CKR
ENGINEERS
CONSULTING STRUCTURAL ENGINEERS

1295 North State Street ▪ Orem, Utah 84057
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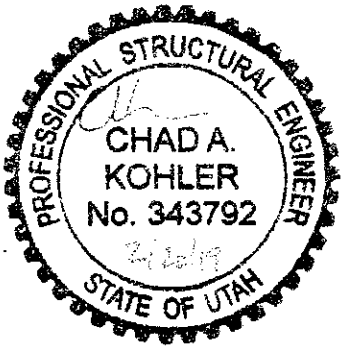
STRUCTURAL CALCULATIONS

Heritage Gardens Roof Repair
321 E 800 South
Springville, UT

Project: 19069

February 20, 2019



Scope of Work

-Gravity analysis
-Lateral analysis
-Structural design to resist gravity and lateral forces
-Calculations are valid only at the above address

Design Criteria:

2015 International Building Code

Project: **Heritage Gardens**
Location: **Springville, UT**
Job #: **19069**

All Loads per ASCE/SEI 7-10
Minimum Design Loads for Buildings and Other Structures

General

Risk Category =	**II**	Table 1.5-1
Latitude =	**40.1560**	
Longitude =	**111.6050**	
Elevation =	**4610**	ft
Soil Site Class =	**D**	
Allowable Bearing Pressure =	**1500**	psf

Importance Factors:
Snow I_s = 1 Table 1.5-2
Seismic I_e = 1 Table 1.5-2

Dead Load (Chapter 3) — ASD Level

Roof Dead Loads:

Framing	3 psf
Decking	3 psf
Roofing	3 psf
Ceiling	2 psf
Misc.	4 psf
Total Roof Dead Load	**15** psf

Live Load (Chapter 4) — ASD Level

Roof	**20** psf	Table 4-1
Floor	**40** psf	Table 4-1

Snow Load (Chapter 7) — ASD Level

Snow Load (ASCE 7-10 and Utah Snow Study)

County	Utah	
Snow Exposure Coef. C_e	1	Table 7-2
Thermal Factor C_t	1	Table 7-3
Sloped Roof Coef. C_s	1	Figure 7-2
Roof Snow Load = C_s * P_f	30 psf	
Snow for Seismic	0 psf	

Elevation A_o = 4500 ft
P_o = 43 psf
Ground Snow Load P_g = 44 psf
Flat-Roof Snow Load P_f = 30 psf

Wind Load (Chapters 26-31) — Strength Level

Basic Wind Speed:	**115** mph	Figure 26.5-1
Exposure:	**B**	Section 26.7

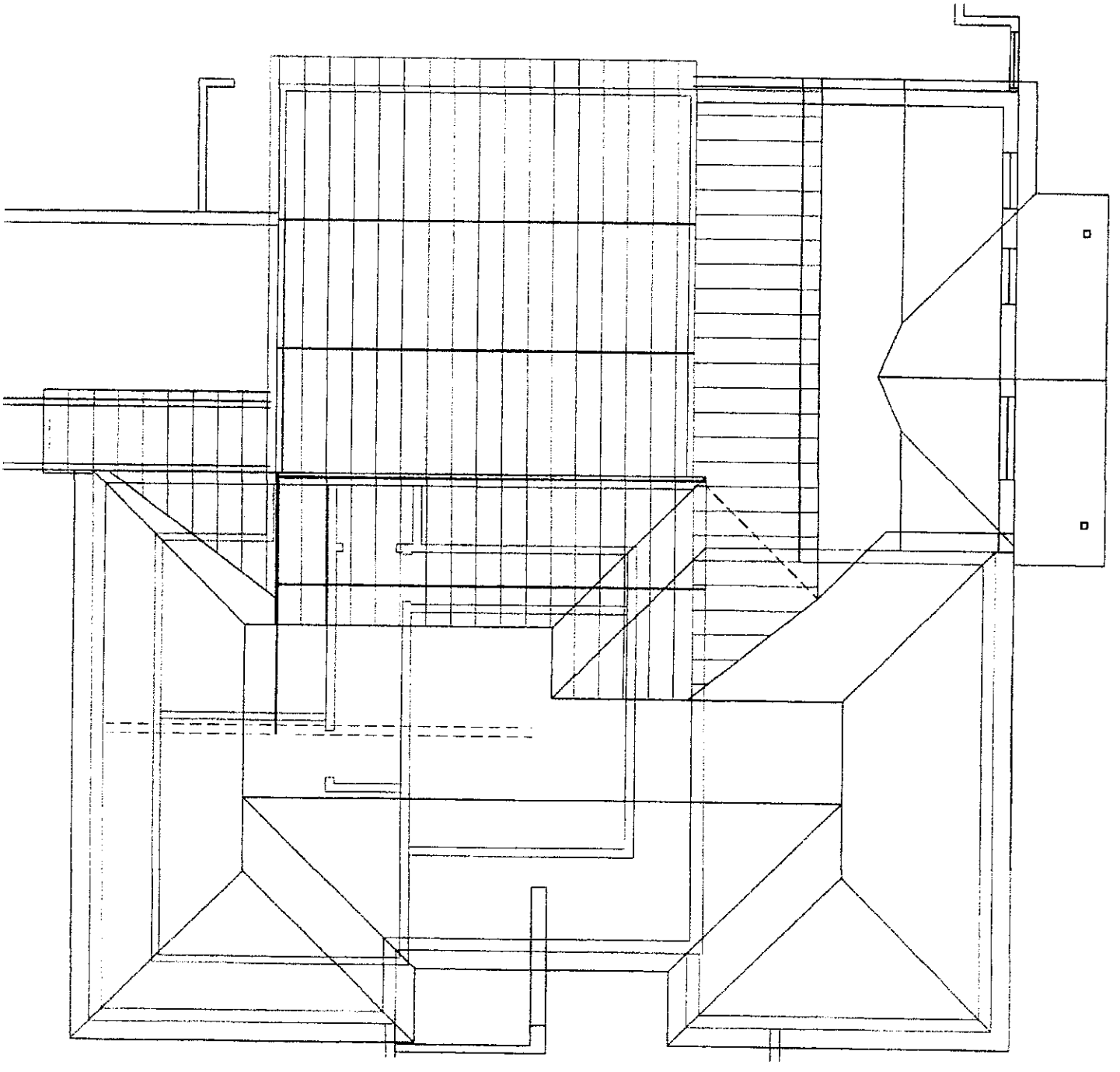
Seismic Load (Chapters 11-23) — Strength Level

S_s =	**1.2**	Section 11.4.1
S_1 =	**0.44**	Section 11.4.1
S_{DS} =	**0.82**	Section 11.4.4
S_{D1} =	**0.45**	Section 11.4.4
h_n =	30	ft - Section 11.2
Seismic Design Category =	**D**	Section 11.6
R =	**6.5**	Table 12.2-1
Seismic Force-Resisting System =	**Light-Framed Wood Shear Walls**	Table 12.2-1
C_s =	**0.1262**	Strength Level — Section 12.8.1.1
C_s =	**0.0883**	Allowable Stress Level

C_t = 0.02 Table 12.8-2
x = 0.75 Table 12.8-2
T_a = 0.26 Section 12.8.2.1
T_L = 8 Section 11.4.5

Seismic Load Combinations

Strength - 5 =	$1.36D + \rho Q_E + L + 0.2S$
Strength - 7 =	$0.74D + \rho Q_E$
Allowable Stress - 5 =	$1.11D + 0.7\rho Q_E$
Allowable Stress - 6b =	$1.08D + 0.525\rho Q_E + 0.75L + 0.75S$
Allowable Stress - 8 =	$0.49D + 0.7\rho Q_E$



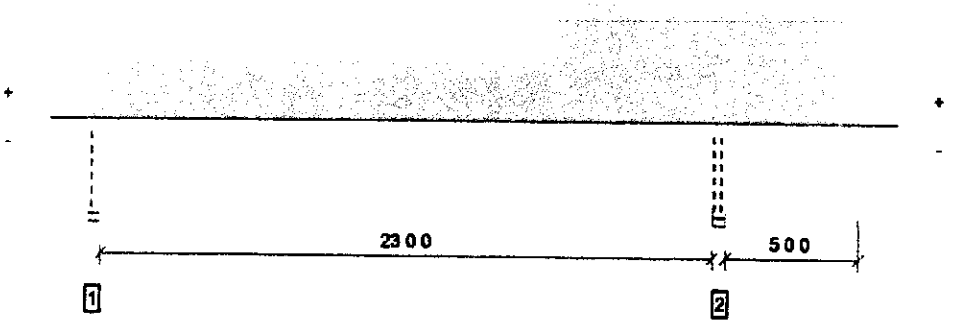
FORTE

MEMBER REPO... *Level, A*

PASSED

2 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL

Overall Length: 28 7 0



All locations are measured from the outside face of left support (or left cantilever end).All dimensions are horizontal.;Drawing is Conceptual

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4770 @ 23 5 4	5206 (3.50")	Passed (92%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2695 @ 22 1 8	10707	Passed (25%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	12236 @ 12 1 4	27897	Passed (44%)	1.15	1.0 D + 1.0 S (Alt Spans)
Live Load Defl. (in)	0.496 @ 11 11 0	0.776	Passed (L/563)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.777 @ 11 10 4	1.164	Passed (L/360)	--	1.0 D + 1.0 S (Alt Spans)

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2012
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 13 9 0 o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 28 7 0 o/c unless detailed otherwise.
- Upward deflection on right cantilever exceeds 0.4".

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - SPF	3.50"	3.50"	1.50"	783	1296	2079	Blocking
2 - Stud wall - SPF	3.50"	3.50"	3.21"	1755	3015	4770	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 0 0 to 28 7 0	N/A	14.3		
1 - Uniform (PSF)	0 0 0 to 17 0 0 (Top)	3 6 0	15.0	30.0	Roof
2 - Uniform (PSF)	17 0 0 to 28 0 0 (Top)	7 6 0	15.0	30.0	

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The product application, input design loads, dimensions and support information have been provided by Forte Software Operator

SUSTAINABLE FORESTRY INITIATIVE

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Job Notes

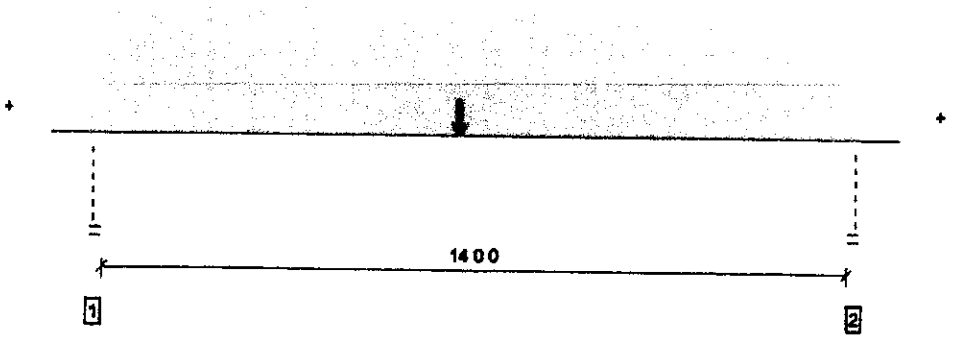
FORTE

MEMBER REPO... *Level, B*

PASSED

2 piece(s) 1 3/4" x 9 1/2" 2.0E Microllam® LVL

Overall Length: 14 7 0



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Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1481 @ 0 2 0	5206 (3.50")	Passed (28%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1422 @ 1 1 0	7265	Passed (20%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	8780 @ 7 0 0	13541	Passed (65%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.343 @ 7 0 0	0.475	Passed (L/498)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.563 @ 7 0 0	0.712	Passed (L/304)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2012
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 13 4 0 o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 14 7 0 o/c unless detailed otherwise.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - SPF	3.50"	3.50"	1.50"	588	893	1481	Blocking
2 - Stud wall - SPF	3.50"	3.50"	1.50"	556	840	1396	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 0 0 to 14 7 0	N/A	9.7		
1 - Uniform (PSF)	0 0 0 to 14 7 0 (Front)	1 0 0	15.0	30.0	Roof
2 - Point (lb)	7 0 0 (Front)	N/A	783	1296	Linked from: A, Support 1

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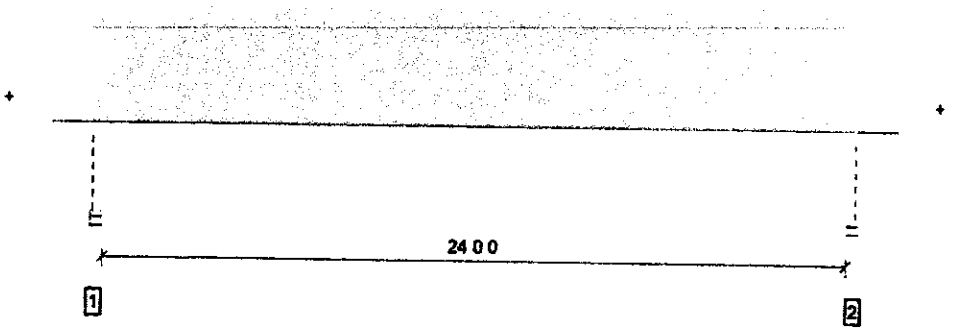
SUSTAINABLE FORESTRY INITIATIVE

2 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL

Overall Length: 24 7 0



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Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2112 @ 0 2 0	5206 (3.50")	Passed (41%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1861 @ 1 5 8	10707	Passed (17%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	12628 @ 12 3 8	27897	Passed (45%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.529 @ 12 3 8	0.808	Passed (L/551)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.865 @ 12 3 8	1.212	Passed (L/337)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2012
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 13 3 0 o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 24 7 0 o/c unless detailed otherwise.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - SPF	3.50"	3.50"	1.50"	821	1291	2112	Blocking
2 - Stud wall - SPF	3.50"	3.50"	1.50"	821	1291	2112	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 0 0 to 24 7 0	N/A	14.3		
1 - Uniform (PSF)	0 0 0 to 24 7 0 (Front)	3 6 0	15.0	30.0	Roof

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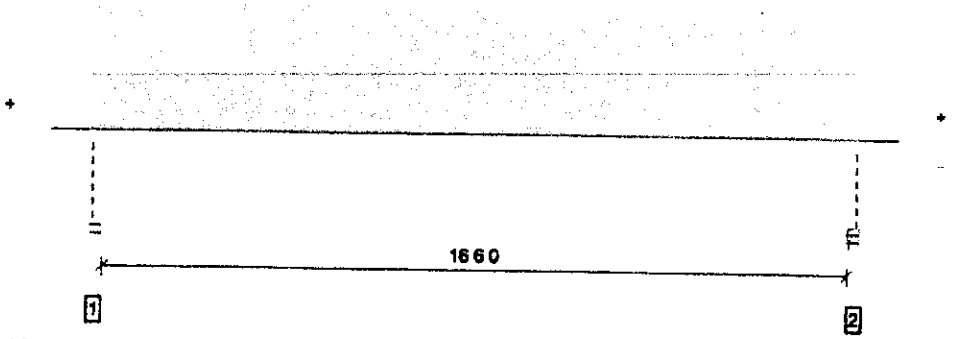
SUSTAINABLE FORESTRY INITIATIVE

2 piece(s) 1 '4" x 11 7/8" 2.0E Microllam® LVL

Overall Length: 17 1 0



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Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	488 @ 0 2 0	5206 (3.50")	Passed (9%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	415 @ 1 3 6	9081	Passed (5%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2003 @ 8 6 8	20525	Passed (10%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.057 @ 8 6 8	0.558	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.109 @ 8 6 8	0.837	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2012
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 17 1 0 o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 17 1 0 o/c unless detailed otherwise.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - SPF	3.50"	3.50"	1.50"	232	256	488	Blocking
2 - Stud wall - SPF	3.50"	3.50"	1.50"	232	256	488	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 0 0 to 17 1 0	N/A	12.1		
1 - Uniform (PSF)	0 0 0 to 17 1 0 (Front)	1 0 0	15.0	30.0	Roof

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SUSTAINABLE FORESTRY INITIATIVE

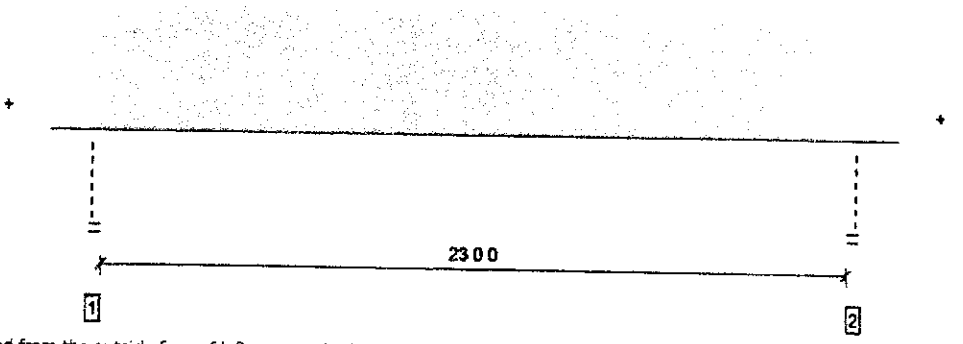
FORTE

MEMBER REPO Level, C

PASSED

3 piece(s) 1 3/4" x 14" 2.0E Microllam® LVL

Overall Length: 23 7 0



All locations are measured from the outside face of left support (or left cantilever end).All dimensions are horizontal.;Drawing is Conceptual

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4496 @ 0 2 0	7809 (3.50")	Passed (58%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	3943 @ 22 1 8	16060	Passed (25%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	25758 @ 11 9 7	41846	Passed (62%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.682 @ 11 9 8	0.775	Passed (L/409)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	1.084 @ 11 9 8	1.163	Passed (L/257)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2012
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 12 2 0 o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 23 7 0 o/c unless detailed otherwise.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - SPF	3.50"	3.50"	2.02"	1667	2829	4496	Blocking
2 - Stud wall - SPF	3.50"	3.50"	1.92"	1598	2691	4289	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 0 0 to 23 7 0	N/A	21.5		
1 - Uniform (PSF)	0 0 0 to 23 0 0 (Top)	8 0 0	15.0	30.0	Roof

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SUSTAINABLE FORESTRY INITIATIVE

Forte Software Operator

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Job Notes

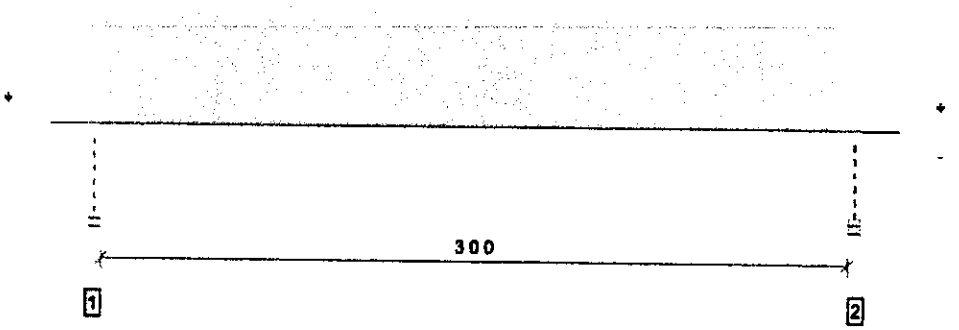
FORTE

MEMBER REPO Level, F

PASSED

1 piece(s) 6 x 6 Douglas Fir-Larch No. 2

Overall Length: 3 7 0



All locations are measured from the outside face of left support (or left cantilever end).All dimensions are horizontal.;Drawing is Conceptual

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1035 @ 0 2 0	8181 (3.50")	Passed (13%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	602 @ 0 9 0	3943	Passed (15%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	763 @ 1 9 8	1993	Passed (38%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.008 @ 1 9 8	0.108	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.015 @ 1 9 8	0.162	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2012
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 3 7 0 o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 3 7 0 o/c unless detailed otherwise.
- Applicable calculations are based on NDS.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - SPF	3.50"	3.50"	1.50"	497	538	1035	Blocking
2 - Stud wall - SPF	3.50"	3.50"	1.50"	497	538	1035	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 0 0 to 3 7 0	N/A	7.7		
1 - Uniform (PSF)	0 0 0 to 3 7 0 (Front)	8 0 0	15.0	-	East side roof
2 - Uniform (PSF)	0 0 0 to 3 7 0 (Front)	10 0 0	15.0	30.0	West side roof

Member Notes

Existing 6x6 on top of existing CMU wall

Weyerhaeuser Notes

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