0.00	10.17	Floor	PARAPET
125	15	12.00	W_3 =	1500	180	1680	0.00	10.17	Floor	
			W_4 =			0				
			W_5 =			0				
			W_6 =			0				

Triangular Loads (Starting or ending load must be 0)

	Start W_L	Start W_D	End W_L	End W_D	Start W_T	End W_T	Start @	End @	LL Type	Load Description
T_1 =					0	0				
T_2 =					0	0				
T_3 =					0	0				
T_4 =					0	0				

Member Shear Design ***Member design controlled by D+L***

Fv = 285 psi
$Fv' = Fv*(C_DC_MC_tC_i)$ = 285 psi
Max V = 9809 lbs
Design V = 6884 lbs
A = b*d = 56.00 in^2
fv = 1.5*V/A = 263 psi
OK

Adjustment Factors

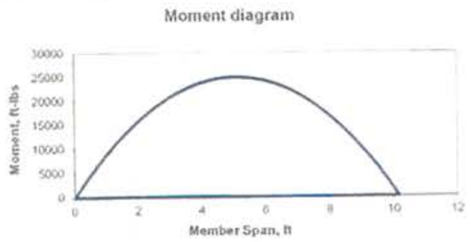
C_D =	1.00	For floor live load
C_M =	1.00	For MC < 19%
C_t =	1.00	Insulated against 100+ F
C_F =	▨	No size increase
C_V =	0.96	Volume Factor
C_{fu} =	▨	Narrow face loaded
C_i =	▨	No incising
C_r =	1.00	Not a repetitive member
C_f =	▨	Rectangular shaped
C_T =	▨	Buckling stiffness factor
C_b =	1.00	Bearing area factor

Member Bending Design ***Member design controlled by D+L***

	Fb*	Fb'	
Fb =	2600	2600	psi
$Fb^* = Fb*(C_DC_MC_tC_FC_iC_rC_f)$ =	2600	2600	psi
Emin =	965710	965710	psi
Emin' = Emin*(CMCtCiCT) =	965710	965710	psi
unbraced length, lu =	9.67	9.67	ft
lu/d =	7.25	7.25	
le =	237	237	in
$R_B = (le*d/b^2)^{1/2}$ =	17.60	17.60	≤ 50, OK
$F_{bE} = 1.20*E'min/(R_B)^2$ =	3741	3741	psi
C_L =	0.919	0.919	
$Fb' = Fb*(C_DC_MC_tC_LC_FC_VC_{fu}C_iC_rC_f)$ =	2389	2389	psi

	+ Moment	- Moment	
Max moment, M =	24939		lb-ft
$S = bd^2/6$ =	149.33	149.33	in^3
fb = M/S =	2004	0	psi
	OK	OK	


Shear Diagram


Moment diagram

Member Bearing **Member design controlled by D+L**

$Fc_\perp$ = 625 psi
$F'c_\perp = Fc_\perp*(C_MC_tC_iC_b)$ = 625 psi

	C_b	P, lbs	A, in^2	$fc_\perp = P/A$		
Support @ A =	1.00	9809	15.75	623	psi	OK
Support @ B =	1.00	9809	15.75	623	psi	OK

Member Deflection

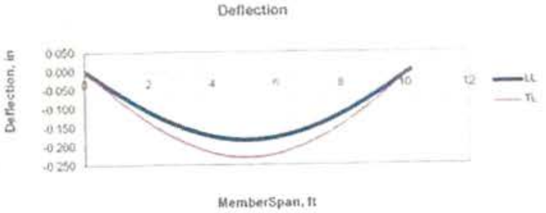
Moment of Inertia, $I = bd^3/12$ = 1194.667 in^4
E = 1900000 psi
$E' = E*(C_MC_tC_i)$ = 1900000 psi

Mid Span Deflection

Loading	$Ratio_{allow}$	$\Delta_{allowed}$	Δ_{actual}	$Ratio_{actual}$	Check
Δ_{LL}	360	0.339	0.185	L/661	OK
Δ_{TL}	240	0.509	0.230	L/530	OK

Cantilever Deflection

Loading	$Ratio_{allow}$	$\Delta_{allowed}$	Δ_{actual}	$Ratio_{actual}$	Check
Δ_{LL}	180	0.000	0.000	N/A	OK
Δ_{TL}	120	0.000	0.000	N/A	OK


Deflection

(2) 1.75" x 16" LVL 1.9E

Date: 6/11/19 2:35 PM

ASD Wood Member Design v7.4.0 (7-3-18)

PROJECT 1150374 LAKE MEAD TITLE LOAN ~~(FB-6)~~ FB-4

Member Dimensions Beam ● Joist ○

	Cantilever	Span	Cantilever	Total Length
Span =		17.50		17.50

Unbraced length = 1.00 ft
Number of plys = 2
Member width, b = 1.75 in ☐ Custom width
Member depth, d = 14 in ☐ Custom depth
Orientation = Strong

Member Material Properties

Lumber type = Engineered
Type = LVL
Grade = 1.9E
Member unit weight = 42 pcf
Bearing length @ support A = 3.00 in ≥ 1.5 in
Bearing length @ support B = 3.00 in ≥ 1.5 in

Loads

Roof DL = 15 psf
Roof Lr = 20 psf
Snow, S = 15 psf
Rain, R = 5 psf
Floor DL = 15 psf
Floor LL = 125 psf

TL deflection controls member design (63%)

Unfactored Load Reactions

Load type	R_A	R_B	
D =	2028	2028	*lbs*
L =	1094	1094	*lbs*
Lr =	350	350	*lbs*
S =	0	0	*lbs*
R =	0	0	*lbs*
W =	0	0	*lbs*
E =	0	0	*lbs*

Point Loads

	P_L	P_D	P_T	a	LL Type	Load Description
P_1 =			0			
P_2 =			0			
P_3 =			0			
P_4 =			0			
P_5 =			0			
P_6 =			0			

Uniform Loads Roof slope = :12 Member slope = :12

Live, psf	Dead, psf	Trib. Width		W_L	W_D	W_T	Start @	End @	LL Type	Load Description
20	15	2.00	W_1 =	40	30	70	0.00	17.50	Roof	
125	15	1.00	W_2 =	125	15	140	0.00	17.50	Floor	
	15	11.50	W_3 =	0	173	173	0.00	17.50	Floor	wall
			W_4 =			0				
			W_5 =			0				
			W_6 =			0				

Triangular Loads (Starting or ending load must be 0)

	Start W_L	Start W_D	End W_L	End W_D	Start W_T	End W_T	Start @	End @	LL Type	Load Description
T_1 =					0	0				
T_2 =					0	0				
T_3 =					0	0				
T_4 =					0	0				

Member Shear Design ***Member design controlled by D+L***

Fv =	285	psi
$Fv' = Fv^*(C_DC_MC_tC_i)$ =	285	psi
Max V =	3122	lbs
Design V =	2661	lbs
A = b*d =	49.00	in^2
fv = 1.5*V/A =	96	psi
	OK	

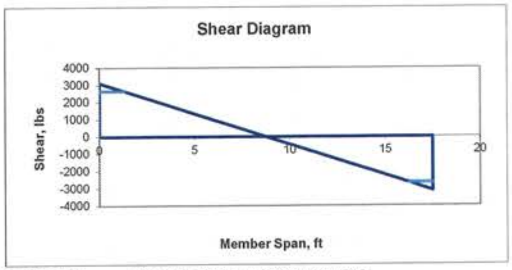
Adjustment Factors

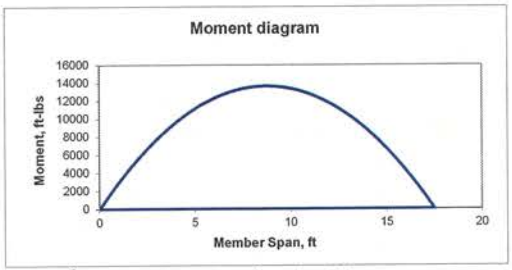
C_D =	1.00	For floor live load
C_M =	1.00	For MC < 19%
C_t =	1.00	Insulated against 100+ F
C_F =		No size increase
C_V =	0.98	Volume Factor
C_{fu} =		Narrow face loaded
C_i =		No incising
C_r =	1.00	Not a repetitive member
C_f =		Rectangular shaped
C_T =		Buckling stiffness factor
C_b =	1.00	Bearing area factor

Member Bending Design ***Member design controlled by D+L***

	Fb^+	Fb^-	
Fb =	2600	2600	psi
$Fb^* = Fb^*(C_DC_MC_tC_FC_iC_rC_f)$ =	2600	2600	psi
Emin =	965710	965710	psi
Emin' = Emin*(CMCtCiCT) =	965710	965710	psi
unbraced length, lu =	1.00	1.00	ft
lu/d =	0.86	0.86	
le =	25	25	in
$R_B = (le^*d/b^2)^{1/2}$ =	5.32	5.32	*≤ 50, OK*
$F_{bE} = 1.20^*E'min/(R_B)^2$ =	41019	41019	psi
C_L =	0.997	0.997	
$Fb' = Fb^*(C_DC_MC_tC_LC_FC_VC_{fu}C_iC_rC_f)$ =	2546	2546	psi

	+ Moment	- Moment	
Max moment, M =	13658		lb-ft
$S = bd^2/6$ =	114.33	114.33	in^3
fb = M/S =	1433	0	psi
	OK	*OK*	





Member Bearing Member design controlled by D+L

$Fc_\perp$ = 625 psi
$F'c_\perp = Fc_\perp^*(C_MC_tC_iC_b)$ = 625 psi

	C_b	P, lbs	A, in^2	$fc_\perp = P/A$		
Support @ A =	1.00	3122	10.50	297	psi	*OK*
Support @ B =	1.00	3122	10.50	297	psi	*OK*

Member Deflection

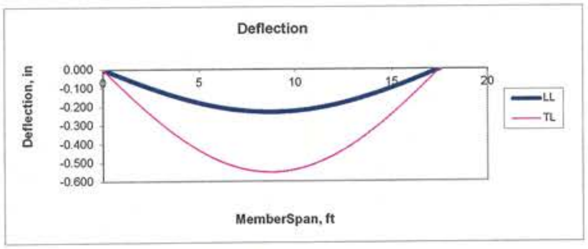
Moment of Inertia, $I = bd^3/12$ = 800.333 in^4
E = 1900000 psi
$E' = E^*(C_MC_tC_i)$ = 1900000 psi

Mid Span Deflection

Loading	$Ratio_{allow}$	$\Delta_{allowed}$	Δ_{actual}	$Ratio_{actual}$	Check
Δ_{LL}	360	0.583	0.229	L/917	*OK*
Δ_{TL}	240	0.875	0.551	L/381	*OK*

Cantilever Deflection

Loading	$Ratio_{allow}$	$\Delta_{allowed}$	Δ_{actual}	$Ratio_{actual}$	Check
Δ_{LL}	180	0.000	0.000	N/A	*OK*
Δ_{TL}	120	0.000	0.000	N/A	*OK*



(2) 1.75" x 14" LVL 1.9E

Date: 11/20/19 12:18 PM

ASD Wood Member Design v7.4.0 (7-3-18)

PROJECT 1150374 LAKE MEAD TITLE LOAN (~~FB-1~~) FB-4

Member Dimensions Beam ● Joist ○

	Cantilever	Span	Cantilever	Total Length
Span =		10.50		10.50

Unbraced length = 1.00 ft
Number of plys = 2
Member width, b = 1.5 in ☐ Custom width
Member depth, d = 9.25 in ☐ Custom depth
Orientation = Strong

Member Material Properties

Lumber type = Solid Sawn
Species = Douglas Fir - North
Grade = No. 2
Member unit weight = 34 pcf
Bearing length @ support A = 3.00 in ≥ 1.5 in
Bearing length @ support B = 3.00 in ≥ 1.5 in

Loads

Roof DL = 15 psf
Roof Lr = 20 psf
Snow, S = 15 psf
Rain, R = 5 psf
Floor DL = 15 psf
Floor LL = 125 psf

*****Pos. Bending stress controls member design (85%)*****

Unfactored Load Reactions

Load type	R_A	R_B	
D =	428	428	*lbs*
L =	656	656	*lbs*
Lr =	0	0	*lbs*
S =	0	0	*lbs*
R =	0	0	*lbs*
W =	0	0	*lbs*
E =	0	0	*lbs*

Point Loads

	P_L	P_D	P_T	a	LL Type	Load Description
P_1 =			0			
P_2 =			0			
P_3 =			0			
P_4 =			0			
P_5 =			0			
P_6 =			0			

Uniform Loads Roof slope = :12 Member slope = :12

Live, psf	Dead, psf	Trib. Width		W_L	W_D	W_T	Start @	End @	LL Type	Load Description
		0.00	W_1 =			0	0.00	10.50		
125	15	1.00	W_2 =	125	15	140	0.00	10.50	Floor	
	15	4.00	W_3 =	0	60	60	0.00	10.50	Floor	wall
			W_4 =			0				
			W_5 =			0				
			W_6 =			0				

Triangular Loads (Starting or ending load must be 0)

	Start W_L	Start W_D	End W_L	End W_D	Start W_T	End W_T	Start @	End @	LL Type	Load Description
T_1 =					0	0				
T_2 =					0	0				
T_3 =					0	0				
T_4 =					0	0				

Member Shear Design ***Member design controlled by D+L***

Fv = 180 psi
$Fv' = Fv^*(C_DC_MC_tC_i)$ = 180 psi
Max V = 1084 lbs
Design V = 899 lbs
A = b*d = 27.75 in^2
fv = 1.5*V/A = 59 psi
OK

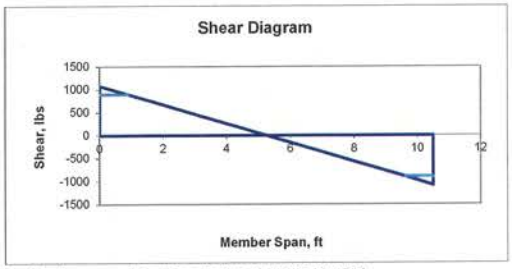
Adjustment Factors

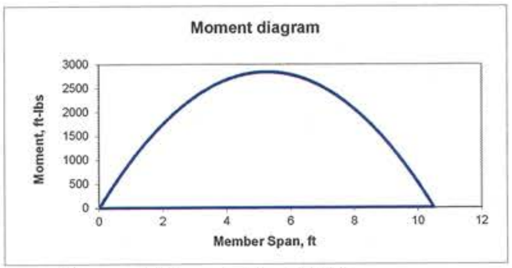
C_D =	1.00	For floor live load
C_M =	1.00	For MC < 19%
C_t =	1.00	Insulated against 100+ F
C_F =	1.10	Size increase
C_V =		Volume Factor
C_{fu} =	1.00	Narrow face loaded
C_i =	1.00	No incising
C_r =	1.00	Not a repetitive member
C_f =	1.00	Rectangular shaped
C_T =	1.00	Buckling stiffness factor
C_b =	1.00	Bearing area factor

Member Bending Design ***Member design controlled by D+L***

	Fb^+	Fb^-	
Fb =	850	850	psi
$Fb^* = Fb^*(C_DC_MC_tC_FC_iC_rC_f)$ =	935	935	psi
Emin =	580000	580000	psi
Emin' = Emin*(CMCtCiCT) =	580000	580000	psi
unbraced length, lu =	1.00	1.00	ft
lu/d =	1.30	1.30	
le =	25	25	in
$R_B = (le^*d/b^2)^{1/2}$ =	5.04	5.04	*≤ 50, OK*
$F_{bE} = 1.20^*E'min/(R_B)^2$ =	27394	27394	psi
C_L =	0.998	0.998	
$Fb' = Fb^*(C_DC_MC_tC_LC_FC_VC_{fu}C_iC_rC_f)$ =	933	933	psi

	+ Moment	**- Moment**	
Max moment, M =	2845		lb-ft
$S = bd^2/6$ =	42.78	42.78	in^3
fb = M/S =	798	0	psi
	OK	***OK***	





Member Bearing Member design controlled by D+L

$Fc_\perp$ = 625 psi
$F'c_\perp = Fc_\perp^*(C_MC_tC_iC_b)$ = 625 psi

	C_b	P, lbs	A, in^2	$fc_\perp$ = P/A		
Support @ A =	1.00	1084	9.00	120	psi	***OK***
Support @ B =	1.00	1084	9.00	120	psi	***OK***

Member Deflection

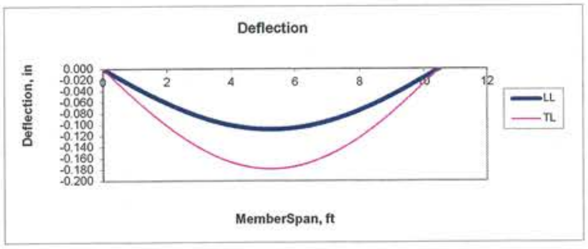
Moment of Inertia, $I = bd^3/12$ = 197.863 in^4
E = 1600000 psi
$E' = E^*(C_MC_tC_i)$ = 1600000 psi

Mid Span Deflection

Loading	$Ratio_{allow}$	$\Delta_{allowed}$	Δ_{actual}	$Ratio_{actual}$	Check
Δ_{LL}	360	0.350	0.108	L/1166	***OK***
Δ_{TL}	240	0.525	0.178	L/706	***OK***

Cantilever Deflection

Loading	$Ratio_{allow}$	$\Delta_{allowed}$	Δ_{actual}	$Ratio_{actual}$	Check
Δ_{LL}	180	0.000	0.000	N/A	***OK***
Δ_{TL}	120	0.000	0.000	N/A	***OK***



(2) 1.5" x 9.25" Douglas Fir - North No. 2

Date: 11/20/19 12:22 PM

ASD Wood Member Design v7.4.0 (7-3-18)

PROJECT 1150374 LAKE MEAD TITLE LOAN (RB-1)

Member Dimensions

Beam ● Joist ○

	Cantilever	Span	Cantilever	Total Length
Span =		16.50		16.50
Unbraced length =		16.00 ft		
Number of plys =		2		
Member width, b =		1.75 in	☐ Custom width	
Member depth, d =		14 in	☐ Custom depth	
Orientation =		Strong		

Member Material Properties

Lumber type = Engineered
Type = LVL
Grade = 1.9E
Member unit weight = 42 pcf
Bearing length @ support A = 3.00 in ≥ 1.84 in
Bearing length @ support B = 3.00 in ≥ 1.84 in

	Loads	
Roof DL =	15	psf
Roof Lr =	20	psf
Snow, S =	15	psf
Rain, R =	5	psf
Floor DL =	15	psf
Floor LL =	40	psf

Pos. Bending stress controls member design (70%)

Unfactored Load Reactions

Load type	R_A	R_B	
D =	2037	2037	*lbs*
L =	0	0	*lbs*
Lr =	1980	1980	*lbs*
S =	0	0	*lbs*
R =	0	0	*lbs*
W =	0	0	*lbs*
E =	0	0	*lbs*

Point Loads

	P_L	P_D	P_T	a	LL Type	Load Description
P_1 =			0			
P_2 =			0			
P_3 =			0			
P_4 =			0			
P_5 =			0			
P_6 =			0			

Uniform Loads

Roof slope = 0.50 :12

Member slope = :12

Live, psf	Dead, psf	Trib. Width		W_L	W_D	W_T	Start @	End @	LL Type	Load Description
20	15	12.00	W_1 =	240	180	420	0.00	16.50	Roof	
0	15	3.50	W_2 =	0	53	53	0.00	16.50	Floor	PARAPET
			W_3 =			0				
			W_4 =			0				
			W_5 =			0				
			W_6 =			0				

Triangular Loads (Starting or ending load must be 0)

	Start W_L	Start W_D	End W_L	End W_D	Start W_T	End W_T	Start @	End @	LL Type	Load Description
T_1 =					0	0				
T_2 =					0	0				
T_3 =					0	0				
T_4 =					0	0				

Member Shear Design ***Member design controlled by D+(Lr or S or R)***

Fv = 285 psi
$Fv' = Fv^*(C_DC_MC_tC_i)$ = 356 psi
Max V = 4017 lbs
Design V = 3388 lbs
A = b*d = 49.00 in^2
fv = 1.5*V/A = 123 psi
OK

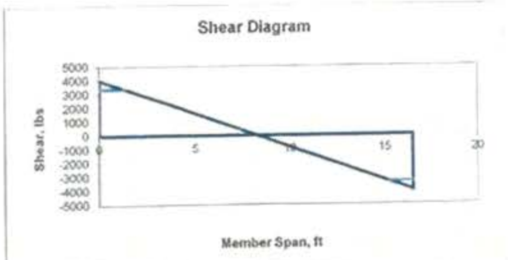
Adjustment Factors

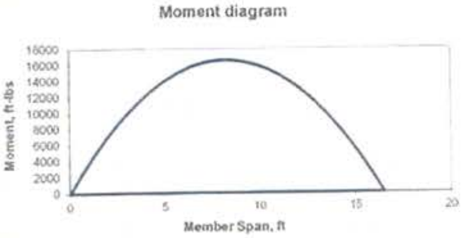
C_D =	1.25	For roof live load
C_M =	1.00	For MC < 19%
C_t =	1.00	Insulated against 100+ F
C_F =		No size increase
C_V =	0.98	Volume Factor
C_{fu} =		Narrow face loaded
C_i =		No incising
C_r =	1.00	Not a repetitive member
C_f =		Rectangular shaped
C_T =		Buckling stiffness factor
C_b =	1.00	Bearing area factor

Member Bending Design ***Member design controlled by D+(Lr or S or R)***

	Fb*	Fb'	
Fb =	2600	2600	psi
$Fb^* = Fb^*(C_DC_MC_tC_rC_iC_fC_t)$ =	3250	3250	psi
Emin =	965710	965710	psi
Emin' = Emin*(CMCtCiCT) =	965710	965710	psi
unbraced length, lu =	16.00	16.00	ft
lu/d =	13.71	13.71	
le =	355	355	in
$R_B = (le^*d/b^2)^{1/2}$ =	20.14	20.14	≤ 50, OK
$F_{bE} = 1.20^*E'min/(R_B)^2$ =	2857	2857	psi
C_L =	0.759	0.759	
$Fb' = Fb^*(C_DC_MC_tC_LC_FC_VC_{fu}C_iC_rC_t)$ =	2468	2468	psi

	+ Moment	- Moment	
Max moment, M =	16571		lb-ft
$S = bd^2/6$ =	114.33	114.33	in^3
fb = M/S =	1739	0	psi
	OK	*OK*	





Member Bearing **Member design controlled by D+(Lr or S or R)**

$Fc_\perp$ = 625 psi
$F'c_\perp = Fc_\perp^*(C_MC_tC_iC_b)$ = 625 psi

	C_b	P, lbs	A, in^2	$fc_\perp = P/A$		
Support @ A =	1.00	4017	10.50	383	psi	OK
Support @ B =	1.00	4017	10.50	383	psi	OK

Member Deflection

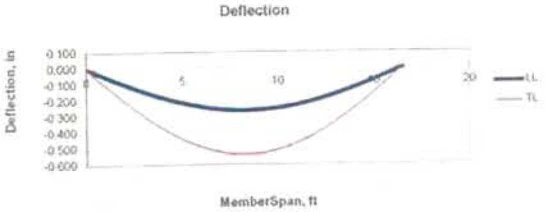
Moment of Inertia, $I = bd^3/12$ = 800.333 in^4
E = 1900000 psi
$E' = E^*(C_MC_tC_i)$ = 1900000 psi

Mid Span Deflection

Loading	$Ratio_{allow}$	$\Delta_{allowed}$	Δ_{actual}	$Ratio_{actual}$	Check
Δ_{LL}	360	0.550	0.283	L/752	OK
Δ_{TL}	240	0.825	0.534	L/370	OK

Cantilever Deflection

Loading	$Ratio_{allow}$	$\Delta_{allowed}$	Δ_{actual}	$Ratio_{actual}$	Check
Δ_{LL}	180	0.000	0.000	N/A	OK
Δ_{TL}	120	0.000	0.000	N/A	OK



(2) 1.75" x 14" LVL 1.9E

Date 6/11/19 2:31 PM

ASD Wood Member Design v7.4.0 (7-3-18)

PROJECT 1150374 LAKE MEAD TITLE LOAN (RB-2)

Member Dimensions Beam ● Joist ○

	Cantilever	Span	Cantilever	Total Length
Span =		12.50		12.50
Unbraced length =		1.00 ft		
Number of plys =		2		
Member width, b =		1.75 in	☐ Custom width	
Member depth, d =		9.5 in	☐ Custom depth	
Orientation =		Strong		

Member Material Properties

Lumber type = Engineered
Type = LVL
Grade = 1.9E
Member unit weight = 42 pcf
Bearing length @ support A = 3.00 in ≥ 1.5 in
Bearing length @ support B = 3.00 in ≥ 1.5 in

Loads

Roof DL = 15 psf
Roof Lr = 20 psf
Snow, S = 15 psf
Rain, R = 5 psf
Floor DL = 15 psf
Floor LL = 125 psf

TL deflection controls member design (79%)

Unfactored Load Reactions

Load type	R_A	R_B	
D =	1186	1186	lbs
L =	0	0	lbs
Lr =	1500	1500	lbs
S =	0	0	lbs
R =	0	0	lbs
W =	0	0	lbs
E =	0	0	lbs

Point Loads

	P_L	P_D	P_T	a	LL Type	Load Description
P_1 =			0			
P_2 =			0			
P_3 =			0			
P_4 =			0			
P_5 =			0			
P_6 =			0			

Uniform Loads Roof slope = :12 Member slope = :12

Live, psf	Dead, psf	Trib. Width		W_L	W_D	W_T	Start @	End @	LL Type	Load Description
20	15	12.00	W_1 =	240	180	420	0.00	12.50	Roof	
			W_2 =			0				
			W_3 =			0				
			W_4 =			0				
			W_5 =			0				
			W_6 =			0				

Triangular Loads (Starting or ending load must be 0)

	Start W_L	Start W_D	End W_L	End W_D	Start W_T	End W_T	Start @	End @	LL Type	Load Description
T_1 =					0	0				
T_2 =					0	0				
T_3 =					0	0				
T_4 =					0	0				

Member Shear Design ***Member design controlled by D+(Lr or S or R)***

Fv = 285 psi
Fv' = Fv*($C_DC_MC_tC_i$) = 356 psi
Max V = 2686 lbs
Design V = 2292 lbs
A = b*d = 33.25 in^2
fv = 1.5*V/A = 121 psi
OK

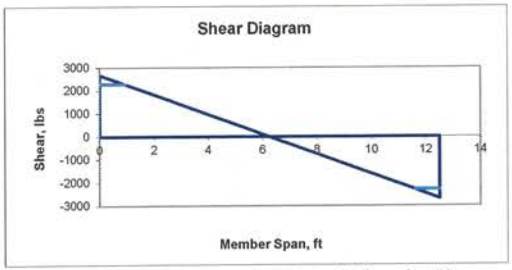
Adjustment Factors

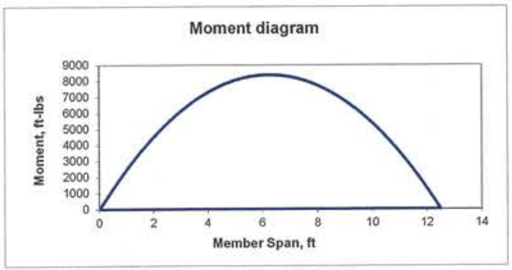
C_D =	1.25	For roof live load
C_M =	1.00	For MC < 19%
C_t =	1.00	Insulated against 100+ F
C_F =		No size increase
C_V =	1.03	Volume Factor
C_{fu} =		Narrow face loaded
C_i =		No incising
C_r =	1.00	Not a repetitive member
C_f =		Rectangular shaped
C_T =		Buckling stiffness factor
C_b =	1.00	Bearing area factor

Member Bending Design ***Member design controlled by D+(Lr or S or R)***

	Fb^+	Fb^-	
Fb =	2600	2600	psi
Fb* = Fb*($C_DC_MC_tC_FC_iC_rC_f$) =	3250	3250	psi
Emin =	965710	965710	psi
Emin' = Emin*(CMCtCiCT) =	965710	965710	psi
unbraced length, lu =	1.00	1.00	ft
lu/d =	1.26	1.26	
le =	25	25	in
$R_B = (le*d/b^2)^{1/2}$ =	4.38	4.38	*≤ 50, OK*
F_{bE} = 1.20*E'min/$(R_B)^2$ =	60449	60449	psi
C_L =	0.997	0.997	
Fb' = Fb*($C_DC_MC_tC_LC_FC_VC_{fu}C_iC_rC_f$) =	3345	3345	psi

	+ Moment	- Moment	
Max moment, M =	8393		lb-ft
S = $bd^2/6$ =	52.65	52.65	in^3
fb = M/S =	1913	0	psi
	OK	*OK*	





Member Bearing Member design controlled by D+(Lr or S or R)

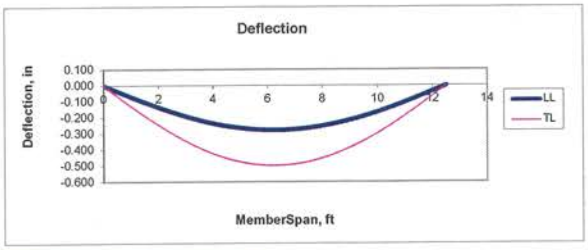
Fc⊥ = 625 psi
F'c⊥ = Fc⊥*($C_MC_tC_iC_b$) = 625 psi

	C_b	P, lbs	A, in^2	fc⊥ = P/A		
Support @ A =	1.00	2686	10.50	256	psi	*OK*
Support @ B =	1.00	2686	10.50	256	psi	*OK*

Member Deflection

Moment of Inertia, I = $bd^3/12$ = 250.068 in^4
E = 1900000 psi
E' = E*($C_MC_tC_i$) = 1900000 psi

Mid Span Deflection					
Loading	$Ratio_{allow}$	$\Delta_{allowed}$	Δ_{actual}	$Ratio_{actual}$	Check
Δ_{LL}	360	0.417	0.277	L/540	*OK*
Δ_{TL}	240	0.625	0.497	L/301	*OK*
Cantilever Deflection					
Loading	$Ratio_{allow}$	$\Delta_{allowed}$	Δ_{actual}	$Ratio_{actual}$	Check
Δ_{LL}	180	0.000	0.000	N/A	*OK*
Δ_{TL}	120	0.000	0.000	N/A	*OK*



(2) 1.75" x 9.5" LVL 1.9E

Date: 11/20/19 12:03 PM

ASD Wood Member Design v7.4.0 (7-3-18)

PROJECT 1150374 LAKE MEAD TITLE LOAN (RB-3)

Member Dimensions Beam ● Joist ○

	Cantilever	Span	Cantilever	Total Length
Span =		7.00		7.00

Unbraced length = 1.00 ft
Number of plys = 2
Member width, b = 1.5 in ☐ Custom width
Member depth, d = 9.25 in ☐ Custom depth
Orientation = Strong

Member Material Properties

Lumber type = Solid Sawn
Species = Douglas Fir - North
Grade = No. 2
Member unit weight = 34 pcf
Bearing length @ support A = 3.00 in ≥ 1.5 in
Bearing length @ support B = 3.00 in ≥ 1.5 in

Loads

Roof DL =	15	psf
Roof Lr =	20	psf
Snow, S =	15	psf
Rain, R =	5	psf
Floor DL =	15	psf
Floor LL =	125	psf

*****Pos. Bending stress controls member design (63%)*****

Unfactored Load Reactions

Load type	R_A	R_B	
D =	653	653	*lbs*
L =	0	0	*lbs*
Lr =	840	840	*lbs*
S =	0	0	*lbs*
R =	0	0	*lbs*
W =	0	0	*lbs*
E =	0	0	*lbs*

Point Loads

	P_L	P_D	P_T	a	LL Type	Load Description
P_1 =			0			
P_2 =			0			
P_3 =			0			
P_4 =			0			
P_5 =			0			
P_6 =			0			

Uniform Loads Roof slope = :12 Member slope = :12

Live, psf	Dead, psf	Trib. Width		W_L	W_D	W_T	Start @	End @	LL Type	Load Description
20	15	12.00	W_1 =	240	180	420	0.00	7.00	Roof	
			W_2 =			0				
			W_3 =			0				
			W_4 =			0				
			W_5 =			0				
			W_6 =			0				

Triangular Loads (Starting or ending load must be 0)

	Start W_L	Start W_D	End W_L	End W_D	Start W_T	End W_T	Start @	End @	LL Type	Load Description
T_1 =					0	0				
T_2 =					0	0				
T_3 =					0	0				
T_4 =					0	0				

Member Shear Design ***Member design controlled by D+(Lr or S or R)***

Fv =	180	psi
$Fv' = Fv^*(C_DC_MC_tC_i)$ =	225	psi
Max V =	1493	lbs
Design V =	1111	lbs
A = b*d =	27.75	in^2
fv = 1.5*V/A =	81	psi
	OK	

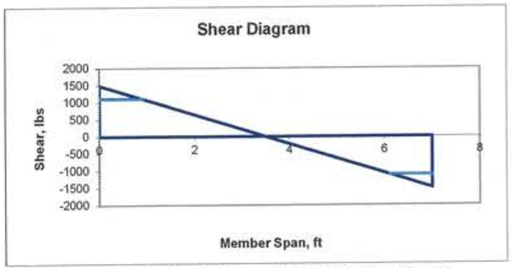
Adjustment Factors

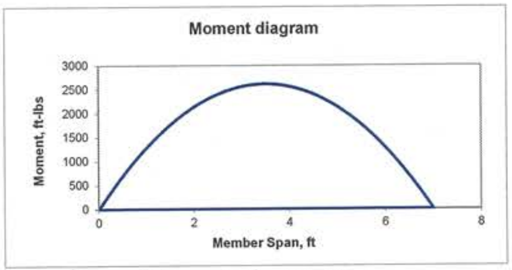
C_D =	1.25	For roof live load
C_M =	1.00	For MC < 19%
C_t =	1.00	Insulated against 100+ F
C_F =	1.10	Size increase
C_V =		Volume Factor
C_{fu} =	1.00	Narrow face loaded
C_i =	1.00	No incising
C_r =	1.00	Not a repetitive member
C_f =	1.00	Rectangular shaped
C_T =	1.00	Buckling stiffness factor
C_b =	1.00	Bearing area factor

Member Bending Design ***Member design controlled by D+(Lr or S or R)***

	Fb^+	Fb^-	
Fb =	850	850	psi
$Fb^* = Fb^*(C_DC_MC_tC_FC_iC_rC_f)$ =	1169	1169	psi
Emin =	580000	580000	psi
Emin' = Emin*(CMCtCiCT) =	580000	580000	psi
unbraced length, lu =	1.00	1.00	ft
lu/d =	1.30	1.30	
le =	25	25	in
$R_B = (le^*d/b^2)^{1/2}$ =	5.04	5.04	***≤ 50, OK***
$F_{bE} = 1.20^*E'min/(R_B)^2$ =	27394	27394	psi
C_L =	0.998	0.998	
$Fb' = Fb^*(C_DC_MC_tC_LC_FC_VC_{fu}C_iC_rC_f)$ =	1166	1166	psi

	+ Moment	- Moment	
Max moment, M =	2612		lb-ft
$S = bd^2/6$ =	42.78	42.78	in^3
fb = M/S =	733	0	psi
	OK	***OK***	





Member Bearing **Member design controlled by D+(Lr or S or R)**

$Fc_\perp$ = 625 psi
$F'c_\perp = Fc_\perp^*(C_MC_tC_iC_b)$ = 625 psi

	C_b	P, lbs	A, in^2	$fc_\perp = P/A$		
Support @ A =	1.00	1493	9.00	166	psi	***OK***
Support @ B =	1.00	1493	9.00	166	psi	***OK***

Member Deflection

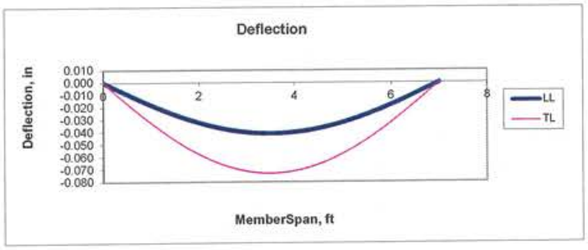
Moment of Inertia, $I = bd^3/12$ = 197.863 in^4
E = 1600000 psi
$E' = E^*(C_MC_tC_i)$ = 1600000 psi

Mid Span Deflection

Loading	$Ratio_{allow}$	$\Delta_{allowed}$	Δ_{actual}	$Ratio_{actual}$	Check
Δ_{LL}	360	0.233	0.041	L/2051	***OK***
Δ_{TL}	240	0.350	0.073	L/1154	***OK***

Cantilever Deflection

Loading	$Ratio_{allow}$	$\Delta_{allowed}$	Δ_{actual}	$Ratio_{actual}$	Check
Δ_{LL}	180	0.000	0.000	N/A	***OK***
Δ_{TL}	120	0.000	0.000	N/A	***OK***



(2) 1.5" x 9.25" Douglas Fir - North No. 2

Date: 11/20/19 12:07 PM

ASD Wood Member Design v7.4.0 (7-3-18)

PROJECT 1150374 LAKE MEAD TITLE LOAN (RB-4)

Member Dimensions

Beam ● Joist ○

	Cantilever	Span	Cantilever	Total Length
Span =		10.17		10.17
Unbraced length =		1.00	ft	

Number of plys = 2

Member width, b = 1.5 in ☐ Custom width

Member depth, d = 11.25 in ☐ Custom depth

Orientation = Strong

Member Material Properties

Lumber type = Solid Sawn

Species = Douglas Fir - North

Grade = No. 2

Member unit weight = 34 pcf

Bearing length @ support A = 3.00 in ≥ 1.5 in

Bearing length @ support B = 3.00 in ≥ 1.5 in

Loads

Roof DL =	15	psf
Roof Lr =	20	psf
Snow, S =	15	psf
Rain, R =	5	psf
Floor DL =	15	psf
Floor LL =	125	psf

Pos. Bending stress controls member design (99%)

Unfactored Load Reactions

Load type	R_A	R_B	
D =	955	955	*lbs*
L =	0	0	*lbs*
Lr =	1220	1220	*lbs*
S =	0	0	*lbs*
R =	0	0	*lbs*
W =	0	0	*lbs*
E =	0	0	*lbs*

Point Loads

	P_L	P_D	P_T	a	LL Type	Load Description
P_1 =			0			
P_2 =			0			
P_3 =			0			
P_4 =			0			
P_5 =			0			
P_6 =			0			

Uniform Loads

Roof slope = :12 Member slope = :12

Live, psf	Dead, psf	Trib. Width		W_L	W_D	W_T	Start @	End @	LL Type	Load Description
20	15	12.00	W_1 =	240	180	420	0.00	10.17	Roof	
			W_2 =			0				
			W_3 =			0				
			W_4 =			0				
			W_5 =			0				
			W_6 =			0				

Triangular Loads (Starting or ending load must be 0)

	Start W_L	Start W_D	End W_L	End W_D	Start W_T	End W_T	Start @	End @	LL Type	Load Description
T_1 =					0	0				
T_2 =					0	0				
T_3 =					0	0				
T_4 =					0	0				

Member Shear Design *Member design controlled by D+(Lr or S or R)*

Fv =	180	psi
$Fv' = Fv*(C_D C_M C_t C_i)$ =	225	psi
Max V =	2176	lbs
Design V =	1721	lbs
A = b*d =	33.75	in^2
fv = 1.5*V/A =	97	psi
	OK	

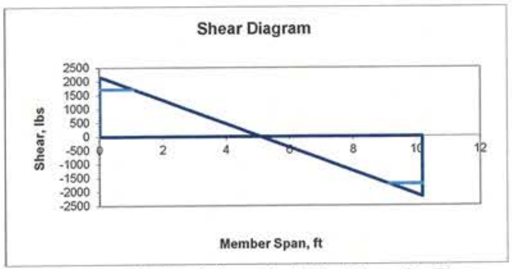
Adjustment Factors

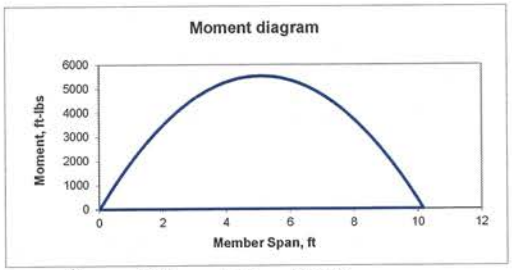
C_D =	1.25	For roof live load
C_M =	1.00	For MC < 19%
C_t =	1.00	Insulated against 100+ F
C_F =	1.00	No size increase
C_V =		Volume Factor
C_{fu} =	1.00	Narrow face loaded
C_i =	1.00	No incising
C_r =	1.00	Not a repetitive member
C_f =	1.00	Rectangular shaped
C_T =	1.00	Buckling stiffness factor
C_b =	1.00	Bearing area factor

Member Bending Design *Member design controlled by D+(Lr or S or R)*

	Fb^+	Fb^-	
Fb =	850	850	psi
$Fb^* = Fb*(C_D C_M C_t C_F C_i C_r C_f)$ =	1063	1063	psi
Emin =	580000	580000	psi
Emin' = Emin*(CMCtCiCT) =	580000	580000	psi
unbraced length, lu =	1.00	1.00	ft
lu/d =	1.07	1.07	
le =	25	25	in
$R_B = (le*d/b^2)^{1/2}$ =	5.56	5.56	*≤ 50, OK*
$F_{bE} = 1.20*E'min/(R_B)^2$ =	22524	22524	psi
C_L =	0.998	0.998	
$Fb' = Fb*(C_D C_M C_t C_L C_F C_V C_{fu} C_i C_r C_f)$ =	1060	1060	psi

	+ Moment	- Moment	
Max moment, M =	5532		lb-ft
$S = bd^2/6$ =	63.28	63.28	in^3
fb = M/S =	1049	0	psi
	OK	*OK*	





Member Bearing

Member design controlled by D+(Lr or S or R)

$Fc\perp$ = 625 psi

$F'c\perp = Fc\perp*(C_M C_t C_i C_b)$ = 625 psi

	C_b	P, lbs	A, in^2	$fc\perp = P/A$		
Support @ A =	1.00	2176	9.00	242	psi	*OK*
Support @ B =	1.00	2176	9.00	242	psi	*OK*

Member Deflection

Moment of Inertia, $I = bd^3/12$ = 355.957 in^4

E = 1600000 psi

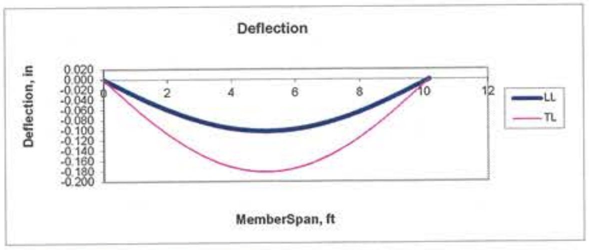
$E' = E*(C_M C_t C_i)$ = 1600000 psi

Mid Span Deflection

Loading	$Ratio_{allow}$	$\Delta_{allowed}$	Δ_{actual}	$Ratio_{actual}$	Check
Δ_{LL}	360	0.339	0.101	L/1203	*OK*
Δ_{TL}	240	0.509	0.181	L/674	*OK*

Cantilever Deflection

Loading	$Ratio_{allow}$	$\Delta_{allowed}$	Δ_{actual}	$Ratio_{actual}$	Check
Δ_{LL}	180	0.000	0.000	N/A	*OK*
Δ_{TL}	120	0.000	0.000	N/A	*OK*



(2) 1.5" x 11.25" Douglas Fir - North No. 2

Date: 11/20/19 12:08 PM

CONTINUOUS FOOTING DESIGN V6.0.0 (7/1/16)

Project: 1150374 LAKE MEAD TITLE LOAN
Description: CONT. FOOTING W/WORST CASE LOADING

Date: 6/11/2019 14:45
Design by: LRP

FOOTING LOADS AND BEARING CALCULATIONS

Footing Bearing Calculations (ASD)

Total vertical load, P =	2410	plf
Factored vertical load, Pu =	3612	plf
Allowable soil pressure, Qa =	2000	psf
footing length, l =	1	ft
Reqd footing width (Multiples of 4") =	14	in.
footing width, w = P/(Qa*l) =	16	in.
e =	0.00	in.
Use =	24	in.
Qmax = P/A+M/S =	1205	psf
Qmin = P/A-M/S =	1205	psf

Uniform Loads

Framed wall =	15	psf * 20' ht =	300	plf
Concrete/CMU wall =	0	psf * 0' ht =	0	plf
Roof DL =	15	psf * 12' width =	180	plf
Roof LL =	20	psf * 12' width =	240	plf
Floor DL =	15	psf * 12' width =	180	plf
Floor LL =	125	psf * 12' width =	1500	plf
Snow load =	20	psf * 12' width =	240	plf
Rain load =	5	psf * 12' width =	60	plf
		Footing weight =	250	plf
		Total service load, P =	2650	plf

FOOTING DESIGN CALCULATIONS

Footing Flexural Design (LRFD) - Plain Concrete

Governed by 1.2D+1.6L+.5*(Lr or S or R)

f'c =	2500	psi
fy =	60000	psi
Factored load, Pu =	3612	plf
Qumax =	1806	psf/ft of wall
Factored moment, Mu =	659	lb-ft/ft of wall
h =	8	in
Sm = 12*h^2/6 =	128	in^3
ΦMn = 0.60*5*λ*f'c1/2*Sm =	1600	lb-ft/ft of wall

Footing Longitudinal steel requirement

As(min) = 0.0018*b*d =	0.432	in^2
Number of rebar =	3	
Size of rebar =	4	
As actual =	0.6	in^2

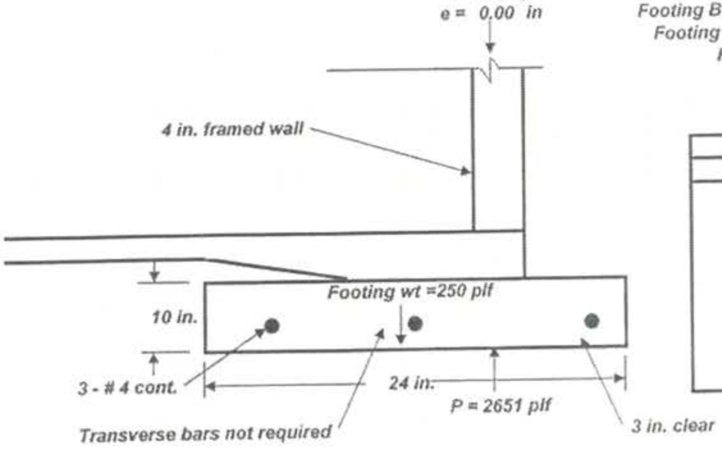
Footing Shear Design (LRFD) - Plain Concrete

Governed by 1.2D+1.6L+.5*(Lr or S or R)

Vu = Qu*((w-wall thickness)/2-d) =	489	plf
ΦVc = 0.60*4/3*(f'c)^.5*b*h =	3840	plf

FOOTING DESIGN AND LOAD COMBINATION SUMMARY AND SCHEMATIC FOOTING DETAIL

Footing design detail



	Actual	Allowable	
Footing Bearing pressure =	1205	2000	psf
Footing One Way Shear =	489	3840	plf
Footing Moment =	659	1600	lb-ft/ft

Footing bearing calculation summary (ASD)

Load combination	Qmax	Qmin	e, ft
D	455	455	0.00
D+L	1205	1205	0.00
D+(Lr or S or R)	575	575	0.00
D+0.75L+0.75(Lr or S or R)	1108	1108	0.00
D+(0.6W or 0.7E)	455	455	0.00
D+0.75(0.6W)+0.75L+0.75(Lr or S or R)	1108	1108	0.00
D+0.75(0.7E)+0.75L+0.75(S)	1108	1108	0.00
0.6D+0.6W	273	273	0.00
0.6D+0.7E	273	273	0.00

CONTINUOUS FOOTING DESIGN V6.0.0 (7/1/16)

Project: 1150374 LAKE MEAD TITLE LOAN
Description: CONT. FOOTING W/WORST CASE LOADING

Date: 6/11/2019 14:45
Design by: LRP

CONT. FOOTING DESIGN CALCULATIONS - MAX POINT LOAD ON CONT. FOOTING

Footing Flexural Design (LRFD) - Reinforced Concrete

f'c =	2500	psi	
fy =	60000	psi	
Min. clear distance =	3.00	in	
Footing thickness =	10	in	
Footing width =	24	in	
As(min) = 0.0018*b*d =	0.432	in^2	
Number of rebar =	3		
Rebar size =	4		
As =	0.600	in^2	
d =	6.75	in	
a = (As*fy)/(0.85*f'c*b) =	1.694	in	OK
Conc. Ult. compressive strain, εcu =	0.003		
β1 =	0.85		
c =	1.993	in	
Strain in steel, εt = (εcu(d-a/β1))/(a/β1) =	0.0072	in/in	
εt > 0.004 (ACI Requirement) =	OK		
εt > 0.005 (Tension controlled) =	OK		
ΦMn = 0.9*As*fy*(d-a/2) =	15938	lb-ft	

Footing Shear Design (LRFD) - Reinforced Concrete

ΦVn = 0.75*2*(f'c)^.5*b*d =	12150	lbs
Allowable soil pressure, Qa =	2000	psf
Qumax =	3200	psf
Uniform pressure on footing, wu =	6400	plf
Footing ΦMn =	15938	lb-ft
ΦMn = wul^2/2, l allowable =	2.23	ft ea. side of point load
Footing ΦVn =	12150	lbs
ΦVn = wul , l allowable =	1.90	ft ea. side of point load
Thickened slab depth =	0.83	ft
Remaining brg pressure =	795	psf
Max length of ext. ftg for pt load =	5.46	ft
Max point load on ext. footing =	8686	lbs
Max length of int. ftg for pt load =	3.80	ft
Max point load on int. footing =	6036	lbs