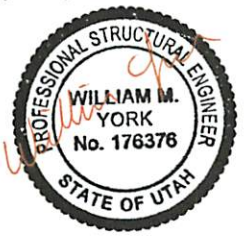
York Engineering

Structural Design
(801) 876-3501



30 Sep 2016

Structural Calculations

M1823A
2240 N. 5600 E., Eden

Prepared For:

ARNELL'S HOUSE PLANS

Arnell's House Plans
582 East 2050 North
North Ogden, UT 84050

9/30/2016

9/30/2016

STRUCTURAL CALCULATIONS

For: Arnell's House Plans
Plan #: M1823A
Location: 2240 N. 5600 E., Eden

From: York Engineering Inc.
2329 West Spring Hollow Road
Morgan, Utah 84050
(801) 876-3501

Design Criteria 2015 IBC:

Roof Loads:	
Roof Snow Load (psf):	50
Roof Dead Load (psf):	15
Floor Loads:	
Floor Live Load (psf):	40
Floor Dead Load (psf):	10
Seismic Design Category:	D
Wind Speed:	115 mph for Exposure C

Material Properties:	
Concrete (f_c'):	3000 psi (foundation) to 4000 psi (suspended slab)
Concrete Reinforcement:	ASTM A615 Grade 60
Site Conditions:	Dry & stable granular based, 1500 psf bearing capacity, granular based
Backfill:	KH = 35 pcf, slope not to exceed 20%, setback from slopes is min. 25'
Dimensional Lumber:	Doug Fir #2 or better
Steel:	ASTM Grade 50

Use straps and tie downs, and meet nailing, reinforcement and other structural requirements as noted on the drawing and within the pages of this document. These structural calculations are based on conditions and assumptions listed above. If the conditions listed herein are not met or are different it shall be brought to the attention of the engineer. Prefrab roof trusses to be engineered by the supplier. This engineering assumes that the building site is dry and stable, a high water table or adverse soils such as plastic clays, fills etc. could cause future flooding, settlement, site instability, or other adverse conditions. Verification of and liability for the soil bearing pressure, site stability, and all other site conditions, including site engineering as required, is the responsibility of others. These calculations and engineering are for the new 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. York Engineering Inc. does not assume the role of "Registered Design Professional in Responsible Charge" on this project. 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 following general requirements shall be followed during construction:

1. Contractor to verify all dimensions, spans, & conditions and notify engineer of any errors, omissions, or discrepancies prior to construction.
2. If discrepancies are found, the more stringent specification shall be followed.
3. All 2-ply and 3-ply beams and headers to be nailed using 16d two rows @ 12" O.C.
4. Contractor shall assure that all materials are used per manufactures recommendations.
5. Site engineering and liability shall be provided by the owner/builder as required.
6. Contractor shall assure that footings are properly drained, soil is dry, footings rest on undisturbed native soil, building horizontal clearance from footings to adjacent slopes be a minimum of 25 feet, and that the intent of IRC Section R403.1.7.2 is met. If setback requirements of R403.1.7.2 cannot be met then contact engineer for further design requirements.
7. The contractor shall conform to all building codes and practices as per the 2015 IRC
8. Use balloon framing method when connecting floors in split level designs.
9. Provide solid blocking through structure down to footing for all load paths
10. Builder shall follow all recommendations found in all applicable geotechnical reports.
11. Stacking of two sill plates is permitted with 5/8" J-Bolts through both plates. Stacking more than
12. two plates is not permitted without special engineering.
13. Minimum strength requires 2,500 PSI concrete; however, as per IRC 402.2 3,000 PSI conrete shall
14. be used.
15. All exterior walls shall be sheathed with 7/16" APA rated structural wood panel.
16. Block all horizontal edges 1 1/2" nominal or wider.
17. Sheathing shall extend continuous from floor to top plate and be nailed at least 4" O.C. along sill plate. Nails shall be placed not less than 1/2" from edge of panel and driven flush but shall not fracture the surface of the sheathing. Extend sheathing over gable end to wall joints and over rim joist between floors and nail to rim and wall plates at 6" O.C.

York Engineering

Table of Contents

Plan: M1823A
Date: 30 Sep 2016
Location: 2240 N. 5600 E., Eden

	PASS	PASS	PASS	PASS	PASS
LOCATION	**Back**	**Front**	**Left**	**Right**	**Interior**
	FS: 1.25	FS: 1.25	FS: 3.82	FS: 3.82	FS: 1.6
SOIL SPECS					
Density (pcf)	125	125	125	125	125
Soil Pressure (psf)	1500	1500	1500	1500	1500
Weight (k/lft)	0.04	0.04	0.04	0.04	0.03
BUILDING LOADS					
Roof Span (ft)	34	34	4	4	0
Floor Span (ft)	17	17	2	2	34
Wall Height (ft)	10	10	10	10	10
Suspended Slab Span (ft)	0	0	0	0	0
Total Load (k/lft)	1.73	1.73	0.38	0.38	1.05
FOOTING SPECS					
Footing Width (in)	20	20	20	20	16
Footing Width (ft)	1.67	1.67	1.67	1.67	1.33
Footing Height (ft)	0.83	0.83	0.83	0.83	0.67
FOUNDATION					
Height Above Grade (in)	8	8	8	8	8
Wall Thickness (in)	8	8	8	8	8
Weight (k/lft)	0.07	0.07	0.07	0.07	0.07
CONCRETE SPECS					
Density (pcf)	150	150	150	150	150
Strength (psi)	2500	2500	2500	2500	2500
Clear Cover Thickness (in)	3	3	3	3	3
CALCULATIONS					
Total Weight on Soil (k)	2.01	2.01	0.66	0.66	1.25
Soil Load (ksf)	1.20	1.20	0.39	0.39	0.94
FOOTING SELECTION	**F-20**	**F-20**	**F-20**	**F-20**	**F-16**

Plan: M1823A
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LOADING SUMMARY	
Roof Live Load (psf):	50
Roof DeadLoad (psf):	15
Floor Live Load (psf):	40
Floor Dead Load (psf):	10
Exterior Wall Dead Load (psf):	20
Interior Wall Dead Load (psf):	10
Suspended Slab Dead Load (psf	75
Suspended Slab Live Load (psf):	60
SNOW LOAD PARAMETERS	
Roof Slope (x/12):	9
Roof Pitch (θ):	36.87
Total Roof Load (psf):	65.00
SEISMIC LOAD PARAMETERS	
Site Class:	D
F_a:	1.14
R:	6.5
S_s:	0.897
S_{MS}:	1.024
S_{DS}:	0.682
C_S:	0.105
Redundancy Factor, ρ :	1.30
ASD Load Combination Factor:	0.70
Factored C_S:	0.095
SHEAR DISTRIBUTION	
Base Shear Force lb:	3,403
Floor 1 Lateral Force lb:	0
Floor 2 Lateral Force lb:	0
Roof Lateral Force lb:	3,403
Diaphragm Loading (plf):	49
Diaphragm FS	5.86

DIAPHRAGM LOADING

	Avg. Length (ft)	Avg. Width (ft)	Wall Height (ft)	Dead Wgt. (psf)	Snow Wgt. (psf)	Diaphragm Weight (lb)	Wall Weight (lb)	Total Weight (lb)
Roof	82.32	34.3	—	15	10	14,664	20,992	35,656
Floor 2	0.98	1	0	10		42,339	20,992	0
Floor 1	82.32	34	9	10		21,820	25,656	47,476

SEISMIC FORCE DISTRIBUTION

	H_x (ft)	W_x (kip)	$H_x \times W_x$	% Force	Total Shear (kip)	F_x	V_x
Roof	10.00	35.66	357	100%	3.40	3.40	3.40
Floor 2	0.00	0.00	0	0%	3.40	0.00	3.40
Floor 1	1.00	0.00	0	0%	3.40	0.00	3.40
TOTALS	0.01	35.66	357	3,403	—	—	3.40

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	Seismic (kips)	Wind (kips)	
	total	left/right	front/back
2nd Floor	0.0 kips	0.0	0.0
1st Floor	3.4 kips	7.0	2.5
Basement	0.0 kips	7.7	2.7

Shear Wall Allowable Loads (plf)		
	seismic	wind
SW-1	350	490
SW-2	450	630
SW-3	585	819

Location	Bedroom	Living Room	Garage	Garage	Living Room	Bedroom	Entire	Garage	Garage	Entire	Entire	Garage
	Front side	Front side	Front side	Front side	Front side	Front side	Right side	Right side	Right side	Back side	Left side	Left side
Floor	1	1	1	1	1	1	1	1	1	1	1	1
Lines up w/	none	none	none	none	none	none	none	none	none	none	none	none
Width	**12.5**	**17**	**12.5**	**12.5**	**17**	**12.5**	**34**	**4**	**4**	**84**	**34**	**4**
Depth	**34**	**30**	**35**	**35**	**30**	**34**	**84**	**25**	**12**	**34**	**84**	**25**
Area (sqft)	212.5	255	218.75	218.75	255	212.5	1428	50	24	1428	1428	50
Force (lb)	256	307	264	264	307	256	1721	60	29	1721	1721	60
Adj. Force	258	310	266	266	310	258	1618	57	27	1735	1618	57
% of floor	8%	9%	8%	8%	9%	8%	48%	2%	1%	51%	48%	2%
Flr. Diaphragm	0	0	0	0	0	0	0	0	0	0	0	0
Transfered Force:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
orces from Upper	0	0	0	0	0	0	0	0	0	0	0	0
Total Seismic	**258**	**310**	**266**	**266**	**310**	**258**	**1618**	**57**	**27**	**1735**	**1618**	**57**
Wind (lb)	188	226	194	194	226	188	3518	123	59	1264	3518	123
Adj. Force	190	228	195	195	228	190	3306	116	56	1274	3306	116
% of total	8%	9%	8%	8%	9%	8%	48%	2%	1%	51%	48%	2%
Total Wind	**190**	**228**	**195**	**195**	**228**	**190**	**3306**	**116**	**56**	**1274**	**3306**	**116**
Shear Wall	**8**	**6.5**	**portal**	**portal**	**6.5**	**8**	**29**	**4**	**4**	**50**	**29**	**4**
Aspect Ratio	1	0.69			0.69	1	1	1	1	1	1	1
PSW Adj. C_o	1	1			1	1	1	1	1	1	1	1
Seis Load (plf)	32	48			48	32	56	14	7	35	56	14
Wind Load (plf)	23.7	35.0			35.0	23.7	114.0	28.9	13.9	25.5	114.0	28.9
Shear Wall	**SW-1**	**SW-1**			**SW-1**	**SW-1**	**SW-1**	**SW-1**	**SW-1**	**SW-1**	**SW-1**	**SW-1**
Uplift												
% Force on pier	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Wall Length (ft)	8	6.5	portal	portal	6.5	8	29	4	4	50	29	4
Wall Height (ft)	9	9	9	9	9	9	9	9	9	9	9	9
Floor Span (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Roof Span (ft)	34	34	34	34	34	34	4	4	4	34	4	4
Wall Load (plf)	180	180	180	180	180	180	180	180	180	180	180	180
Total DL (plf)	261	261	261	261	261	261	126	126	126	261	126	126
Seis.Uplift (lbs)	**0**	**0**	**-**	**-**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Wind Uplift (lbs)	**0**	**0**	**-**	**-**	**0**	**0**	**0**	**8**	**0**	**0**	**0**	**8**
		STHD10	STHD14	STHD14	STHD10							

Location	Garage	A	A	A	A	A	A	A	A	A	A	A
	Left side	Front side	Front side	Front side	Front side	Front side	Front side	Front side	Front side	Front side	Front side	Front side
Floor	1	1	1	1	1	1	1	1	1	1	1	1
Lines up w/	none	none	none	none	none	none	none	none	none	none	none	none
Width	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Depth	**12**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Area (sqft)	24	0	0	0	0	0	0	0	0	0	0	0
Force (lb)	29	0	0	0	0	0	0	0	0	0	0	0
Adj. Force	27	0	0	0	0	0	0	0	0	0	0	0
% of floor	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Flr. Diaphragm	0	0	0	0	0	0	0	0	0	0	0	0
ransfered Forces	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
orces from Upper	0	0	0	0	0	0	0	0	0	0	0	0
Total Seismic	**27**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Wind (lb)	59	0	0	0	0	0	0	0	0	0	0	0
Adj. Force	56	0	0	0	0	0	0	0	0	0	0	0
% of total	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Total Wind	**56**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Shear Wall	**4**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**
Aspect Ratio	1	1	1	1	1	1	1	1	1	1	1	1
PSW Adj. C_o	1	1	1	1	1	1	1	1	1	1	1	1
Seis Load (plf)	7	0	0	0	0	0	0	0	0	0	0	0
Wind Load (plf)	13.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shear Wall	**SW-1**	**SW-1**	**SW-1**	**SW-1**	**SW-1**	**SW-1**	**SW-1**	**SW-1**	**SW-1**	**SW-1**	**SW-1**	**SW-1**
Uplift												
% Force on pier	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Wall Length (ft)	4	10	10	10	10	10	10	10	10	10	10	10
Wall Height (ft)	9	9	9	9	9	9	9	9	9	9	9	9
Floor Span (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Roof Span (ft)	4	34	34	34	34	34	34	34	34	34	34	34
Wall Load (plf)	180	180	180	180	180	180	180	180	180	180	180	180
Total DL (plf)	126	261	261	261	261	261	261	261	261	261	261	261
Seis.Uplift (lbs)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Wind Uplift (lbs)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Plan: M1823A
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LEFT AND RIGHT

Wind Loading Calculations using Main Windforce-Resisting System (MWFRS)
Longitudinal Direction
Table 27.5-1 Steps to Determine MWFRS Loads Enclosed Simple Diaphram Buildings

Risk Category	II	Table 1.5-1
Wind speed	115	Figure 26.5-1 A-B or C
Exposure Category	C	Section 26.7
L/B upper floor	1.00	
L/B main floor	0.50	
Roof Height	0.00	
Mean roof Height	10.0	
Truss Span	0	
Roof Slope	9 /12	
Roof Angle (deg)	36.90	Sine = 0.6004
Lower Truss Span	34	
Lower roof Slope	9 /12	
Lower roof Angle (deg)	36.90	Sine = 0.6004
Load combination factor	0.6	(ASCE 7-10 2.4.1)
Upper floor, p_h	27.6	Table 27.6-1
Upper floor, p_o	27.6	Table 27.6-1
Main floor, p_h	27.6	
Main floor, p_o	27.6	
Basement floor, p_h	27.6	
Basement floor, p_o	27.6	

				Relative positioning	
Upper Floor (psf)					
Net Pressure	16.6	Windward	10.3	Left	8.9
		Leeward	6.3	Right	8.9
Main Floor (psf)					
Net Pressure	16.6	Windward	10.3	Left	8.9
		Leeward	6.3	Right	8.9
Basement Floor (psf)					
Net Pressure	16.6	Windward	10.3	Left	8.9
		Leeward	6.3	Right	8.9

	Zone 1	Zone 2	Exposure Adj. Factor	1.000
Roof (psf)				
Load Case 1	-4.7	-10.1		
Load Case 2	7.6	-4.9		
Lower Roof (psf)				
Load Case 1	-4.7	-10.1		
Load Case 2	7.6	-4.9		

Roof Load

Roof Height	Length	Area (ft^2)	Horizontal Force (lbs)
0.00	1.00	0.0	0

Lower Roof Load

Low Roof Height	Upper Length	Lower length	Low Roof Length(ft)	Area (ft^2)	Horizontal Force (lbs)
0.0	1	84	83	0.0	0.0

Wall Load	**Basement**	(height) 1	**1st floor**	(height) 10	**2nd floor**	(height) 0
	ft^2	force (lbs)	ft^2	force (lbs)	ft^2	force (lbs)
Windward	84	862.4	840	8624.4	0	0.0
Leeward	84	528.6	840	5286.0	0	0.0

2nd Floor Diaphragm Shear	
Total Shear (lbs)	0
Right Wall Length	0
Left Wall Length	0
1st Floor Diaphragm Shear	
Total Shear (lbs)	6955
Right Wall Length	0
Left Wall Length	0
Basement Diaphragm Shear	
Total Shear (lbs)	14606
Right Wall Length	0
Left Wall Length	0
Base Wind Shear	15301

Hurricane Ties		**Factors of Safety**	
Uplift	(lbs)	H1	H2.5
Roof (per truss)	0.0	**#DIV/0!**	**#DIV/0!**
Low roof (per truss)	-54.1	**-7.40**	**-9.90**
Lateral	(lbs)	H1	H2.5
Roof (per truss)	0.0	**#DIV/0!**	**#DIV/0!**
Low roof (per truss)	0.0	-	-

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FRONT AND BAC

Wind Loading Calculations using Main Windforce-Resisting System (MWFRS)
Transverse Direction
Table 27.5-1 Steps to Determine MWFRS Loads Enclosed Simple Diaphram Buildings

Risk Category	II	Table 1.5-1
Wind speed	115	Figure 26.5-1 A-B or C
Exposure Category	C	Section 26.7
L/B upper floor	1.00	
L/B main floor	2.00	
Roof Height	0.00	
Mean roof Height	2.0	
Truss Span	0	
Roof Slope	9 /12	
Roof Angle (deg)	36.90	Sine = 0.6004
Lower Truss Span	34	
Lower roof Slope	9 /12	
Lower roof Angle (deg)	36.90	Sine = 0.6004
Load combination factor	0.6	(ASCE 7-10 2.4.1)
Upper floor, p_h	27.6	Table 27.6-1
Upper floor, p_o	23.8	Table 27.6-1
Main floor, p_h	23.8	
Main floor, p_o	23.8	
Basement floor, p_h	23.8	
Basement floor, p_o	23.8	

				Relative positioning	
Upper Floor (psf)					
Net Pressure	15.4	Windward	9.1	Left	8.9
		Leeward	6.3	Right	8.9
Main Floor (psf)					
Net Pressure	14.3	Windward	10.4	Left	9.1
		Leeward	3.9	Right	9.1
Basement Floor (psf)					
Net Pressure	14.3	Windward	10.4	Left	9.1
		Leeward	3.9	Right	9.1

Roof (psf)	Zone 1	Zone 2	Exposure Adj. Factor	1.000
Load Case 1	-4.7	-10.1		
Load Case 2	7.6	-4.9		

Lower Roof (psf)		
Load Case 1	-4.7	-10.1
Load Case 2	7.6	-4.9

Roof Load

Roof Height	Length	Area (ft^2)	Horizontal Force (lbs)
0.00	1.00	0	0

Lower Roof Load

Lower Roof Height	Upper Length	Lower length	Low Roof Length(ft)	Area (ft^2)	Horizontal Force (lbs)
0.0	1	35	34	0	0.0

Wall Load	**Basement** (height) 1		**1st floor**	(height) 10	**2nd floor**	(height) 0
	ft^2	force (lbs)	ft^2	force (lbs)	ft^2	force (lbs)
Windward	35	364.9	350	3648.5	0	0.0
Leeward	35	134.9	350	1349.5	0	0.0

2nd Floor Diaphragm Shear	
Total Shear (lbs)	0
Front Wall Length	0
Back Wall Length	0

1st Floor Diaphragm Shear	
Total Shear (lbs)	2499
Front Wall Length	0
Back Wall Length	0

Basement Diaphragm Shear	
Total Shear (lbs)	5248
Front Wall Length	0
Back Wall Length	0
Base Wind Shear	5498

Hurricane Ties		**Factors of Safety**	
Uplift	(lbs)	H1	H2.5
Roof (per truss)	0.0	**#DIV/0!**	**#DIV/0!**
Low roof (per truss)	-54.1	**-7.40**	**-9.90**
Lateral	(lbs)	H1	H2.5
Roof (per truss)	0.0	**#DIV/0!**	**#DIV/0!**
Low roof (per truss)	0.0	-	-

Plan: M1823A
Date: 30 Sep 2016
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	PASS Moment: 1.61
JOIST SPECIFICATION	Truss Joists
Joist Type:	TJI
Joist Series:	210
Joist Depth (ft):	11.88
Joist Span (ft):	16.5
Joist Spacing (in):	16
LOAD PARAMETERS	
Floor Dead Load	10
Floor Live Load	40
Total Floor Load	50
SIMPLE SPAN JOIST	
Duration Increase	1
Joist Weight (plf)	2.8
Joist Loading (plf)	69
Max Reaction (lb)	573
Max Moment (ft-lb)	2364
JOIST DETERMINATION	
Max Moment 100% (ft-lb)	3795
Moment FS	**1.61**
Max Shear 100% (lb)	1655
Shear FS	**2.89**
Bearing Required (in)	2.00
Live Load Deflection Limit	360
Live Load Deflection (in)	0.31
Allowable Live Load Deflection (in)	0.55
LL Deflection FS	**1.75**
Total Load Deflection Limit	240
Total Load Deflection (in)	0.41
Allowable Total Load Deflection (in)	0.83
TL Deflection FS	**2.01**
1 3/4" Allowable Reaction (lb)	1005
3 1/2" Allowable Reaction (lb)	1460
SELECTION	**11 7/8" TJI 210 @ 16" O.C.**

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Beam Page 1

RB-1	LVL (2) 14"	2.0E 2600 Fb
RB-2	Sawn (2) 2X8's	DF #2
RB-3	Sawn (2) 2X8's	DF #2
RB-4	Sawn (2) 2X8's	DF #2
RB-5	LVL (2) 9 1/2"	2.0E 2600 Fb
RB-6	LVL (2) 7 1/4"	2.0E 2600 Fb
RB-7	Sawn (2) 2X10's	DF #2
RB-8	Sawn (2) 2X10's	DF #2
RB-9	Sawn (2) 2X6's	DF #2
RB-10	LVL (2) 9 1/2"	2.0E 2600 Fb

Beam Page 2

RB-12	LVL (1) 9 1/2"	2.0E 2600 Fb
RB-11	LVL (1) 9 1/2"	2.0E 2600 Fb
FB-1	LVL (2) 9 1/2"	2.0E 2600 Fb
RB-13	Sawn (2) 2X8's	DF #2

Plan: M1823A
Date: 30 Sep 2016
Location: 2240 N. 5600 E., Eden

	PASS	PASS	PASS	PASS
	LVL (1) 9 1/2"	LVL (1) 9 1/2"	LVL (2) 9 1/2"	Sawn (2) 2X8's
	Shear: 4.94	Shear: 1.99	Shear: 1.72	Moment: 2.01
Name	RB-12	RB-11	FB-1	RB-13
Grade	LVL	LVL	LVL	Sawn
LOADING PARAMETERS				
Floor Live Load (psf)	40	40	40	40
Floor Total Load (psf)	50	50	50	50
Roof Live Load (psf)	50	50	50	50
Roof Total Load (psf)	65	65	65	65
Wall Load (psf)	20	20	20	20
BEAM SPECIFICATIONS				
Beam Span (ft)	**5.5**	**8.5**	**7**	**6**
Beam Weight (plf)	4.82	4.82	9.64	4.35
BEAM SIZING				
Beam Depth (in)	**9.5**	**9.5**	**9.5**	**7.25**
Beam Width/Weight	**1.75**	**1.75**	**3.5**	**3**
UNIFORM LOADING				
Floor Span (ft)	0	0	0	0
Roof Span (ft)	7	7	32	4
Wall Height (ft)	0	0	0	0
Total Uniform Floor Load (plf)	0	0	0	0
Total Live Floor Load (plf)	0	0	0	0
Total Uniform Roof Load (plf)	227.5	227.5	1040	130
Total Live Roof Load (plf)	175	175	800	100
Total Uniform Wall Load (plf)	0	0	0	0
PARTIALLY UNIFORM LOADING				
Partially Uniform Load 1	-----	-----	-----	-----
1 Span/Height (ft)	0	0	0	0
1 Start Point (ft)	0	0	0	0
1 End Point (ft)	0	0	0	0
1 Totally Partially Uniform Load (plf)	0	0	0	0
Partially Uniform Load 2	-----	-----	-----	-----
2 Span/Height (ft)	0	0	0	0
2 Start Point (ft)	0	0	0	0
2 End Point (ft)	0	0	0	0
2 Total Partially Uniform Load (plf)	0	0	0	0
2 Total Live Partially Uniform Load (p	0	0	0	0
Partially Uniform Load 3	-----	-----	-----	-----
3 Span/Height (ft)	0	0	0	0
3 Start Point (ft)	0	0	0	0
3 End Point (ft)	0	0	0	0
3 Total Partially Uniform Load (plf)	0	0	0	0
3 Total Live Partially Uniform Load (p	0	0	0	0
POINT LOADS				
Point Load 1	-----	Roof	-----	Roof
1 Location (ft)	0	8	0	1
1 Total Load (lb)	0	639	0	1025
Point Load 2	-----	-----	-----	-----
2 Location (ft)	0	0	0	0
2 Total Load (lb)	0	0	0	0
Point Load 3	-----	-----	-----	-----
3 Location (ft)	0	0	0	0
3 Total Load (lb)	0	0	0	0
TAPERED LOADS				
Tapered Load Starting Point (ft)	0	0	0	0
Tapered Load Ending Point (ft)	0	0	0	0
Tapered Load at Start (plf)	0	0	0	0
Tapered Load at End (plf)	0	0	0	0
REACTIONS & MOMENT				
Duration Increase	1	1	1	1
Left Reaction (lb)	639	1025	3674	1257
Right Reaction (lb)	639	1589	3674	574
Max Moment (lb-ft)	878	2261	6429	1174
Max Shear (lb)	639	1589	3674	1257
C_v	1.00	1.00	1.00	1.00
C_t	1.00	1.00	1.00	1.20
Area (in^2)	16.63	16.63	33.25	21.75
Moment of Inertia I (in^4)	125	125	250	95
Maximum Bending Stress (lb-ft)	400	1031	1465	536
Allowable Bending Stress (lb-ft)	2684	2684	2684	1080
Allowable Moment (lb-ft)	5887	5887	11775	2365
MOMENT FS	**6.70**	**2.60**	**1.83**	**2.01**
Allowable Shear Stress (psi)	285	285	285	180
Maximum Shear Capacity (lb)	3159	3159	6318	2610
SHEAR FS	**4.94**	**1.99**	**1.72**	**2.08**
Bearing Required	0.49	1.21	1.40	1.03
Elastic Modulus (psi)	2,000,000	2,000,000	2,000,000	1,600,000
Live Load Deflection (in)	0.01	0.09	0.09	0.04
Live Load Deflection Limit	360	360	360	360
Allowable Live Load Deflection (in)	0.18	0.28	0.23	0.20
LIVE LOAD DEFLECTION FS	**12.60**	**3.12**	**2.67**	**5.12**
Total Load Deflection (in)	0.02	0.12	0.11	0.05
Total Load Deflection Limit	240	240	240	240
Allowable Total Load Deflection (in)	0.28	0.43	0.35	0.30
TOTAL LOAD DEFLECTION FS	**14.24**	**3.53**	**3.06**	**5.81**
SELECTION	LVL	LVL	LVL	Sawn
	(1) 9 1/2"	(1) 9 1/2"	(2) 9 1/2"	(2) 2X8's

Plan: M1823A
Date: 30 Sep 2016
Location: 2240 N. 5600 E., Eden

	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
	LVL (2) 14"	Sawn (2) 2X8's	Sawn (2) 2X8's	Sawn (2) 2X8's	LVL (2) 9 1/2"	LVL (2) 7 1/4"	Sawn (2) 2X10's	Sawn (2) 2X10's	Sawn (2) 2X6's	LVL (2) 9 1/2"
	Moment: 0.23	Moment: 0.14	Moment: 0.08	Moment: 0.08	Shear: 1.33	Shear: 1.2	Moment: 1.68	Moment: 1.17	Shear: 7.18	Moment: 3.22
Name	RB-1	RB-2	RB-3	RB-4	RB-5	RB-6	RB-7	RB-8	RB-9	RB-10
Grade	LVL	Sawn	Sawn	Sawn	LVL	LVL	Sawn	Sawn	Sawn	LVL
LOADING PARAMETERS										
Floor Live Load (psf)	40	40	40	40	40	40	40	40	40	40
Floor Total Load (psf)	50	50	50	50	50	50	50	50	50	50
Roof Live Load (psf)	50	50	50	50	50	50	50	50	50	50
Roof Total Load (psf)	65	65	65	65	65	65	65	65	65	65
Wall Load (psf)	20	20	20	20	20	20	20	20	20	20
BEAM SPECIFICATIONS										
Beam Span (ft)	**9**	**5**	**4**	**6**	**5**	**4**	**7.5**	**7.5**	**2**	**7.5**
Beam Weight (plf)	14.21	4.35	4.35	4.35	9.64	7.36	5.55	5.55	3.15	9.64
BEAM SIZING										
Beam Depth (in)	**14**	**7.25**	**7.25**	**7.25**	**9.5**	**7.25**	**9.25**	**9.25**	**5.25**	**9.5**
Beam Width/Weight	**3.5**	**3**	**3**	**3**	**3.5**	**3.5**	**3**	**3**	**3**	**3.5**
UNIFORM LOADING										
Floor Span (ft)	2	2	0	0	0	0	0	0	0	2
Roof Span (ft)	4	2	8	8	0	0	9	13	8	8
Wall Height (ft)	10	0	2	0	0	0	0	0	0	10
Total Uniform Floor Load (plf)	50	50	0	0	0	0	0	0	0	50
Total Live Floor Load (plf)	40	40	0	0	0	0	0	0	0	40
Total Uniform Roof Load (plf)	130	65	260	260	0	0	292.5	422.5	260	260
Total Live Roof Load (plf)	100	50	200	200	0	0	225	325	200	200
Total Uniform Wall Load (plf)	200	0	40	0	0	0	0	0	0	200
PARTIALLY UNIFORM LOADING										
Partially Uniform Load 1	—	—	—	—	Roof	Roof	—	—	—	—
1 Span/Height (ft)	0	0	0	0	34	34	0	0	0	0
1 Start Point (ft)	0	0	0	0	1.5	2	0	0	0	0
1 End Point (ft)	0	0	0	0	5	4	0	0	0	0
1 Totally Partially Uniform Load (plf)	0	0	0	0	1105	1105	0	0	0	0
Partially Uniform Load 2	—	—	—	—	—	—	—	—	—	—
2 Span/Height (ft)	0	0	0	0	0	0	0	0	0	0
2 Start Point (ft)	0	0	0	0	0	0	0	0	0	0
2 End Point (ft)	0	0	0	0	0	0	0	0	0	0
2 Total Partially Uniform Load (plf)	0	0	0	0	0	0	0	0	0	0
2 Total Live Partially Uniform Load (p	0	0	0	0	0	0	0	0	0	0
Partially Uniform Load 3	—	—	—	—	—	—	—	—	—	—
3 Span/Height (ft)	0	0	0	0	0	0	0	0	0	0
3 Start Point (ft)	0	0	0	0	0	0	0	0	0	0
3 End Point (ft)	0	0	0	0	0	0	0	0	0	0
3 Total Partially Uniform Load (plf)	0	0	0	0	0	0	0	0	0	0
3 Total Live Partially Uniform Load (p	0	0	0	0	0	0	0	0	0	0
POINT LOADS										
Point Load 1	Roof	—	—	—	Roof	Roof	—	—	—	—
1 Location (ft)	1	0	0	0	1.5	2	0	0	0	0
1 Total Load (lb)	5775	0	0	0	4420	4420	0	0	0	0
Point Load 2	Roof	—	—	—	—	—	—	—	—	—
2 Location (ft)	8	0	0	0	0	0	0	0	0	0
2 Total Load (lb)	5775	0	0	0	0	0	0	0	0	0
Point Load 3	—	—	—	—	—	—	—	—	—	—
3 Location (ft)	0	0	0	0	0	0	0	0	0	0
3 Total Load (lb)	0	0	0	0	0	0	0	0	0	0
TAPERED LOADS										
Tapered Load Starting Point (ft)	0	0	0	0	0	0	0	0	0	0
Tapered Load Ending Point (ft)	0	0	0	0	1.5	2	0	0	0	0
Tapered Load at Start (plf)	0	0	0	0	200	230	0	0	0	0
Tapered Load at End (plf)	0	0	0	0	260	260	0	0	0	0
REACTIONS & MOMENT										
Duration Increase	1	1	1	1	1	1	1	1	1	1
Left Reaction (lb)	7549	298	609	793	4763	3142	1118	1605	263	1949
Right Reaction (lb)	7549	298	609	793	3918	4007	1118	1605	263	1949
Max Moment (lb-ft)	9478	373	609	1190	6642	5559	2095	3009	132	3653
Max Shear (lb)	7549	298	609	793	4763	4007	1118	1605	263	1949
C_v	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
C_f	1.00	1.20	1.20	1.20	1.00	1.00	1.10	1.10	1.40	1.00
Area (in^2)	49.00	21.75	21.75	21.75	33.25	25.38	27.75	27.75	15.75	33.25
Moment of Inertia I (in^4)	800	95	95	95	250	111	198	198	36	250
Maximum Bending Stress (lb-ft)	995	170	278	543	1514	2176	588	844	115	833
Allowable Bending Stress (lb-ft)	2546	1080	1080	1080	2684	2784	990	990	1260	2684
Allowable Moment (lb-ft)	24258	2365	2365	2365	11775	7115	3529	3529	1447	11775
MOMENT FS	**2.56**	**6.34**	**3.89**	**1.99**	**1.77**	**1.28**	**1.68**	**1.17**	**11.00**	**3.22**
Allowable Shear Stress (psi)	285	180	180	180	285	285	180	180	180	285
Maximum Shear Capacity (lb)	9310	2610	2610	2610	6318	4821	3330	3330	1890	6318
SHEAR FS	**1.23**	**8.75**	**4.29**	**3.29**	**1.33**	**1.20**	**2.98**	**2.07**	**7.18**	**3.24**
Bearing Required	2.88	0.25	0.50	0.65	1.81	1.53	0.92	1.32	0.22	0.74
Elastic Modulus (psi)	2,000,000	1,600,000	1,600,000	1,600,000	2,000,000	2,000,000	1,600,000	1,600,000	1,600,000	2,000,000
Live Load Deflection (in)	0.06	0.01	0.01	0.04	0.05	0.05	0.05	0.07	0.00	0.03
Live Load Deflection Limit	360	360	360	360	360	360	360	360	360	360
Allowable Live Load Deflection (in)	0.30	0.17	0.13	0.20	0.17	0.13	0.25	0.25	0.07	0.25
LIVE LOAD DEFLECTION FS	**4.82**	**19.87**	**17.47**	**5.18**	**3.70**	**2.70**	**4.89**	**3.39**	**53.06**	**7.25**
Total Load Deflection (in)	0.10	0.01	0.01	0.05	0.06	0.06	0.07	0.10	0.00	0.07
Total Load Deflection Limit	240	240	240	240	240	240	240	240	240	240
Allowable Total Load Deflection (in)	0.45	0.25	0.20	0.30	0.25	0.20	0.38	0.38	0.10	0.38
TOTAL LOAD DEFLECTION FS	**4.48**	**22.48**	**17.22**	**5.87**	**4.25**	**3.11**	**5.54**	**3.86**	**60.49**	**5.02**
SELECTION	LVL (2) 14"	Sawn (2) 2X8's	Sawn (2) 2X8's	Sawn (2) 2X8's	LVL (2) 9 1/2"	LVL (2) 7 1/4"	Sawn (2) 2X10's	Sawn (2) 2X10's	Sawn (2) 2X6's	LVL (2) 9 1/2"